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ERGA Special Task Report on the provision of greater accessibility to audiovisual media services for persons with disabilities

– Pilot study: preparing for a possible European benchmarking and bench-learning initiative in the television field

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1. Introduction

The European Regulators Group for Audiovisual Media Services (ERGA) brings together heads or high level representatives of national independent regulatory bodies in the field of audiovisual services, to advise the Commission on the implementation of the EU's Audiovisual Media Services Directive (AVMSD).

As part of its work programme for 2016, ERGA established 3 sub-groups, one of which is tasked with **"Exploring key themes which are of high relevance and beneficial to future-proof European Audiovisual Regulation"** (sub-group 2). The subgroup has the remit to consider issues that are of high relevance and beneficial to future-proof European Audiovisual Regulation, regardless of the way in which the EU framework for Audiovisual Media evolves. Within the sub-group, two task forces were established – one addressing the topic of Protection of Minors and a second which would examine the provision of greater accessibility to audiovisual services for persons who are visually or aurally impaired. This report concerns the work of the Accessibility task force during 2016.

1.1 Accessibility Topic

The topic of accessibility is of especially high relevance to EU regulators since the European Commission recently proposed a European Accessibility Act including TV equipment and audiovisual media services. The proposed Accessibility Act is intended to set common accessibility requirements for certain key products and services that will help people with disabilities at EU level to participate fully in society. The directive has a much broader scope than the current AVMSD as it covers not only content but also other aspects in the supply chain such as TV equipment. At the same time the Commission has proposed a deletion of Article 7 in the AVMSD. It is still not decided if accessibility requirements for audiovisual media should be regulated in the Accessibility Act or in the AVMSD, or in both.

In 2013 a study conducted on behalf of the European Commission concluded that there would be merit in considering the undertaking of a more extensive European benchmarking and bench-learning initiative in the field to address the entire supply chain for accessibility in the television field (broadcast content, carriers such as cable TV companies equipment/set top boxes, etc.) as well as a full range of recent access/delivery modes today.

At the first meeting of sub group 2 **("SG2")** in Brussels in April 2016, the members agreed to establish a special task force which would examine the provision of greater accessibility to audiovisual media services for persons who are visually or aurally impaired. In May 2016 a special task force was created. The expected outcome of the activities of the task force was the completion of a pilot study preparing for a potentially more extensive European benchmarking and bench-learning initiative addressing the entire value chain for accessibility in the television field. In this Special Task Report the task force delivers the results of the pilot study which was conducted during May to October 2016 by regulatory authorities from Sweden, Ireland, Finland and Italy.

2. Methodology

Given the limited time frame and resources for the pilot study the task force has mainly gathered and compiled already existing information. In order to draw conclusions on the needs and content of a more detailed benchmarking and bench learning initiative, the task force has also asked the national regulatory authorities questions about the benefits they might receive from such an initiative and to share any information they have, both general publications on accessibility within the television field as well as country-specific information.

Mia Ahlgren for the European Disability Forum and Dr. Pilar Orero at the Universitat Autònoma de Barcelona were also asked for input on different topics. Conclusions and views set out in this report are however those of the Members of ERGA SG2.

2.1 Existing studies on Accessibility and Audiovisual Media

The task force has made an inventory of relevant initiatives, studies and research in the field of accessibility and audiovisual media. Also, we have written a non-exhaustive summary of the listed publications that we have found relevant for this report. We do not claim to provide a comprehensive summary of the conclusions drawn in all reports listed in the inventory. Neither do we claim that the inventory covers all information available. There is so much information and new research and studies are developed continuously. As there is so much information we have had to prioritize which literature to refer to. We have paid special attention to publications issued within the framework of the International Telecommunication Union (ITU) because those publications have a focus on delivery systems and value chains.

In order to do a benchmark study addressing the entire supply chain it is necessary to define what is meant by the term supply chain. Since there are multiple platforms for linear and non-linear audiovisual services there are also variations of a supply chain. In this study, as a starting point, we use a certain value chain presented in the report Making Television Accessible (2011) and reused in a report issued by the ITU-T Focus Group on Audiovisual Media Accessibility (see the next section for further information concerning the focus group). We decided early in the process that it would be better to use a chain that has been developed and published by experts on accessibility, rather than inventing our own chain. ERGA did present value chains for content distribution in the Report on material jurisdiction in a converged environment (2015). However, those chains did not have a focus on accessibility.

In the summary (**Appendix A**) and in the inventory (**Appendix B**) we have sorted reports under different headings that derive from that specific value chain. Although in reality there are several value chains we found it necessary to use a generic chain to provide structure to the compilation of information.

2.1.1 The ITU-T Focus Group on Audiovisual Media Accessibility

Within the ITU there was a focus group called ITU-T Focus Group on Audiovisual Media Accessibility (FG AVA) that was to address the need to make audiovisual media accessible for persons with disabilities. FG AVA was charged with examining what measures can be taken to make access systems for persons with disabilities more widely available across all audiovisual (AV) media-broadcasting and Internet protocol (IP) systems. Of particular interest were interoperable systems that can be used for all delivery systems. The Focus Group was concluded in October 2013 and delivered a range of technical reports.

In December of 2013 a new group of experts was created within ITU called ITU Intersector Rapporteur Group on Audiovisual Media Accessibility (IRG-AVA). The IRG-AVA studies topics related to audiovisual media accessibility and aimed at developing draft Recommendations for access

systems that can be used for all media delivery systems. It is expected that the group will conclude its work in 2016. The task force has not found any official reports from the group so far.

The chairman of FG AVA prepared a report in 2011 called Making Television Accessible. This report was published in cooperation with G3ict – The Global Initiative for Inclusive Information. That report has been frequently used and referred to in this pilot study as well.

2.1.2 Academic research

Within academia, media accessibility studies is often considered a part of audiovisual translation studies, with audio description and subtitles being the main objects of study. The task force has found that there are numerous interesting articles within this field. The inventory does not cover all articles available to date but a few European publications are listed.

2.2 Input from regulatory authorities

All regulatory authorities of the sub group were given the opportunity to add information to the inventory and to answer questions on the benefits they might receive from a forthcoming study. Authorities from Bulgaria, Germany, Norway, United Kingdom, France, Sweden, Spain, the Netherlands, Finland and Slovakia have given their input. Additional reports and other material suggested by the regulatory authorities have been added to the inventory. Below is a summary of the comments received from the authorities.

- A benchmarking study will be of great value for all
- All parts of the value chain are equally important as all of them contribute to greater accessibility for persons with disabilities.
- The study could cover the quality of the accessibility obligations and the key role of the television platforms in providing accessibility measures.
- The study could cover the actual needs of people with disabilities, including how current access services work and if there are some needs that cannot yet be met.
- The role of the consumer in the value chain is critical.
- Also, the degree of burden for TV channels and challenges for production should be considered.
- The role of distributors regarding accessibility could be a possible focus in the upcoming study. In many countries only broadcasters have obligations regarding accessibility but the distributors play an important part too.
- The most interesting parts of the value chain are the Contribution: software and equipment suppliers (7), Transmission: software and equipment suppliers (8) and Reception: CE manufacturers (9).
- There are no harmonized solutions on the set-up boxes or the equipment needed to use the access services. This makes it difficult for many viewers with disabilities.
- The accessibility of video on demand services is important.
- Accessibility regarding connected television would be of particular interest and a study on what is done at the European level.
- The role of video on demand could be better reflected in the value chain used as a starting point in the task force report.
- The prospective study should include information on European technical standards in use in relation to on demand subtitling and audio description, for example, which standards are offered by content providers and which standards are supported by platforms or devices.
- The benchmarking study should also include information on the current availability of on demand content with subtitles, signing or audio description.

- The report should compile information on consumer use of access services (subtitles, signing, audio description) across different platforms and devices (e.g. websites, connected TV apps, set top box services).
- A summary of regulatory requirements for provision of subtitles, signing and audio description in Member States would also be of benefit.

2.3 Input from other stakeholders

In this section we summarize the inputs we have got from Mia Ahlgren for the European Disability Forum and Dr. Pilar Orero at Universitat Autònoma de Barcelona.

Mia Ahlgren is responsible for coordination on human rights, antidiscrimination and universal design at the Swedish Disability Federation. She has been an active member of the European Disability Forum network on ICT policies since 2003. In FG AVA Mia has been a work group coordinator for Access to working procedures.

Pilar Orero teaches at Universitat Autònoma de Barcelona where she is the director of the European MA in Audiovisual Translation. She took part in the working group FG AVA and she is now participating in the IRG-AVA. Among other projects, she leads the EU project HBB4ALL.

The Task Force asked the following questions;

1. If you were to conduct a benchmark study addressing the entire value chain, what would you pay special attention to?
2. Is there any part of the value chain that you think is more important than others?
3. Is there any part or aspect of the value chain that is often missing in studies/literature?
4. In relation to a benchmarking study, what does Europe need to know in order to enhance the provision of greater accessibility for person with disabilities in the television field (including all platforms and devices)?

Below is a summary of the answers and inputs.

It is important to realize a European benchmark study addressing the entire supply chain since no such study has been conducted. Addressing the whole value chain of accessible television content is a complex task. As a reference for the pilot study, the value chain presented in Making Television Accessible is valid.

- *If you were to conduct a benchmark study addressing the entire value chain, what would you pay special attention to?*
  Case studies from smaller countries, with several languages with different broadcasters, distributors and devices. The case studies should be carried out in countries or regions with a demography and language situation that is typical for Europe.

  It would be interesting to study the value chain from a user perspective and follow the track behind how standards are used and so on, including also retail shops and how they advise users. Cable tv, satellite, IPT-tv operators are important as well as broadcasters as they sometimes provide the devices or control how the user can access the services. It would be good to describe and visualize the user situation. Tracking it back to the barriers in standards etc. How to find accessible content, find out how to access it, what devices you need and if there are costs involved for the equipment and whether/ how many different solutions/ equipment needed for different TV-channels in a country.

Is there any part of the value chain that you think is more important than others?

- We know from HBB4ALL and other broadcasters that there is a problem with devices and mandatory requirements, there might be others who can do these tests and ask for declarations of these functions.

  When it comes to the user situation it is important to have a variety of users, especially if there are not so many. Ages, functional impairments also cognitive, gender, work, different ICT skills and so on.

  But starting from the user situation how users access TV content, we know VOD is increasing, and tracing the issues that occur back through the distribution to the broadcaster would be interesting. That would be possible with case studies in some selected areas.

Is there any part or aspect of the value chain that is often missing in studies/literature?

- Private companies delivering access services are reluctant to share their know how. Distributors and manufacturers are never part of the value chain in studies. Most studies start from public broadcasters, and never follow the whole chain. Many actors make up their own “standards” as private companies, finding solutions without seeing the whole user situation.

  There is a gap between the accessibility value chain and media producers, as media producers are not part of the broadcasting industrial sector. They have their own sector, with their own funding.

  Media content producers are unaware of media accessibility, they have a few persons working on it, but it is never an integrated part of the media producing process. Ironical as accessibility should be implemented in the very first stage, to avoid duplication of efforts. It will be the cheapest and most quality solution.

In relation to a benchmarking study, what does Europe need to know in order to enhance the provision of greater accessibility for person with disabilities in the television field (including all platforms and devices)?

- Europe needs to understand that it is possible to get quality access services to users, with the benefits of a lean cooperation along the value chain, that will show that it is not expensive as some say. Some countries have successfully implemented good quotas, at a very cheap price. Accessibility is fundamental to implement the EU Single Media Market, in this case "accessibility" is also "Language accessibility" that is translation. Europe has to find better ways to secure quality of services including translations. It would be good to create European icons for the different access services, and also to have a EU label to mark what content has what access service for end users to know.

3. Conclusions

In this chapter ERGA summarises the conclusions emerging from this pilot study and makes a number of recommendations to the European Commission, on the next steps to be undertaken. These include the conducting of a future benchmarking and bench-learning initiative; the scope and the methodology of any study which might be undertaken and a suggested mechanism for enhancing dialogue between stakeholders. The recommendations are also summarized in chapter 4.

3.1 Information-gaps

The inventory made by the task force shows that there is very much information within the area of accessibility and audiovisual media that could be used in a forthcoming study.

One single physical end-to end-chain for accessible audiovisual media content does not exist. However, a logical generic chain, or various generic chains, must be used to outline the details of how a possible benchmarking and bench-learning study should be undertaken. In the inventory, there are reports listed that can be useful for that.

However, the group has to date not found any report benchmarking the European situation addressing the entire end-to end chain in the audiovisual field.

The number of platforms for distributing linear and non-linear audiovisual services has grown rapidly in recent years as are the number of technical solutions for making the services accessible for the end-users. There are more possibilities to assist visually, hearing and cognitively impaired persons than ever before. However, the task force has not found any review of the different technical solutions for access services that are available and used in different countries in Europe.

Nor have we found any comprehensive study mapping the cooperation between stakeholders in the value chain. Therefore, we do not know much about the possible obstacles in the cooperation between actors in the value chain. One obstacle that is known though is that the situation for manufactures of Digital Terrestrial Television (DTT) set-top boxes and tuners in Europe is an extremely complex one as equipment and standards vary considerable between countries.

We have found plenty of information about the quantity of access services provided by broadcasters in Europe, but not much information *by* broadcasters such as for example statistics on how many end-users use their accessible services and programs. We have not found many evaluations or studies on broadcaster´s knowledge about different solutions and user-group-preferences or cooperation with other stakeholders in the delivery-chain. It might be that such information exists but is not officially available.

End-users of accessibility services seems to be considered when it comes to quality aspects, such as user-preferences for subtitling and audio description. We have however not found recent studies on how user groups in different countries actually consume accessible programs, for example statistics on the knowledge of the services and programs accessible or which platforms or devices that are being used and how they work for users.

3.2 A future benchmarking and bench-learning initiative should be conducted

ERGA finds that a benchmarking and bench-learning initiative would be valuable to support Member States and their regulatory bodies in the efforts to promote the provision of greater accessibility to audiovisual media for people with disabilities. It would provide useful information to the regulatory authorities in light of the proposed upcoming regulatory changes and would promote the provision of greater accessibility by identifying and sharing good practice. Also, it would be beneficial for other stakeholders in the value chain such as for example broadcasters that have accessibility requirements to fulfill.

However, ERGA is not suited to take on such an extensive mission. Rather, it seems more evident that such a study is to be funded and conducted by the European Commission which has previous experience of benchmarking studies within the field, and better resources for the task.

3.2.1 The scope of the study

The study should address the entire value chain for accessibility of audio visual media services. The study would benefit from a broad scope of the analysis taking into account the definitions of persons with functional limitations including persons with disabilities in the proposed Accessibility Act as well as both audiovisual media services and TV-equipment. Both linear and non-linear services should be covered as well as multiple platforms and user-devices.

In the study the concept of accessible audiovisual media should be introduced, the complexity of value chains explained, as well as the main features of making audio visual media content accessible along the value chain. Also, interoperability and standards should be described.

Furthermore, ERGA has identified three priority topics for a benchmark and bench-learning initiative which are of special interest for the regulatory authorities. Those areas are (1) users, (2) delivery modes and equipment and (3) costs.

1. *Users*

The starting point for accessible television is the user. The regulatory authorities would therefore like to gain a better understanding of user needs and the specific challenges users face in accessing content to date, as well as user behaviours and preferences for accessible television, including metadata (findability), access services, delivery modes and equipment.

We do not have a full picture of how viewers use access services and it would be interesting to include supply-side metrics that show quality of experience to ensure that the users benefit from the access service provided, and to see different user behaviours in different countries as well as statistics on which delivery modes and access services that are used. Comparable metrics for access service use in European countries are most probably hard to find but would be very informative to include.

2. *Delivery modes and equipment*

ERGA members would like to get information on recent delivery modes for access-services and related consumer equipment for linear and on-demand audiovisual media services, and a review of the different modes that are available and used in different countries in Europe. The usability of the different options should be examined and described, considering the diverse factors that are important to take into consideration at the viewers end to enable accessibility.

3. *Costs*

The main argument by broadcasters against increasing levels of accessible content is that it is too expensive to make. The study should therefore examine various mechanisms, both existing and planned, which would support more cost-effective ways of making content accessible.

3.2.2 The methodology of the study

Given the complexity of the topic emphasis should be placed on the identification of relevant indicators which may be possible to use as metrics. It is probably a challenge to find relevant metrics addressing the entire value chain.

Applying a user perspective, both methodology-wise and in terms of the indicators chosen, is crucial. Identifying relevant indicators – that give relevant results – requires a method involving users from the start. Therefore, if possible, the indicators in the study should reflect both supply-side metrics and demand-side metrics.

To gain a deeper understanding it would be valuable to include also a few case studies of the best performers found in the benchmark. However, it might be that the scope becomes too extensive and the costs too high. In the end, this must be decided by the European Commission, if a study is to be conducted.

3.3 Structured dialogue between stakeholders

Separate to the study ERGA finds that it would be valuable if a Platform for Accessibility was put together by the European Commission, for initiating dialogue between stakeholders at the European level. It would enable a structured dialogue and exchange of expertise within the topic of accessibility, including audiovisual media. Such a mechanism could provide useful information to Member States and the national regulatory authorities in progressing the objectives of the Accessibility Directive (and, if still applicable to the AVMSD) and for identifying and sharing good practice.

4. Recommendations

1. In accordance with the findings in the report, ERGA considers that an extensive benchmarking and bench-learning initiative addressing the entire value chain for accessibility within the field of audiovisual media services is necessary. Both linear and non-linear services should be covered as well as multiple platforms and user-devices. ERGA has not the means to conduct such a study but will engage with the European Commission on how this could be implemented.
2. The study should address three priority topics; (1) users, (2) delivery modes and equipment and (3) costs.
3. Separate to the study ERGA finds that it would be valuable if a Platform for Accessibility was put together by the European Commission, for initiating dialogue between stakeholders at the European level. It would enable a structured dialogue and exchange of expertise within the topic of accessibility, including audiovisual media.

APPENDIX A: Non-exhaustive summary of publications on accessibility and audiovisual media in Europe

Content

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In this appendix, we first introduce the subject of accessible media and define what is meant by a value chain. The subchapters after that derive from the structure of a value chain for accessible television content and the information is compiled under the following headlines; 1.3 Viewer, 1.4 Production, 1.5 TV-channel, 1.6 TV-service, Contribution and Transmission, 1.7 Reception and Use and 8.8 Regulators and legislators.

1.1 The cornerstones of accessible audiovisual media

FG AVA states that making content accessible encompasses actions on three fronts:

(A) The intrinsic and extrinsic usability of the audiovisual content itself;

(B) Access services (enhancing the accessibility of digital media by offering an access service such as closed captioning/same language subtitles and video description/audio description with the audiovisual content itself); and

(C) Assistive technologies (extending the accessibility of digital media by ensuring their interoperability with assistive technologies used by persons with disabilities).

FG AVA stress the need to address not only audiovisual content creation but also the creation of 'meta-content', metadata and information services about the existence and availability of audiovisual content such as programme listings, electronic programme guides and even online app stores. This meta-content also covers information about the existence and availability of access services for a given piece of content, as well as mechanisms to allow users with disabilities to use their own assistive technologies such as screen readers when using content on their laptops, smartphones or computer tablets (Technical report Part 1, ITU, 2014).

In a tutorial held in Las Vegas (HCI International 2013) the chairman of the FG AVA explained what affected the accessibility of a TV-program:

1. Intelligibility (audio & picture)
2. Access services (subtitling, signing, audio description and spoken subtitles)
3. Meta-content (EPGs, spots, search)
4. TV interfaces (including remote controls)
5. Interfaces to assistive technologies

In the Technical Reports of FG AVA (17 reports in total) a broad range of recommendations are presented on different topics such as subtitling, signing and sign language and audio description, accessibility features for mobile media devices throughout the value chain and recommendations for TV-receivers for closed signing. See the inventory for further details. In the first Technical Report there are general proposals recommended by the group, those are listed in Annex 2 of this report.

1.2 Addressing the entire supply chain

In order to do a benchmark-study addressing the entire supply chain one must first define what is meant by the term "supply chain". In Technical Report Part 1 FG-AVA concludes that having put in place an understanding of the logical and actual audiovisual content systems it is feasible to describe the service requirements of access systems components and to do this in a manner that involves and can be supported by all stakeholders concerned.

In the studies listed in the inventory the terms value chain, the end-to-end broadcast delivery chain and the end-to end-chain are used.

In technical Report 18 FG AVA state the following.

> *The main challenge to make digital television accessible is to understand and manage all elements of the end-to-end broadcast delivery chain. This includes managing support for access services from stakeholders and developing the necessary consensus and momentum.*

There is a lack of awareness of the end-to-end chain for planning, producing, delivering, using and benefiting from programmes that have associated access services.

> *Very few of the stakeholders understand how, for example, captions for both programmes and advertising are produced, delivered and can finally be displayed correctly on the viewers' receivers in the home. Standardizing the receiver without regard to how the access services are produced and delivered will not necessarily lead to improved accessibility.*

In Technical Report Part 1 FG AVA uses the term value chain:

> *A convenient way of visualizing content, metadata creation and access service creation and delivery is a 'value chain', a term coined by Michael Porter in 1985. "A value chain is a chain of activities. Products pass through all activities of the chain in order and at each activity the product gains some value. The chain of activities gives the products more added value than the sum of added values of all activities".*

In Technical Report Part 16 “Interworking and digital audiovisual media accessibility” FG AVA states that when broadcast technologies were introduced in the last century, first for radio and then for television services, a limited number of platforms were used to distribute media. Within the last 30 years, the number of platforms for distributing linear and non-linear audiovisual services such as broadcast television and video on demand (VoD) has grown rapidly. The capacity of the hardware and/or software architecture to handle content for multiple distribution platforms to ensure interoperability requires some kind of interworking[1].

The key observations are that:

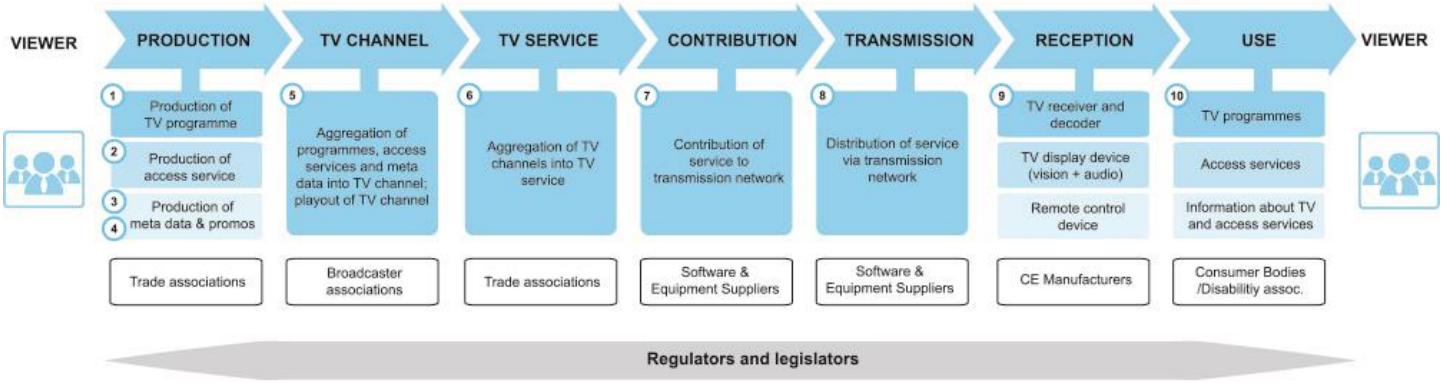
[1] Network interworking: Interworking between two similar (like) networks via an intermediary network with dissimilar characteristics.” Recommendation ITU-T Y.1401 (02/2008).

– Platforms for the distribution and use of digital audiovisual content have increased in number.

– The proliferation of such platforms is likely to continue.

– Distributing content will require media companies to formulate clear production and distribution strategies to prevent costs from escalating as the result of a fragmented media market.

In the report there are various figures of value chains for accessible television content. The following figure is a copy of a value chain from the report, designed by the task force. Hence, the data is directly taken from the report. We have added a viewer also at the beginning of the chain, as FG AVA states that the starting point for accessible television is the user.



Source: Making Television Accessible (2011) and Technical Report Part 16 of FG AVA (2013)

The figure is a block diagram to show the value chain for television content. It should be read from left to right.

Traditionally, interworking has involved architectures for handling TV programmes themselves: TV access services and TV meta-content services. In the case of (1), interworking involved collaboration between internal producers, external content producers or a mix of both and a commissioning editor at the TV channel (5). Interworking is also involved in the production of access services (2) and meta-content such as the metadata for EPGs (3) and spots and trailers (4). All of these entities have to collaborate with the commissioning body at the broadcaster (5) and also with those concerned with play-out, contribution and distribution (7, 8). The TV service has to be extracted from the transport stream in the device (9). Depending on whether the access services are open or closed (part of the assets or under some degree of viewer control), the access service has to be displayed along with the content to which it refers. The metacontent such as EPG, spots and trailers also need to be accessible to allow persons with disabilities to discover, use and enjoy the programme or series. Interworking thus involves both the commissioning and production of content (1 to 5) and its subsequent delivery to users via one or more distribution systems (7-8) so that it can be decoded (9) and the content (10) used and enjoyed by the viewer.

In the report FG AVA also shows different value chains depending on different scenarios; open access services versus closed access services, one platform versus current and future multi platform scenarios, showing the complexity that comes with a multiplatform future with accessible audiovisual content for different platforms and devices.

FG AVA concludes that as audiovisual media mature and develop into both linear and non-linear services, interworking will have to address the challenges listed in relation to the different scenarios presented in the report. They will gradually change status from optional to mandatory requirements

in a multiplatform world. Standardization efforts are already underway to look at interworking on managed, unmanaged and IBB networks. Interworking will thus have to come up with service architectures that allow for the effective and efficient exchange and transformation of access services so that these can be delivered with content and meta-content on the platforms that emerge as the result of market forces.

On-demand content

ATVOD (The Authority for Television On Demand) was an industry body designated by Ofcom as the "co-regulator" of television on demand in the UK from 2010 until 2015, when the function was taken over by Ofcom directly. ATVOD issued various concluding reports on accessibility and on-demand services having a broad scope.

ATVOD concluded in a paper in 2014 that the end-to-end chain for on-demand generally differs substantially from that of linear TV. Some processes are, or could be, the same or similar whilst others are not; some also may apply to an on-demand service provider but not to another. In particular, the species (and sometimes generational variants) of end-user equipment are diverse and some may not have been designed a priori with accessibility in mind. ATVOD also concludes that there are no fundamental technical barriers to providing subtitles and where appropriate audio description on on-demand content. For service/content providers, most other barriers are related to workflow issues which can be significantly complicated by the variety of delivery standards, even within company groups (ATVOD Working Group on Access Services, WGAS).

In a report from 2015 ATVOD concludes that providers continue to point to barriers to accessibility on VOD, including technical issues in converting subtitles for multiple platforms, and the associated costs. Content providers (e.g. Fox) continue to disagree with platform operators (e.g. Virgin) over whose responsibility it is to make content accessible, and there is a lack of clarity over platform requirements and/or capabilities. However, more platforms appear to now support access services, and more content providers are working with platforms to get accessible content through to consumers.

- Progress is being made, but ATVOD continues to receive complaints from consumers who cannot access content on the major television platforms.
- ATVOD recognises that there are technical obstacles and that in some cases accessibility has to be introduced to coincide with more general systems upgrades.
- ATVOD therefore welcomes the news from key content providers and platform operators that many such upgrades are planned and that accessibility will be factored in.
- ATVOD urges platform operators to ensure that their platforms support accessibility and that content providers are kept updated of technical requirements, including upgrade roadmaps which may affect any access requirements.
- ATVOD notes that costs of implementation of access services across different platforms is again a key obstacle for service providers and would encourage platforms to work together and with service providers in this area.
- Although the complexity of the situation (in terms of proliferation of platforms and technologiess) may simplify as the market matures, we urge providers to be proactive now, in order to avoid retro-fitting accessibility to future technology. Accessibility needs to be a routine part of contract discussions and systems upgrades.
- ATVOD again urges all service providers to consider audio description alongside subtitling rather than as an optional extra. The industry focus appears to date to have been on subtitling, with relatively little progress made in the quantity of audio described VOD available.

1.3 Viewer

FG AVA Technical Report Part 1 states that the starting point for accessible television is the user, the person who is going to watch television programmes. When it comes to digital television viewers there is no clear international consensus as to which persons with disabilities are the target groups for accessibility actions. The UN Convention on the Rights of Persons with Disabilities (UNCRDP) makes specific references in its preambles to a broad range of persons and the barriers they face. In the proposed Accessibility Act persons with functional limitations and persons with disabilities are target groups.

“Persons with functional limitations” means persons who have any physical, mental, intellectual or sensory impairment, age related impairment, or other human body performance related causes, permanent or temporary, which in interaction with various barriers result in their reduced access to products and services, leading to a situation that requires adaptation to their particular needs of those products and services.

“Persons with disabilities” include persons who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.

The guidelines on the provision of television access services (Ofcom) describes that people using *access services* do not fall neatly into homogenous groups. For example, many people using audio description have visual impairments, but by no means are all completely blind, and most have had some vision at some time. By the same token, those using subtitles can range from those with normal hearing (using subtitles so that the television sound can be turned down), through those with relatively minor hearing loss, to those who are profoundly deaf. Some people (particularly the deafblind) may benefit from more than one access service – certain conditions that lead to the loss of one sense may also impair another. Those using access services range from the very young to older people, but a significant proportion of viewers using access services are older people, as the incidence of hearing and sight loss increases with age.

The report Making Television Accessible (2011) presents a figure with a summary of mature access services, target audiences and user prerequisites. The information in the table below is a copy of that figure, with one additional target group added under Audio Description.

Access service	Target Audience	User prerequisites
Captioning – same language	**Persons;** • who are deaf • with hearing impairments • who find it difficult to understand colloquial language • in contexts where wathcing TV with the audio is an issue (on public transport, in bars, or in homes with family members who are asleep)	Average reading skills or better
Captioning – foreign language	**In addition to the audiences above** • persons who do not understand the language in question	Average reading skills or better
Signing	**Persons:** • who were born deaf • with a variety of cognitive impairments	Able to understand signing in the sign language offered
Audio description - also known as video description in North America	**Persons** • who are blind • with serious visual impairments • who wish to follow a programme without watching the screen • who benefit from having a description of the story – cognitive impairments	Average hearing ability Understanding of the official language being used
Spoken/Audio captioning	**In addition to the audiences for audio description, those:** • who do not understand the foreign language in question	Average hearing ability Understanding of the official language being used

Source: Making Television Accessible, 2011

1.4 Production

The guidelines on the provision of television access services issued by Ofcom give guidance to selection and scheduling of programmes and best practice for subtitling, audio description and signing. The information covers both production and the next section of this text, TV-channel.

The report Making Television Accessible points out things to be taken into account in the production of TV programs, access services and metadata and promos. There is also information in the Technical Reports issued by FG-AVA. Those reports are referred to in the text in this section as well. It should also be mentioned that there are plenty of interesting results from academic research about the production of access services. See the inventory for more information.

1.4.1 Production of TV-programs

The report points out that it is crucial to optimize the audio and video during the production of a TV-programme. The intelligibility of audio[2] should be ensured by taking care to handle and mix speech at the beginning of the production chain. Studies show that optimal quality can't be reached through attempts to clean the audio at broadcast and in the receiver. According to the report it would make a significant difference if rigorous sound quality standards were always applied to TV-programmes.

The intelligibility of the video also depends on careful design of the picture and picture elements during the production of a program. The report includes a checklist for the use of text and color in television programmes and gives examples of screen layouts to promote accessibility.

1.4.2 Production of access services

There are four mature access services provided in Europe, subtitling, audio description, signing and spoken subtitles.

Subtitling

In subtitling, also called captioning, the audio content of a programme is converted into text and displayed on the screen. The subtitles can include non-speech elements, for example description of the soundscape or music. Subtitles can be closed which means that the viewer has to select or turn on the service, or they may be open which means that they are automatically a part of the image seen by the viewer. Subtitling is essential e.g. for viewers who are deaf or hard of hearing.

In the report Making Television Accessible it is described that when planning to introduce captioning for the deaf and hard of hearing, it is crucial to take into account viewer expectations regarding for example subtitling speed. The report explains in detail the workflow of producing pre-prepared same language captioning (intra-lingual subtitling), pre-prepared foreign language captioning (inter-lingual subtitling), and live same language captioning (intra-lingual subtitling). FG AVA has published a Technical Report on Captioning, see the inventory (Annex B). There is also plenty of academic research related to the production of subtitling.

[2] FG AVA has published a technical report on methods for improving the intelligibility of audio: http://www.itu.int/dms_pub/itu-t/opb/fg/T-FG-AVA-2013-P12-PDF-E.pdf.

Audio Description

Audio description is the spoken narration of the essential visual elements of an audiovisual programme. Audio description supplements the regular audio track of a programme and it can include description of for example actions, characters, or the setting of the programme. Audio description greatly improves accessibility of media for persons who are blind, have low vision, or who are otherwise visually impaired.

Signing

Signing as an access service means interpretation of the audio content of the programme into sign language. Signing can be open which means that the signer can be seen next to the picture of the programme by all viewers. In digital television also closed signing is possible, which means that the viewer can turn the signing on or off. Closed signing can be realized e.g. through an overlay on the picture or a separate virtual channel. Signing or sign interpretation is important for deaf persons and other sign language speakers.

Spoken subtitles

Spoken subtitles make foreign language TV-programmes with subtitles more accessible for persons who cannot read the subtitles on the screen. This means that the subtitles in the target language are read aloud, often using speech synthesis, and broadcasted for example using an alternative audio track or a separate device.

Age-related accessibility options and viewing and accessibility options for specific disabilities

The report Making Television Accessible introduces the different access services that can be offered with TV-programmes. The access services are grouped based on different needs of viewers.

Age-related accessibility options

Children watching a programme in a language other than their own	Dubbing (voice-overs) or lectoring (partial voice-overs)
Adults watching a programme in a language other than their own and who can read	Dubbing, lectoring (partial voice-overs) or captioning
(Elderly) adults watching a programme in a language that they speak and read	Same-language captioning with some language condensation to keep reading speed down

Source: Making Television Accessible, 2011

Viewing and accessibility options for specific disabilities

Persons with hearing impairments	• viewers who were born deaf • viewers who have become deaf (oralists) • viewers with hearing impairments who use hearing aids	• signing (captioning) • captioning • wireless connections between the TV-receiver and the hearing aid
Persons with sight impairments	• viewers who are blind or have serious visual impairments	• for TV-programmes in an official language: audio description • for TV-programmes in a foreign language: audio captioning
Persons with speech impairments		• captioning • for persons who have difficulties even with captioning, it's a work in progress
Persons with reduced mobility and dexterity		• easy-to-use remote control devices and user interface • formal help schemes (e.g. the UK switch-over scheme)
Persons with cognitive impairments		• depending on the individual, e.g. optimizing the programme itself or checking access services

Source: Making Television Accessible, 2011

The report also includes a breakdown of how language diversity can be taken into account when producing access services in territories with multiple official languages.

The report further explains the process of how access services are produced, delivered and used, see chapter 1.6 in this report for information on contribution and transmission of access services.

1.4.3 Production of metadata and promos

Producing and distributing access services for television programmes is – in itself – not sufficient. For such services to make a difference to television accessibility, potential viewers need also to be given information about their existence in ways that fit their viewing habits and lifestyles. The challenge facing the potential user of the access service also depends on its availability. In some countries, the availability of captioning is close to 100 per cent. It is easy to promote something that is nearly always available. Audio description, however, is not yet widely available. Making sure that potential users know which film or programme is available with audio description is a major marketing challenge. A prerequisite for user awareness and user take-up is correct labelling of access services in all programme guides.

Programme guides

Programme guides are an important way of informing viewers about the availability of access services. The report suggests that access services can be promoted for example through icons and text (for captioning and signing) and announcements (audio description) at the beginning of

programs, in channel guides, printed and online program guides and EPGs as well as trailers and spots for upcoming programs to indicate the presence of the access service.

1.4.4 Cooperation between media companies

In Technical Report Part 16 FG AVA it is stated that to date (end of 2013), there has been limited interworking among media companies when it comes to the production of access services, although good examples of this among French-speaking public service broadcasters and in connection with the sale of TV drama to other English-speaking countries do exist. The challenges here are the downstream differences in requirements at the national level: regulators in various countries airing the same content with access services have different regulations governing the presentation of, for example, captions/subtitles. As television consumption moves from watching when the programme is aired to increasingly watching when it suits the audience, the number of delivery platforms will continue to increase. These will include managed networks, unmanaged networks and IBB networks where the delivery of content, access services and meta-content will require the synchronization of content delivered on, for example, broadcast and IP networks and displayed as a single service on the viewer's device in the home (IBB one screen) or on a main screen and a second screen (mobile phone or computer tablet) that allows the viewer to interact with the TV service and benefit from access services on this second screen.

1.5 TV-channel

Public information by broadcasters covering for example their internal accessibility work or viewer rates for accessible programs, is not easy to find. There are however different constellations where broadcasters come together.

The Eurovision Access Services Experts Group brings together access service experts with responsibilities covering subtitling, signed programmes, audio description and audio subtitling which enable sensory challenged people to access public broadcasters all over Europe. The group gathers once a year to raise the most important questions. It aims to ensure initiatives of the highest quality, to celebrate excellence and innovation and to encourage pan-European collaboration, while providing its members with professional information. The group is open to all EBU Members and is headed by a bureau. The main goals of the group are to discuss the future development of access services, to present showcases, to stimulate and support the exchange of technologies, products and services, to achieve standardization in order to develop common formats, guidelines, processes and legislation for authorities and stakeholders and to conduct surveys as well as to spread statistics.

NorDig is a cooperative organization consisting of Nordic and Irish television companies and telecom companies. The **NorDigT Accessibility subgroup** is a working group under the Nordig Technical Committee which has responsibility based on a regularly updated mandate to investigate needs and solutions in the field of accessibility services and develop relevant parts of the Nordig specification. The subgroup has made detailed specifications for audio description and spoken subtitles, which are now mandatory receiver requirements in the NorDig Unified TV receiver specification for future coming TV receivers.

There are also various other initiatives and networks where broadcasters participate such as the **HBB44all-project** and **the NEM-ACCESS**. The NEM (New European Media) is a grouping of media-related organizations formed for discussions and consultations about the future of the media, and how to help influence future media development in the public and industrial interest. NEM-ACCESS is a subgroup that has endeavored to collate a list of policies they believe would improve the access situation in Europe. Members include, among others, EBU, BBC, Orange and Sony Europe.

Another actor within the accessibility field is **BBC Research and Developmen**t, the national technical research department in Britain. It shall provide a “centre for excellence” for research and development in broadcasting and the electronic distribution of audio, visual and audiovisual material. The department is made up of more than 100 specialist research engineers, scientists, ethnographers, designers and producers, working on every aspect of the broadcast chain, from audiences, production and distribution right through to the programmes themselves. BBC Research and Development has published many studies on for example the quality of subtitling. Read more in section 1.7, Reception and Use.

The guidelines on the provision of television access services issued by Ofcom give guidance to broadcasters about selection and scheduling of programmes and best practice for subtitling, audio description and signing.

Various broadcasters have user councils with representatives from different disability organization. The councils provide input for improvement and development of the accessibility of the programmes.

Many regulators publish reports on broadcaster´s compliance with national accessibility requirements with information about how broadcasters have met the targets set for subtitling, audio description, signing and spoken subtitling. Some of the reports are listed in the inventory (Annex 2).

1.6 TV-service, Contribution and Transmission

There are various ways in which access services can be delivered to the end user. This is explained in the report Making Television Accessible (2011) and further explained from an end-to end-approach on multiple platforms in Technical Reports issued by FG AVA. The services can be open, visible for all viewers of a programme, or closed, meaning that viewers can turn it off and on.

The Swedish Press and Broadcasting Authority did a survey on available solutions for accessibility services in 2013 and in 2016, investigating possible solutions in the European market. The survey used the report Making Television Accessible as a reference and in this section information is also taken from that report. The tables below show the solutions available for subtitling, audio description, spoken subtitles and signing. In the reports the different solutions are explained in more detail as well as their usability for the end-users.

1.6.1 Transmission and reception for subtitling

Open subtitles are burned into the video signal and can be seen by everyone. Closed subtitling for digital linear television in Europe either uses teletext or DVB-standard. For on-demand television different solutions have been developed. Subtitling can also be delivered by other means such as an application for a smart phone or iPad.

Some countries have two or more official languages. In countries with significant numbers of immigrants or refugees captioning in multiple immigrant languages can be a vehicle for social integration and promote social cohesion. Although multiple language audio streams can be carried on the multiplex, the cost of the extra bit rate must be considered and whether receiver equipment can accommodate multiple audio tracks (Making Television Accessible 2011).

Transmission and reception	Technical solution
Open subtitling (not selectable)	• Burned into the video signal
Closed subtitling (selectable)	• Tele-text captioning • DVB captioning • On-demand-tv-solutions • Non-television delivery of Subtitling distributed by some other means such as an application for a smart phone or iPad.

Source: Making Television Accessible, 2011 and Tillgänglig tv (2013)

1.6.2 Transmission and reception for audio description[3]

The report Making Television Accessible (2011) presents the work flow of creating audio description and introduces three different options for delivering closed audio description to the viewer:

1. Broadcast mix where the viewer hears an alternative mix created by the broadcaster.

[3] FG AVA has published two reports on audio description: Audio characteristics for audio descriptions and/or spoken subtitles: http://www.itu.int/dms_pub/itu-t/opb/fg/T-FG-AVA-2013-P13-PDF-E.pdf and Audio/Video description and spoken captions: http://www.itu.int/dms_pub/itu-t/opb/fg/T-FG-AVA-2013-P5-PDF-E.pdf.

2. Receiver mix where the viewer's receiver mixes the original sound and a mono audio description track in the television receiver itself.
3. Non-television delivery of audio description, where the viewer listens to the audio description channel distributed by some other means (AM medium-wave radio, telephone, streaming over the Internet to a computer, netbook or tablet such as the Apple iPad, or via a mobile phone)".

In the case of the broadcast mix, there are two alternative workflows for the broadcaster or production company:

1. Creating a mono audio description track with production metadata to handle the mixing of this track with the existing stereo /multichannel audio when the programme is played out at transmission time.
2. Creating a final stereo or multichannel audio mix in which the audio description is included and transmitted as an alternative to the original mix at transmission time.

Transmission and reception	Technical solution
Open Audio Description (not selectable)	• Premixed program with Audio Description superimposed.
Closed Audio Description (selectable)	• Broadcast mix – pre-mixed audio (any digital receiver) • Receiver mix – audio with fade info (digital receiver of mixing) • A separate signal for the Audio Description to a separate digital receiver (two digital receivers) • Non-television delivery of Audio Description distributed by some other means such as an application for a smart phone or iPad.

Source: Making Television Accessible, 2011 and Tillgänglig tv (2013)

1.6.3 Transmission and reception for spoken subtitles

Spoken subtitles/audio captioning uses speech synthesis at the broadcaster playout centre to generate an additional audio track which can be delivered in the same way as audio description. This also requires additional capacity on the multiplex, the cost of which would be a consideration (Making Television Accessible 2011).

Transmission and reception	Technical solution
Open Spoken Subtitles (not selectable)	• Pre-mixed program with Audio Captioning superimposed – all platforms
Closed Spoken Subtitles (selectable)	• Broadcast mix – pre-mixed audio (digital receiver) • Receiver mix – audio with fade info (digital receiver of mixing) • A separate signal for the closed audio to a separate digital receiver (two digital receivers) • Non-television delivery of Audio Captioning distributed by some other means such as an application for a smart phone or iPad.

Source: Making Television Accessible, 2011 and Tillgänglig tv (2013)

1.6.4 Transmission and reception for signing[4]

Closed signing can be implemented in two ways. The first uses a separate channel on the multiplex to carry the signer which has an overhead cost, while the second carries the signer on a broadband link which is mixed at the receiver. The availability of high quality broadband is required and a receiver that can mix the signer with the broadcast channel in synch. An open version of the signed programme could be made available on the web to allow for viewing at a later time (Making Television Accessible 2011).

Transmission and reception	Technical solution
Open Signing (not selectable)	• Pre-mixed program with Signer superimposed – all platforms
Closed Signing (selectable)	• Additional vision component (any digital receiver) • Simulcast IP-delivery of signer superimposed on signal (any IP-cable receiver)

Source: Making Television Accessible, 2011 and Tillgänglig tv (2013)

1.6.5 Delivery of access services – a multi-stakeholder process

In Technical Report 1 of FG AVA it is stated that a multi-stakeholder process is usually required to get accessible digital broadcast television from the experimental stage into mainstream use. The case for action is a complex mixture of modest market-related benefits for the broadcasters and platform operators and of their image (Corporate Social Responsibility) from the perspective of their users.

For digital broadcast television accessibility there is a need to provide an 'end-to-end' service comprising content, meta-content and access services in a value chain where, either the pay-TV operator or the individual broadcasters, assume responsibility. Digital television is a closed, managed system. On pay-TV platforms, the platform operator like the satellite operator Sky in the UK has the ultimate responsibility to ensure that the infrastructure operates correctly.

For free-to-air broadcasting, the platform operator (e.g. Freeview in the UK) does not have the same muscle. It can manage the value chain as far as the receiver, but at that point it is dependent on standards such as digital video broadcasting (DVB) and the Digital TV Group (DTG) D Book to ensure interoperability.

At this point, the difference between 'mandatory' and 'optional' requirements in standards like DVB become apparent, as is shown by a recent analysis conducted by the Nordic Digital Television standardization body, NorDig. The technical committee carried out a study on sixteen of the most widely sold digital television receivers in the Nordic area that comply with the current NorDig specification. The TV receiver models in the study account for a majority of receiver sales. Using a test transport stream, the receivers were evaluated using five different test scenarios to measure their performance in connection with Audio Description (AD).

The scenarios included:

1. Being able to select AD (Broadcast mix[5]) by signalling a 'virtual channel' so that the viewer just has to select the TV channel with AD on the EPG or by pressing the number keys on the remote corresponding to the TV channel ID;

[4] FG AVA has published two reports regarding sign language servide: Draft recommended production guidelines for sign language service: http://www.itu.int/dms_pub/itu-t/opb/fg/T-FG-AVA-2013-P11-PDF-E.pdf and Visual signing and sign language: http://www.itu.int/dms_pub/itu-t/opb/fg/T-FG-AVA-2013-P6-PDF-E.pdf.

2. Selecting AD (Broadcast mix) by signalling the presence of AD broadcast mix;

3. Selecting AD (Receiver mix[6]) by signalling the presence of AD receiver mix;

4. Selecting the AD (Broadcast mix) by pressing the 'alternative audio' button.

All sixteen receivers were able to handle the first scenario. Four responded correctly to the second scenario. Four responded in different ways to the 'receiver mix' signalling (differences in levels and fading). None of the receivers responded correctly to Alternative Audio. The receivers were also tested to see if the scenarios led to interference with the normal operations of the receivers. (Technical Report Part 1 of FG AVA, 2013)

1.6.6 Initiatives

There are or have been different initiatives and projects concerning delivery systems, transmission and standards for accessible media.

ITU-T Intersector Rapporteur Group on Audiovisual Media Accessibility

In December of 2013 a group of experts was created within ITU called ITU Intersector Rapporteur Group on Audiovisual Media Accessibility (IRG-AVA). The IRG-AVA studies topics related to audiovisual media accessibility and aims to develop draft recommendations for access systems that can be used for all media delivery systems, including broadcast, cable, Internet, and IPTV. The IRG also addresses matters contributing to the coordination of the standardization work of the involved ITU-T and ITU-R groups and collaborates with other SDOs and other audiovisual media organizations. The group is planned to conclude its work in 2016.

ITU-T Focus Group on Audiovisual Media Accessibility

The ITU-T Focus Group on Audiovisual Media Accessibility (FG AVA) operated during 2009–2013 and was charged with examining what measures can be taken to make access systems for persons with disabilities more widely available across all audiovisual media-broadcasting and IP-systems. Of particular interest where interoperable systems that can be used for all delivery systems. The group published 17 reports, many which are referred to in this report.

HBB4ALL (Hybrid Broadcast Broadband for All)

HBB4ALL is a European project which addresses media accessibility for all citizens in the connected TV environment. HbbTV (Hybrid Broadcast Broadband TV) is a European standard being adopted by European broadcasters to support customised accessibility services for various target groups.

HbbTV typically allows “broadcast-related applications” to be accessed for particular channels or programmes over a broadband connection, even though the television programme may be carried by terrestrial methods. Applications include extra information on a programme, programme guides or a menu for additional video programming. It also has the potential to support accessibility services, e.g. a signer in the corner of the screen.

DTV4All

DTV4All was a project funded by the European Commission, under the CIP ICT Policy Support Programme, to facilitate the provision of access services on digital television across the European Union.

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[5] AD Broadcast mix is an alternative ‘ready-to-use’ mix of the audio channels including the AD. It is produced by the broadcaster.

[6] AD Receiver mix delivers the AD as a separate audio track to the receiver. This track is mixed with the original programme audio in the receiver itself.

The NEM (New European Media) Initiative

This group has put forward proposals for a European Policy for improving media access for those with decreased abilities, including the ageing population. NEM members have put forward a list of policies they believe would improve the access situation in Europe and request that the suggestions are considered by the appropriate European bodies.

1.7 Reception and use

In Technical Report part 18 by FG AVA it is stated that receivers are not necessarily tested for compliance in a free-to-air market. There seems to be little or no formal end-to-end testing to assure that access services actually reach their intended users in a form that they can use. Regulators tend to focus on supply side metrics (quality of service, proportion of programmes with the service) rather than demand side metrics, eg. quality of experience to ensure that the user benefits from the access service that is supposed to be provided.

The report Making Television Accessible describes factors that are important to take into consideration at the viewer's end to enable accessibility. Many aspects have to be considered so the viewer can receive, view and benefit from television programs and access services. In order to be able to watch television, there are a number of practical prerequisites: a receiver, a TV signal and in some cases a subscription and a conditional access card.

For persons with disabilities, there are three main options for setting up for television reception; doing the work themselves, asking family and/or friends for help, or getting help from someone who is paid for their services or does so on a voluntary basis.

Viewers should be able to use access services with as few button presses as possible. This requires careful planning by broadcasters, platform operators and consumer electronics manufacturers. Viewers however have different behavior patterns when it comes to watching television. These viewer preferences for discovering and viewing programmes have implications for finding and using access services. There is no significant marketing challenge for open services, because their availability should be self-evident. There are, however, significant differences when it comes to closed, or opt-in services. Using an optional access service such as closed captioning will depend on the viewer knowing in advance that the service is available with the chosen programme, or it will depend on some kind of icon or information to help the viewer who zaps, to indicate what access service is available. If the viewer uses an EPG, selecting the access service will depend on whether the availability of the access service is mentioned in the EPG or the programme listing.

1.7.1 Subtitling

There is much research undertaken on the quality of subtitles. The BBC Research and Development is a national technical research department in Britain. On their website many research articles on subtitling can be found. Below are a few examples.

Candidate Techniques for Improving live Subtitle Quality

This paper looked at ways to improve the quality of subtitles using language modelling. This shows promising results but will require further analysis (BBC White Paper – Candidate Techniques for Improving live Subtitle Quality, 2013).

Dynamic Subtitles – the User Experience

This paper looked at varying the position of subtitles to improve the viewer experience. The results showed that varying the position of the subtitles made viewers more immersed in the action, missed less of the video content and were able to follow more of the action. It was suggested that for the likes of news, subtitles should be located in the normal position at the bottom of the screen (BBC White Paper – Dynamic Subtitles – the User Experience, 2016)

The Impact of Subtitle Display Rate on Enjoyment under Normal Television Viewing Conditions

This paper looked at the impact of subtitle display rate. Guidelines often quote an optimal subtitling rate of 140 wpm, and a maximum of 180-200 wpm. The results of this study found that optimal rates were around 170wpm, with a maximum of 220-230wpm (BBC White Paper – The Impact of Subtitle Display Rate on Enjoyment under Normal Television Viewing Conditions, 2015).

BBC White Paper – Live Subtitles re-timing proof of concept

This paper looked at the possibility of reducing the delay between audio and subtitles. Typical delays are around 5 seconds, but the proof of concept reduced this to around 3 seconds. This was possible because the BBC HD encoders have a coding delay of over 5 seconds which gives scope for an improvement in the subtitle delay. The BBC will roll out this solution on a phased basis (BBC White Paper – Live Subtitles re-timing proof of concept, 2016).

Caption Quality – International Approaches to Standards and Measurement

This paper looked at the quality of closed captions, in particular for live programming, which are currently in place around the world and evaluates the models that have been developed to measure quality. The report concluded that: greater discussion across national boundaries and information sharing between regulators about their approaches will help standardise high quality captions, the move to field testing of different approaches and evaluation models be encouraged and that consumers are involved in decision making about what works for them (Media Access Australia – Caption Quality – International Approaches to Standards and Measurement, 2014).

1.7.2 Audio Description

Although audio description can be mixed at the studio or at the receiver, the BBC tend to use the receiver mix method due to the large volume of audio described programming that they produce and the fact that it is cheaper, more flexible and allows for multiple delivery formats when the same programme is simulcast on as many as 30 different distribution networks. Moving to this method will require analysis given that set top boxes and televisions must be capable of handling the receiver mixing function and viewers may require support and training. While some countries require that receiver mixing is available on set top boxes and televisions, this is not the case in all countries (Making Television Accessible, 2011).

Audio description can be hard to access due to numerous button presses. In 2007 a new licence was awarded in Canada to TACtv (The Accessible Channel) which carries closed subtitles and open audio description for all programmes. AMI studies show that there is little adverse reaction from sighted viewers to open audio description (G3ict White Paper – Making Television Accessible).

1.7.3 Spoken subtitles

There are some solutions to produce audio captioning in the television itself using speech synthesis. Consumer electronics manufacturers are also working on a speech interface to allow the viewer to operate a television receiver using a remote control and through spoken feedback created using speech synthesis. This is still a “work in progress”.

Audio captions can be used to read subtitles in a different language. Viewers of programmes in foreign languages can follow the programme by listening to the captions read aloud in their own language. This does not require a significant additional cost for broadcasters, but does require that viewers buy a box that can read subtitles aloud.

The costs of audio subtitles depend on the 2 methods used – speech synthesis at the broadcaster head end or in the digital TV receiver. The central option builds on the same infrastructure as AD, requires capex, but running costs are low. Synthesis at the receiver end requires further development of digital tv standards to allow for the conversion of subtitles for re-speaking and the incorporation of speech synthesis chips for all required languages in the set top box. These changes will increase the cost of the receiver equipment. (Making Television Accessible 2011).

1.7.4 Signing

Ofcom have provided guidance on sign language in the UK. This guidance covers the country's default language, the qualifications, style and appearance of the signer, the size of the signer on screen and the method of delivery of the signed version, either as a simultaneous version through interactive services, closed signing when the technology becomes available or IP delivery of signed versions of programmes.

1.8 Regulators and legislators

There are various European overviews of accessibility requirements. In this chapter we summarize the conclusions from the studies described below.

The European Commission has made an overview of accessibility rules in European countries showing the transposition of article 7 of the AVMSD into national legislation. The data was collected in 2014 and published as part of the 2nd Application Report /Refit document. It covers both public service broadcasters and commercial broadcasters.

Deloitte presented the Final Report of the "Study on the socio-economic impact of new measures to improve accessibility of goods and services for people with disabilities", commissioned by the European Commission, Directorate-General for Justice. The study provided the European Commission with analysis and data as a foundation for its Impact Assessment for the proposed European Accessibility Act. Television and related services (linear TV broadcasting accessibility services, DTT equipment) were examined together with other priority goods and services. 9 countries were examined in depth. All 27 (Croatia was not a member at the time) were examined to some degree.

The Academic network of European Disability experts (ANED) provided a study for the European Commission in January 2013 called "National accessibility requirements and standards for products and services in the European single market: overview and examples". The report provides the results of a rapid response survey, carried out amongst members of the ANED for the European Commission. An initial typology was developed to distinguish between general obligations, specific requirements and technical specifications. A wide range of goods and service types were considered. Television receivers and broadcasting were included.

The Swedish Press and Broadcasting Authority conducted a survey in November 2015 to find out how the European countries have designed accessibility requirements for commercial broadcasters. A total of 24 regulatory authorities answered the questionnaire. It includes also brief information on monitoring and effects.

European Union Agency for Fundamental Rights (FRA), 2014: The FRA published the report "Accessibility standards for audio-visual media, indicators on political participation of persons with disabilities" in 2014. The report provides an overview of accessibility rules in European countries.

A report presenting results and conclusions from a study assessing and promoting e-accessibility was conducted on behalf of **the Directorate General for Communications Networks, Content and Technology of the European Commission in** 2013. The main aim was to take stock of the extent of e-accessibility across EU27 countries and some key third countries, as well as the policy efforts that have emerged in the area. The focus was on accessibility in three domains, one of which concerned television. The chapter on television presents the results of the work of benchmarking the current situation and evolution of e-accessibility in relation to television services. In the following we refer to the study as "the Study on e-accessibility".

In 2013 **EPRA** published a comparative background document providing an overview on the general legal framework and broadcasters´ obligations with regard to subtitling, signing and audio description for linear and on-demand audiovisual media services, on measures concerning the accessibility of end-user TV equipment, on the role played by broadcasting regulators in accessibility policies, and on funding issues.

1.8.1 Developments on a general level

In the comparative document from EPRA it is concluded that the recognition of the need for accessible television services by national legal frameworks has made considerable progress and further developments are under way. Also in the Study on e-accessibility it is stated that there apparently has been some progress across the Member States in the extent to which measures in relation to television accessibility are in place; the accessibility provisions in the EU's Audiovisual Media Services Directive seem to have provided a stimulus for this in a number of countries. Nevertheless, there remains much room for improvement of television accessibility across Europe as a whole.

1.8.2 Variation across Member States

The results of all the studies show that there is considerable variation across Member States in terms of the extent to which different types of accessibility measures are in place for broadcast programme content, as well as in the proportion of programming that is covered by these. In the comparative document by EPRA it is also said that there is a great variety of policies, traditions, and situations regarding accessibility of audiovisual services across Europe. Even though the legal recognition of accessibility issues has clearly improved, the scope and implementation in practice of the provisions by Member States vary considerably. Many countries have introduced fairly general provisions which do not correlate with some concrete obligations in terms of a required level of subtitling, sign language or audio description for the media service operators.

The Study on e-accessibility concludes that the variation across member states in terms of the aspects of television accessibility and in the quality of the measures that are implemented suggests that the establishment of an ongoing European-level mechanism for providing guidance to Member States and the national regulatory bodies in progressing the objectives of the AVMSD Directive and for identifying and sharing good practice (i.e. bench-learning) might be considered.

The study by Deloitte states that the priority goods and services with a high degree of regulatory coverage and fragmentation of technical accessibility requirements include broadcasting accessibility services as well as digital terrestrial television (DTT) equipment. The varying national technical accessibility requirements are likely to have a negative impact on cross-border trade, resulting in the full potential of the Internal Market not being achieved. Furthermore, the lack of accessibility has a negative impact on competition among industry players in the Internal Market as the variations between national technical accessibility requirements make it difficult for in particular new market entrants and SMEs to engage in cross-border trade. The problems that have been evidenced for business bring about negative consequences for different societal groups, in particular persons with disabilities and elderly.

Deloitte also concludes that the situation for manufactures of Digital Terrestrial Television set-top boxes and tuners in Europe is an extremely complex one. National specifications for DTT tuners exist for most Member States, although some countries use similar or identical specifications to others. In terms of accessibility, the support within these specifications appear to vary greatly and detailed technical analysis of the various specification is required to identify if requirements for accessible services such as subtitling, audio description, sign language interpretation provision within programming and audio output for EPGs differ or conflict.

Furthermore, Deloitte concludes that for television and related services there are high costs associated with cross-border trade. In fact, 99.7 percent of these costs can be attributed to accessible broadcasting services for which accessibility features such as, for example, signal encoding, subtitling, and captioning need to be implemented individually for each TV production that is aired in an individual Member State.

Also, Deloitte concludes, accessibility requirements can change the way a product or a service is designed. They may limit which products and services can be bought and sold. In the European single market this is a very important issue. National differences in accessibility requirements or technical specifications can have a real effect (e.g. if a product is designed in one country, manufactured in a second country, sold in a third country, with customers in a fourth country).

Looking at television receivers and broadcasting services there is a similar distinction as for telephones and telecommunication services, with fewer examples of obligations or requirements for products than for service provision. For broadcasting services, examples of general obligation or specific requirement are more readily available. In these examples, it is noteworthy that while requirements may sometimes relate only to public TV broadcasters the large majority cover both public and private sector providers. General obligations may arise from non-discrimination laws covering service provision in general, while specific requirements for TV broadcasting may be identified either in law or in the statutory codes of broadcasting regulators.

1.8.3 Specific obligations generate better results

Both the background document by EPRA and the Study on e-accessibility concludes that progressive targets seem to be the most effective way to implement obligations in practice. Better results seem generally to be achieved where there are specific obligations imposed in legislation and/or by the regulators; in the absence of such obligations, there seems to be a lot less likelihood that the relevant accessibility measures are being provided by broadcasters in a country.

1.8.4 Differences between regulations for public service broadcasters and commercial broadcasters

The EPRA-document describes that accessibility provisions, as a rule, apply to both public and commercial TV broadcasters. There is a clear trend towards the extension of access service obligations to commercial broadcasters. Nevertheless, legal provisions on accessibility are generally more stringent for public service broadcasters.

1.8.5 On- demand audio visual media services

The studies show that in the vast majority of countries covered, there are no accessibility obligations imposed on on-demand audiovisual media services. Accessibility provisions also rarely apply to local broadcasters.

It seems that 9 countries have some sort of regulation for nonlinear/on-demand content; Bosnia and Herzegovina, France, Greece, Slovakia, Lithuania, Poland, Czech Republic, Estonia and Belgium. In addition, Ireland has a voluntary code of conduct. In Finland and Sweden no obligations are imposed on on-demand service providers but linear broadcasters may fulfil the requirements by, to a certain extent, including some access services in their on-demand services. In the UK service providers are encouraged to make their services accessible.

1.8.6 End-to-end chain

The Study on e-accessibility concludes that there would be a merit in considering a more extensive European benchmarking and bench-learning initiative in the field to address the entire supply chain for accessibility in the television field (broadcast content, carriers such as cable TV companies equipment/set top boxes, etc.) as well as a full range of recent access/delivery modes today. In the EPRA document its concluded that policy measures to encourage accessibility of end-user TV

Equipment are, as a rule, considered outside the scope of broadcasting regulators, even if there are a few exceptions that are outlined below.

In *the UK*, the government has taken measures to encourage manufacturers to voluntarily provide interoperable TV services for disabled end users, through the launch of an e-accessibility action plan in 2010. As part of this plan, an eAccessibility Forum brings Government together with industry and the voluntary sector to explore issues of e-accessibility, and to develop and share best practice across all sectors. The eAccessbility forum is led by the UK department for Business, Innovation and Skills (BIS). There are currently no statutory requirements for manufacturers to provide equipment that is able to receive interoperable TV services for disabled end users.

An example of voluntary co-operation in the field of accessibility services for disabled end users is the 'Smart Talk29' set top box which is a result of a collaboration between the electronics company Goodmans and the Royal National Institute of Blind People (RNIB). The 'Smart Talk' box is available for the Freeview platform and the technology enables screen information, such as programme information from the EPG, to be spoken aloud.

In *Ireland,* television sets and set top boxes which are sold with Saorview approval (and hence guaranteed to work with the Irish DTT system) must be able to receive, decode and display the various access services.

In *Portugal,* PT Comunicações (Portugal Telecom) is required to ensure that services for people with disabilities are received by end-users. PTC should also ensure additional capacity for features that provide access for people with visual and hearing impairments to television broadcasts. PTC is also required to subsidize the purchase of DTT reception equipment for seriously disabled persons.

A few regulatory authorities also play an active role:

In *Turkey*, the RTÜK published specifications of the set-top-boxes. Special audio streaming for the visually disabled, and subtitle choices for the audio disabled have been included to the set top-boxes.

In *Portugal*, the ERC has established criteria for electronic programmes guides (EPGs) which specify that they have to be accessible to persons with disabilities, through the use of appropriate functionalities.

In *France*, the CSA has commissioned a study on TV devices with voice features (financial and technical aspects), which was published in June 2012. The document sets up all the technical aspects required for a device to meet most of the end-user´s needs. The main objective is to encourage the development and commercialization of a DTT device with accessibility features in French language.

In *the French-speaking Community of Belgium*, the CSA has issued a binding regulation in 2011 on the basis of the governmental Decree on audiovisual services of 2009, according to which television service providers are expected to use best endeavours to ensure that television access services can be accessed by the greatest number of viewers, to allow viewers to benefit from existing devices for the accessibility of programmes which are broadcast by foreign French speaking audiovisual media services available in their offer and to provide viewers with multilingual versions offering an audio track for audio description. The regulation will be assessed by the CSA in 2014.

At *the EU level*, the Green Paper of April 2013 opened the consultation on the additional standardization efforts which would be needed to improve accessibility and on the incentives to encourage investment in innovative services for people with disabilities.

1.8.7 The role of the regulators

The comparative document by EPRA show that National Regulatory Authorities play an increasing role in the field of accessibility. The most widespread roles played by regulators are monitoring and enforcing compliance with broadcasters' obligations. Many authorities are involved in awareness campaigns and have implemented systems of periodic consultation between service providers and representatives of disabled end-users.

In the report Making Television Accessible, under the heading "Regulator approach, national and regional, the following is stated:

> *When it comes to planning and implementing a new television access service, there is no single approach to be followed, as" there are many roads that lead to Rome". Big national markets such as India, China and the United States are large enough to sustain a viable market for free-to-air and Pay TV receivers that can handle access services delivered with the television transmission standards in force in that territory. Small national markets, each of which adopts its own standards and norms, would lead to increased receiver costs. There is much to be said in favour of regional or continent-wide collaboration to set hardware and transmission standards and to agree a road map for action in terms of access service rollout.*
>
> *The regional approach towards "e-inclusion" being followed by the European Union in the form of the Direction on Audiovisual Media Services Directive can be combined with legislation, regulation and public service contracts at national and local levels across Europe.*
>
> *The regional approach may involve collaboration based not on geographical proximity but on the television standards in use for receivers and television transmission. This is of particular importance in areas such as satellite Pay-TV operators who may cover several states, or upload their signals from a country different from those who watch the service. Ultimately, the provision of successful and sustainable access services will depend on the stipulations of Article 9.2.h of the CRPD to "promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost".*

1.8.8 Funding and costs

Broadcasters are as a rule expected to bear all the required costs, which can be particularly problematic in a context of economic crisis. However, accessibility obligations are usually modulated according to the audience share and revenues of broadcasters, thus taking into account their financial situation. In the survey by the Commission (data from 2014) two countries, Belgium and Croatia, report that the government grants funding/state aid for accessibility services.

1.8.9 Monitoring and effects

In November 2015 the Swedish Press and Broadcasting authority collected data from the European regulating authorities on monitoring, compliance and effects for commercial broadcasters. The results show that the efforts made by the authorities when it comes to monitoring vary between countries. Many authorities do not follow up on compliance at all, others use multiple sources of information for monitoring. Most often broadcasters are required to submit details of the *quantity* of access services they provide. An exception is the BAI in Ireland that monitors a selection of the

output of each broadcaster and assesses this for the quantity, quality and reliability of subtitles. The BAI meets with the broadcaster annually to discuss their performance for the previous year, the results of BAI monitoring, their plans for the coming year and any issues raised by users. The BAI also meets with users of access services on a quarterly basis to discuss the quantity, quality and reliability of access provision. Any issues raised are fed back to the broadcasters.

The background document by EPRA show that several regulators report overall positive trends in the compliance with access obligation as in the UK and the Netherlands. In many countries, however, recent data (from 2012) levels of compliance are not always that satisfactory.

To measure the degree of compliance with obligations related to requirements set up by regulators, new tools and research methodologies are necessary to monitor both the quantity and the quality of the provided services. This challenge has been address within a research project in Spain, the Hermes-TDT- project. A prototype for automatic monitoring and a methodology for obtaining quality measurements has been developed.

1.8.10 Technology driven changes

The Study on e-accessibility concludes that aspects of accessibility that particularly arise in relation to technology driven changes in the broadcasting world, e.g. when it comes to the digital switch over, seem have been addressed in comparatively few countries by means of dedicated policies, and there is variability in regard to how these aspects are addressed.

APPENDIX B: Inventory

Studies on value chains

Information that either deals directly with value chains of accessible audiovisual media, or are so broad in scope that they do not fit under any of the headlines alone.

Technical reports of the ITU standardization focus group on audiovisual media accessibility FG-AVA Link to the list of reports	**Technical Report: Part 1: Overview of audiovisual media accessibility: An introduction**	**2013**
	Technical Report: Part 2: Vocabulary for ITU-T Focus Group on Audiovisual Media Accessibility (FG AVA)	2013
	Technical Report: Part 3: Using audiovisual media - A taxonomy of participation	2013
	Technical Report: Part 4: Final report of activities: Working Group A "Captioning"	2013
	Technical Report: Part 5: Final report of activities: Working Group B "Audio/Video description and spoken captions"	2013
	Technical Report: Part 6: Final report of activities: Working Group C "Visual signing and sign language"	2013
	Technical Report: Part 7: Final Report of activities: Working Group C "Visual signing and sign language" and D "Emerging access services" on common topics.	2013
	Technical Report: Part 8: Final report of activities of Working Group F "Participation and digital media"	2013
	Technical Report: Part 9: Requirements and good practice for supporting remote participation in meetings for all	2013
	Technical Report: Part 10: Draft recommended requirements of TV receiver for closed signing	2013
	Technical Report: Part 11: Draft recommended production guidelines for sign language service	2013
	Technical Report: Part 12: Methods for improving the intelligibility of audio	2013
	Technical Report: Part 13: Audio characteristics for audio descriptions and/or spoken subtitles	2013
	Technical Report: Part 14: Draft recommended requirements for the application of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) for media services for all	2013
	Technical Report: Part 15: Draft recommended accessibility features for mobile media devices	2013
	Technical Report: Part 16: Interworking and digital audiovisual media accessibility	2013
	Technical Report: Part 18: Working Group G "Digital broadcast television" final report	2013
ATVOD Link	Provision of Video on Demand Access Services - 2015 Report - A report on the level of provision by On Demand Programme Service providers of subtitling, audio description, signing and other services for people with disabilities relating to sight or hearing or both	2015
ATVOD Working group on Access Services WGAS Link	Short report on access services for on demand services. Explains the end-to-end chain (content acquisition, versioning, scheduling, delivery and presentation) for on demand services and practical, technical and commercial challenges which a regulator or service provider may need to recognize and to address if the access services are to be available in a realizable and usable for to the end-user.	2014
2G3ict-ITU Looms, Peter	A comprehensive report on target groups, access services, and production, delivery and costs of access services, the market for accessibility and how to introduce and scale up	2011

Olaf, 2011: Making Television Accessible, Link to the report Making Television Accessible	access services. Also includes incentives and sanctions - what mechanisms exist to promote access service provision. This report is written with a range of decision-makers in mind: • Access service advocates from organizations representing persons with disabilities wishing to get a clear picture of the access options currently available and in the development pipeline. • Media executives concerned with access service provision and complying with media regulation. • Regulators and legislators working on measures to improve digital media accessibility to comply with international conventions and directives. • Pay-TV operators and consumer electronics manufacturers and sales outlets examining the implications of demographic change and media regulation on their business. The report aims to help the reader with the following kinds of strategic challenge: • Formulate the objectives and Key Performance Indicators to make television accessible in a given territory. • Set up from scratch and operate one or more access services on analogue television. • Plan the transition from analogue to digital television and the access services that accompany television programmes. • Conduct pilot tests of a new access service on digital television. • Scale up access services after completion of a pilot phase. Common to all of these challenges is the ability to identify the nature and extent of the access challenge. The report starts here by first looking at the needs that have to be addressed by accessible television. The report also explains in general terms what the options are for improving the accessibility of television. In subsequent chapters there is more about the options for producing and delivering access services, and what they cost to establish and run. It concludes with a chapter on managing change – metrics, key performance indicators and processes to get started. Mention is made of a range of legal instruments that can be used to ensure that a new access service, or an existing service that is scaled up, becomes a success. A check list of strategic issues that need to be covered when considering actions to make television accessible has been included as an appendix to this report. This check list can be used to ensure that key issues have been considered.	
ATVOD Link	This 2015 report first concentrates on Audio Description 1 for Blind and Partially Sighted people (B&PS). It then provides an update on progress in subtitling. As before, the content of this report represents a distillation of understanding from within the ATVOD Working Group on Access Services (WGAS).	2015
DTV4All Link	DTV4All was a project funded by the European Commission, under the CIP ICT Policy Support Programme, to facilitate the provision of access services on digital television across the European Union. The webpage provides all reports from the project.	
NEM Link	The Access Report – Can we make Europe the world leader in media accessibility? (video, audio, print media) The NEM-Access Group October 2015 David Wood Wood@ebu.ch	2015
The NEM Initiative (New European Media Initiative), NEM-ACCESS, Link to the proposal	"Opening doors to Universal Access to the Media – Proposals for a European Policy for improving Media Access for those with Decreased Abilities, including the Ageing Population	February 2016

Viewer

Information concerning targets groups and their needs in relation to accessible audio visual media; persons with functional limitations including persons with disabilities, especially hearing, vision and cognition

Source	Topic	Year
The proposed Accessibility Act	In the proposed directive persons with functional limitations and persons with disabilities are target groups	2016
G3ict-ITU Looms, Peter Olaf, 2011: Making Television Accessible, Link to the report Making Television Accessible	Page 1: Which viewers have difficulties accession television? - Statistics and awareness - Viewing and age - Viewing and language - Viewing and specific functional impairments - Viewing and literacy	2011
The Swedish Press and Broadcasting Authority	A report mapping access/delivery modes and usability, include information on target groups and their needs.	2013
Eurostat Link	This article provides an overview of the key demographic characteristics of people with disabilities in the European Union (EU). It is one of a set of statistical articles concerning disability statistics in the EU and accompanies a number of methodological articles which make up an online publication on disability statistics.	2011
Anna Fernández-Torné and Anna Matamala, Universitat Autònoma de BarcelonaLink	Text-to-speech vs. human voiced audio descriptions: a reception study in films dubbed into Catalan	2015
DR	Tillgængelighed i DR`s udbud – Analyse af døve og blindes særlige barrierer og behov	2015
SFI – The Danish National Centre for Social Research	Report: Døve og døvblevne mennesker – Hverdagsliv og levevilkår	2014
SFI – The Danish National Centre for Social Research	Report: Blinde og stærkt svagsynede – Barrierer for samfundsdeltagelse	2010

Production

Information concerning the production of TV programmes, access services and meta data and promos.

Source	Topic	Year
G3ict-ITU Looms, Peter Olaf, 2011: Making Television Accessible, Link to the report Making Television Accessible	Page 13-18 Which access services can be offered with television programmes? - Age-related accessibility options - Viewing and language – accessibility options - Viewing and accessibility options for specific disabilities - Viewing and literacy- accessibility options Page 31-42: Access services from planning to use - workflows	2011
New Points of View on Audiovisual Translation and Media Accessibility	Page 167: The Language of Audio Description in Dutch: Results of a Corpus Study Page 7: On Subtitling in Norway Page 47: Software Tools for the Analysis of Technical Parameters of Subtitles Page 267: It´s crime time: About the Use of Colour in SDH. Focuses on specific problems related to SDH on TVm especially when it is created for a film genre such as the detective film.	
DLM – The German Media Authorities Link	"Auf Augenhöhe", available at The media authorities are in a regular exchange with the Federal Government Commissioner for matters relating to persons with disabilities. The Advisory Council on Inclusion (coordinated by the Federal Commissioner Verena Bentele) is supported by four special committees covering different thematic areas. The media authorities are working jointly, with other stakeholders, influencers and interest groups of persons with disabilities, in one of the mentioned committees related to "Communication and the Media". One outcome of the committee's work includes a practical guide ("Auf Augenhöhe") geared towards Journalists and other media representatives for topical suggestions, linguistic advice and other recommendations to advocate for people with disabilities in an authentic and varied way.	2015
Academic dissertation: Multimodal Representation and Intermodal Similarity Cues of Space in the Audio Description of Film by Maija Hirvonen Link	The dissertation analyses the representation of space in filmic audio description. The main objective of the study is to shed light on two critical challenges for audio description: (1) how the filmic space becomes audible in audio-described film through spoken language, sound effects, and music, and (2) how the visual representation of space in film can be cued by the linguistic mode in an audio description.	2014

TV-channel

Information on the aggregation of programmes, access services and meta data into TV channel, playout of TV-channel.

The work of TV-channels and case studies that could serve as good examples.

Source	Topic	Year
The Eurovision Access Service Experts (Expert group within EBU) Link	The Eurovision Access Services Experts Group brings together Access service experts with responsibilities covering subtitling, signed programmes, audio description and audio subtitling which enable sensory challenged people to access public broadcasters all over Europe. The main goals of the group are: • to discuss the future development of Access services • to present showcases • to stimulate and support the exchange of technologies, products and services • to achieve standardization in order to develop common formats, guidelines, processes and legislation for authorities and stakeholders • and to conduct surveys as well as to spread statistics The group gathers once a year. All presentations and studies on the webpage seem to be only for members.	
DVB **Link** **Link**	Information about DVB-standards. About aggregation of programmes, access services and meta data into TV channel, playout of TV, channel	
BBC – The Switchover Help Scheme Link	The Switchover Help Scheme was run by the BBC under an agreement with the Government. From 2007 – 2012 it offered eligible older and disabled people across the UK practical help to switch one TV set to digital. The help included easy-to-use equipment, installation, with an aerial upgrade if needed, and 12 months free aftercare. People were eligible if they were aged 75 or more, eligible for certain disability benefits, living in a care home long-term, or registered blind or partially sighted. Many conclusions on many aspects, the web page includes various studies	2011
CSA – Rapport annuel relatif à l'accessibilité des programmes de télévision aux personnes handicapées et à la représentation du handicap à l'antenne Link	The CSA publishes a yearly report focusing on the fulfilment by TV channels of the obligations concerning accessibility to audiovisual programmes by people with disabilities. The report provides quantitative information on the adoption of sub-titles, sign language and audio description. The report includes also information concerning the initiatives launched by the CSA, focusing on the representation of disabilities on audiovisual media.	2015
CSA – Préconisations du Conseil pour l'amélioration de l'accessibilité de la télévision connectée		2014 – 2016
CSA – Méthodologie de constatation de la reprise des sous-titres à destination des personnes sourdes ou malentendantes **Link (methodology report)** **Link (results)**	The document explains the methodology adopted by the French regulator CSA for the assessment of the implementation of subtitles on the 19 FTA French national channels according to different distribution platforms: ADSL TV, DTT, DTH/satellite, cable networks. A first report was published in 2010, whereas an updated followed in 2013. The assessment led in 2013 proved only some problems on some DTH/satellite platforms for France 4 (Bis TV, Fransat).	2010 - 2013
Méthodologie de constatation de la reprise de l'audiodescription à destination des personnes aveugles ou malvoyantes **Link (methodology report)** **Link (results)**	The document explains the methodology adopted by the French regulator CSA for the assessment of the implementation of audio descriptions on the main French national channels according to different distribution platforms: ADSL TV, DTT, DTH/satellite, cable networks. A first report was published in 2010. The assessment led in 2013 proved that all the main TV channels are compliant with the obligations.	2013
CSA – Accessibilité des programmes télévisés aux personnes handicapées **Link**	According to the monitoring activity of the CSA, all the majority French TV channels are compliant with their obligations. In 2012, 2 FTA channels and 11 pay-TV satellite channels did not fulfill their obligations	2013
AMADIS – Congreso de	The AMADIS is a Spanish Forum promoted by University Carlos III of Madrid, the	2014

accesibilidad a los medios audiovisuales para personas con discapacidad **Link (report)** **Link (conference)**	Spanish Center for Sub-titles and audiodescriptions and the Spanish Government. In November 2014, AMID organised the 7th annual conference, involving also the Spanish PSM, RTVE, as co-organiser. The records of the conference have been collected in a report focusing on technical developments, pilot projects, content production and editorial activities (including a benchmark analysis and a focus on online content, synchronization of subtitles in live and streaming TV, and different cultural projects on accessibility and technological aspects. The site of the 2014 conference provides several documents and presentations from relevant stakeholders, such as RTVE, the Spanish organisation of regional PSM (FORTA), and the NRA CNMC.	
Miguel Hernández Communication Journal – La accesibilidad al medio audiovisual para personas sordas: Estudio de caso de TVE Link	The Spanish review Miguel Hernández Communication Journal issued several reports with regard to the topic of accessibility.The report provides a case study on TVE, the television company of the PSM RTVE concerning the level of implementation of measures to facilitate accesibility to audiovisual content for people with hearing impairments. The study combines quantitative (percentage of subtitled programming) and qualitative analysis. The study has verified that 85% of programming on TVE1 and 70% on TVE2 provide subtitles, compared to a required average of 90%. With regard to sign language, the studies point out that the engagement of the two main public TV channels is not matching the target, in the analysed period (only 30 mins vs 10 hours).	2015
CMT - SEGUIMIENTO DE ACCESIBILIDAD A LA TDT **Informe de la CMT sobre accesibilidad de los contenidos televisivos Link**	The former NRA for telecommunications (Comisión del Mercado de las Telecomunicaciones) was providing data concerning the respect of the commitments of the channels of the main national and regional broadcasters for implementation of services for people with disabilities (last report: 2012). Main findings were: - Concerning subtitles, in 2012, 27 channels out of 59 surpassed the threshold of subtitled programmes (45% for private channels and 55% for public channels); - 22 channels out of 59 were compliant with the obligations concerning sign language (1h/week for private channels, 3h/week for public channels); - 19 channels out of 59 were compliant with the obligations concerning audio description (1h/week for private channels, 3h/week for public channels	2012
María Gómez Maciá (2015): "The audiovisual media accessibility for deaf people: Case study of TVE", en Miguel Hernández Communication Journal, nº 6, páginas 5 a 28. Universidad Miguel Hernández, UMH (Elche-Alicante). Recuperado el 17 de Agosto de 2016 de: Link	The object of this research is to discover the accessibility state of the TV networks in Spain, focusing on the study case of Televisión Española, the main public TV chain. For this elaboration, a quantitative analysis that reflects the percentage of subtitled programming in TVE, in two of its main channels: 1 and 2 has been made. And also a qualitative analysis has been made to study the quality of subtitling of the TV chain. These two analyses have been used to obtain an overview of the techniques most used in our country, to discover the advantages and deficiencies of the system and, mainly, to help to progress in the full integration of people with disabilities.	
NRK – Accessibility https://www.nrk.no/tilgjengelighet/	The Norwegian Public Service Broadcaster, NRK (Norsk Rikskringkasting), is obliged to subtitle all fully produced television programmes, and live television programmes between 18.00 and 23.00 if this is technically and practically possible. NRK has, however, as their goal that their content on TV, radio, online and mobile shall be available to all, regardless of disabilities when it comes to vision, hearing or cognitive skills. In 2015 NRK established the User Council, which consists of representatives from 9 different disability organizations and one representative from the retiree association. The User Council shall provide input for improvement and development of the accessibility of NRK's content on TV, radio and online.	
DLM – The German Media Authorities	Constant monitoring of offers of commercial broadcasters for people with disabilities - Fuchs, Thomas/Hein, Dörte (2014): Barrierefreiheit im privaten Fernsehen. Gesellschaftliche Zielwerte und mediale Realitäten. In: Programmbericht der Medienanstalten 2013, S. 175-180, available at Link. - Holsten, Cornelia/Hein, Dörte (2015): Barrierefreiheit im privaten Fernsehen. Statusmeldung und Ausblick. In: Programmbericht der Medienanstalten 2014, S. 211-217, available at Link. - Holsten, Cornelia/Hein, Dörte (2016): Barrierefreiheit im privaten Fernsehen. Wo stehen wir? In: Programmbericht der Medienanstalten 2015, S. 165-171, available at Link. According to §3 of the Interstate Broadcasting Treaty all nationwide broadcasters	2013 and ongoing

	should commit to increasing accessibility within their technical and financial capabilities. There is no binding legal obligation, but rather an expressed expectation of a gradual increase of inclusive broadcasting offers. With this in mind, in November 2012 the General Conference approached the two commercial broadcasters with the widest coverage – Media Group RTL Germany and ProSiebenSat.1 Media SE – to at least offer one programme per evening during Prime Time with subtitles for the deaf or hearing-impaired. To evaluate compliance, we began annual monitoring in 2013. The fourth monitoring (starting in the middle of September 2016) will for the first time also address smaller broadcasters. In these evaluations, commercial broadcasters should highlight their existing commitment as well as their future plans on how to increase accessibility to their programmes. As of December 2013 ProSiebenSat.1 has been meeting the requirement. The Media Group RTL has also been offering accessible, subtitled programs every day on at least one channel since May 2015.	
CESYA **Link**	Seguimiento del subtitulado y la audiodescripción en la TDT. 2014: Annual report regarding the fulfillment of the accessibility obligations of DTT providers in Spain. - The need of legislative review for improving the accessibility obligations. - An important increase in the percentage of subtitling and audio descriptions since 2010. - An improvement of the rate given by the users of subtitling services. The rate of audio description users is not very good, although a high percentage of the respondents confessed they don't use it.	2014
Link **Link**	Information on the websites of Danmarks Radio and TV 2 Danmark about accessibility	

TV-service, Contribution and Transmission

Aggregation of TV channels into TV services. Contributions of services to transmission network and distribution of services via transmission networks.

Information concerning different delivery modes on different platforms, terrestrial, satellite, cable, internet, ip-tv. Open and closed delivery modes. New techniques and innovations. Also carriers such as cable TV companies and others are included here.

Source	Topic	Year
The Centre for Excellence in Universal Design (CEUD) Ireland Link	A listing of publications	
HBB4ALL: Hybrid Broadcast Broadband For ALL Link to hbb4all (Lead by Pilar Orero, see also research above)	The HBB4ALL (Hybrid Broadcast Broadband for All) is a European project, co-funded by the European Commission under the Competitiveness and Innovation Framework Program (CIP) and by 12 partners from several complementary fields: universities, TV channels/broadcasters, research institutes, and SMEs; all are experts in the field of media accessibility and the multi-device environment.	Dec 2013–Dec 2016
IRG-AVA - Intersector Rapporteur Group Audiovisual Media Accessibility Link to IRG-AVA	No reports officially available so far	Ongoing
IEC TC 100 Link: • **Digital Television Accessibility – Functional Specifications (IEC 62944, TA 100/PT)** • **Accessibility for audio, video and multimedia systems and equipment (merged into stage 0 project on AAL) (PWI 100-1, TC 100/PT)**	Title**:** Audio, video and multimedia equipment and systems Scope: To prepare international publications in the field of audio, video and multimedia systems and equipment. These publications mainly include specification of the performance, methods of measurement for consumer and professional equipment and their application in systems and its interoperability with other systems or equipment.	
The Swedish Press and Broadcasting Authority	A report mapping access/delivery modes and usability.	2013
The Swedish Post and Telecom Authority	The authority holds innovation competitions for new solutions, the winners receive funding. Innovations that have received funding include mobile applications for Audio description and Audio Subtitling for movies and television	
G3ict-ITU Looms, Peter Olaf, 2011: Making Television Accessible, Link to the report Making Television Accessible	A comprehensive report on target groups, access services, and production, delivery and costs of access services, the market for accessibility and how to introduce and scale up access services. Also includes incentives and sanctions _ what mechanisms exists to promote access service provision	2011
G3ict White paper Business case series: Making Television Accessible to Everyone Accessible Media Inc.(AMI) & The Canadian Experience Researched in Cooperation with AMI Accessible Media, Inc. Link to the paper	The paper describes how media access to persons with disabilities has been promoted in Canada through a non-profit organization called Accessible Media Inc. (AMI). The case study also examines international guidelines, the Canadian regulatory background and the needs of the visually impaired community.	2013
Technical reports of the ITU	ITU-T (Standardization) had a Focus Group on Audiovisual Media Accessibility	2013

standardization focus group on audiovisual media accessibility **Link to the list of reports**	(FG AVA) from May 2011 to October 2013. FG AVA produced multiple reports that aim to identify actions that are needed to promote digital audiovisual media accessibility and recommend a set of actions that should be followed up by ITU to promote digital audiovisual (AV) media accessibility. FG AVA also prepared multiple draft recommendations. The themes discussed in the technical reports include e.g. captioning, audio/video description and spoken captions, visual signing and sign language, emerging access services, participation and digital media etc. See table "Studies on end-to end chains".	
ATVOD Working Group on Access Services	A short report on access services for on demand services. Explains the end-to-end chain (content acquisition, versioning, scheduling, delivery and presentation) for on demand services and practical, technical and commercial challenges which a regulator or service provider may need to recognize and to address if the access services are to be available in a realizable and usable form to the end-user.	18/07/2014
Book: Audiovisual Translation and Media Accessibility at the Crossroads-Media for All 3 Link	Page 133. Applying a punctuation-based Segmentation to a new Add-on Display Mode of Respoken Subtitles. Describes the challenges posed by speech-recognition systems and the technology and techniques that – in collaboration with WDR Videotext and the engineers from FAB – have been developed at SWISS TXT. It focuses on ways to improve transmission speed and achieve an optimum display mode of respoken subtitles.	

Reception and use

Information concerning the equipment needed to use access services, includes set top boxes, TVs, remote controls, smart phones, iPads, laptops et al. And requirements/information about accessible equipment.

Information about different access services in relation to usability/quality. For example, size, colour, accuracy and speed for subtitling, the selection of programs and pros and cons with different delivery modes. Includes for example costs related to different delivery modes and if target groups have access to the Internet/cable-TV etc. Also include information on findability, how the users know about access services offered and when.

Source	Topic	Year
Guidelines from Ofcom Link Link	Guidelines on the provision of television access services and information about usability of devices and services	
Book: Researching Audio Description - new approaches, by Pilar Orero and Anna Matamala Link		2016
Book: Audiovisual Translation and Media Accessibility at the Crossroads-Media for All 3 Link	Page 111*: Quality in Live subtitling: The reception of Respoken Subtitles in the UK*. Addresses the quality of live subtitling from a user perspective. Gives insights into deaf and hard of hearing viewers preferences. Page 147: *Experimenting with Characters: An Empirical Approach to the Audio Description of Fictional Characters*. Presents a cognitive approach to the AD of fictional characters in films. In order to shed light on the way in which we understand characters, the results of an empirical experiment are presented and applying such a perspective to AD is discussed. Conclusion: Scientific studies must be undertaken to understand how to create AD which facilitates optimum reception.	2012
Book: New Points of View on Audiovisual Translation and Media Accessibility by Jankowska, Anna/Szarkowska, Agnieszka, New Trends in Translation Studies Vol. 15 Link		2016
Book: Audiovisual Translation across Europe by Silvia Bruti and elena Di Giovanni , Agnieszka (New Trends in Translation Studies Vol. 7)		
BBC – subtitling Link to studies on subtitling		2016
Online Research Center for Accessibility and Audiovisual Translation (ORCAAT) Link to the center		
Advanced research seminar on Audio description: Link to the seminar		2016
International Symposium on Accessible Live Events Link to the seminar		2016

European Disability Forum	EDF Position on Indicators to Check and Assess Accessibility of Television for Persons with Disabilities. EDF presents the indicators to check and assess accessibility of television for persons with disabilities. In order to check and assess accessibility of television for persons with disabilities, there are three aspects to be taken into account: accessibility of the consumer equipment, accessibility of television programmes and accessibility of the television services.	2012
Media Access Australia Link	"Caption quality: International approaches to standards and measurement" The paper compares and contrasts the captioning standards that communications regulators have adopted in Australia, the UK, Canada, France and Spain. It also looks at the methods used for captioning news and current affairs programs and how they have evolved over the years.	2014
Technical reports of the ITU standardization focus group on audiovisual media accessibility FG-AVA Link to the list of reports	Include information relevant here.	2013

Regulators and legislators

Information concerning the proposed Accessibility Act, the AVMS-directive, how the directive is implemented on national level and issues related to country-specific requirements, such as which and how many broadcasters, targets for access services, monitoring and effects.

Source	Topic	Year
European Commission Link	The proposed Directive with annexes and implementation plan	2015
European Commission: Link	Table on transposition of Article 7 of Directive 2010/13/EU (accessibility requirements). General provisions and more specific rules/practical implementation. Includes the requirements for public service broadcasters and commercial broadcasters in member states.	2016-data from 2014
Visionary analytics, SQW and Ramboll (commissioned by the European Commission) Link	Digital Single Market Survey and data gathering to support the Impact Assessment of a possible new legislative proposal concerning Directive 2010/13/EU (AVMSD) and in particular the provisions on media freedom, public interest and access for disabled people - Framework contract for evaluations, evaluation-related studies and support for impact assessments, EAC/22/2013-01	2016
Deloitte (commissioned by the European Commission) Link	Study on the socio-economic impact of new measures to improve accessibility of goods and services for people with disabilities -Final report Television and related services were examined (Linear TV broadcasting accessibility services, DTT equipment) 9 countries were examined in depth. All 27 (Croatia was not a member at the time) were examined to some degree. Page 21: "These priority goods and services have been subject to more in-depth research, through desk research and interviews with accessibility experts and stakeholders (industry and consumers), to complement the above mentioned information gathering activities concerning goods and services which require specific attention with regard to accessibility. This next step in the research activities involved an examination of accessibility aspects of prioritised goods and services, more detailed legislative analysis, the level of use/take-up by people with disabilities and elderly, the market size, key market players as well as market trends and related costs and benefits of making these goods and service accessible." Page 25: A detailed legislative analysis based on primary and secondary sources has been conducted for each of the cases as part of the present study.	2012?
ANED Link to report	"National accessibility requirements and standards for products and services in the European single market: overview and examples". Include brief information on TV and broadcasting and television receivers. The report provides the results of a rapid response survey, carried out amongst members of the Academic Network of European Disability experts (ANED) for the European Commission. An initial typology was developed to distinguish between general obligations, specific requirements and technical specifications. A wide range of goods and service types, widely available across the single market, were considered. The findings are presented in overview and with illustrative examples. They are intended to be indicative rather than definitive of the existing patterns of coverage within the EEA and EU, seeking primarily to highlight examples with links to further information.	2013
Swedish Press and Broadcasting Authority:	The requirements for commercial broadcasters in 24 member states in November 2015. Includes information on monitoring as well.	2015
European Union Agency	"Are there legal accessibility standards for public and private audiovisual media?	2014

for Fundamental Rights (FRA)		
EPRA	Comparative background document providing an overview on the general legal framework and broadcasters´ obligations with regard to subtitling, signing and audio description for linear and on-demand audiovisual media services, on measures concerning the accessibility of end-user TV equipment, on the role played by broadcasting regulators in accessibility policies, and on funding issues. Includes also some information on monitoring.	2013
European Commission	Benchmarking the current situation and evolution of e-accessibility in relation to television services.	2013
ITU G3ict Link	e-Accessibility Policy Toolkit for Persons with Disabilities A toolkit intended for Telecommunication/ICT Regulator, Broadcasting Authority/ Ministry of Telecommunications/Communications/Technology.	2011
Danske Handicaporganisationer (DH), Funksjonshemmedes Fellesorganisasjon (FFO) och Handikappförbunden.	Media för alla? Tillgänglighet till tv i Danmark, Finland, Norge och Sverige (Media for all?) A report in Swedish comparing Sweden, Finland, Norway and Denmark, including regulations and effects.	2011
Broadcasting Authority of Ireland	Research documents from 2009/2010 that were commissioned to assist in the review of the Access Rules. The Access Rules specify the targets for subtitling, audio description and Irish Sign Language that broadcasters must provide. Three research documents were produced. The first covered a jurisdictional review of access provision in other countries. The second was an audience consultation to find out what the viewer wanted in terms of accessible services. The third was a human resource analysis to determine the cost of providing access services.	2010
ITU G3ict Link	Model ICT Accessibility Policy Report (Module 4: Television/video programming accessibility policy framework on p. 59- 74) The report is designed as a tool for national policy-makers and regulators to create their own accessibility policy frameworks and it is in line with the G3ict and ITU e-Accessibility toolkit mentioned above. One of the six modules is focused on television. There is also a list of sample regulations e.g. from the U.S. and Canada.	2014
ATVOD Link	Provision of Video on Demand Access Services - 2015 Report - A report on the level of provision by On Demand Programme Service providers of subtitling, audio description, signing and other services for people with disabilities relating to sight or hearing or both	2015
Council of Europe and European Audiovisual Observatory	Publication: IRIS Plus 2014-3: Enabling Access to the Media for all. Gives a brief overview of different accessibility services and delivery modes, legal instruments at international and European level and national level and information on recent developments on broadcasting legalization in Albania, Spain, Ireland, Italy, Romania and Slovakia.	2014
Cambridge, Eliza Varney Link	Publication: Disability and information technology A Comparative Study in Media Regulation. Include a chapter (3) called: Case Study: The European Union	2013
G3ict-ITU Looms, Peter Olaf, 2011: Making Television Accessible, Link to the report Making Television Accessible	Page 63: 9.4 Regulatory approach, national and regional	2011
Ofcom Link	This section covers research in a number of related areas: usability of devices and services, and accessibility, particularly in relation to older people and those with disabilities; specific communications technologies such as audio description and text relay; and the accessibility of communications services for the purposes of active citizenship.	
Research Article: Monitoring Accessibility Services in Digital Television Link	This paper addresses methodology and tools applied to the monitoring of accessibility services in digital television at a time when the principles of accessibility and design are being considered in all new audiovisual media communication services. The main objective of this research is to measure the quality and quantity of existing accessibility services offered by digital terrestrial television (DTT). The preliminary results, presented here, offer the development of a prototype for automatic monitoring and a methodology for obtaining quality measurements, along with the conclusions drawn by initial studies carried out in Spain. The recent approval of the UN Convention on the Rights of Persons with Disabilities gives special relevance to this research because it provides valuable guidelines to help set the priorities to improve services currently available to users.	2012

EDF Toolkit on the EU Regulatory Framework for Electronic Communications Networks and Services (The Telecoms Package)	This Toolkit lists the provisions related to e-accessibility for persons with disabilities in the Telecoms Package and gives insights on how they could be understood to enable a full and common understanding throughout the EU. This toolkit is primarily targeted at EDF member organizations to enhance their capacity in following up on the transposition into national legislation and the implementation of the Telecoms Package; but, it could also be useful to anyone who wishes to better understand the disability-related provisions in the Telecoms Package.	2011

APPENDIX C: General proposals on digital Audiovisual Media Accessibility – recommendations from ITU-T FG AVA

Within ITU (the International Telecommunication Union) there was a focus group called ITU-T Focus Group on Audiovisual Media Accessibility (FG-AVA). The group issued several Technical Reports with recommendations. In the first report, Technical Report: Part 1: Overview of audiovisual media accessibility: An introduction, the following general proposals are made.

> *– The access service with probably the highest 'KPI' for society for AV services is the provision of optional subtitles (US: closed captions) for users with hearing disabilities, which give, in text, the dialogue being spoken. They make a major difference in following AV content for those with hearing disabilities.*
>
> *– Compatible optional subtitling systems should ideally be usable with all video media delivery systems for television broadcasting, IPTV, Internet, and hand-held units. In this way, subtitles can be simply transferred together with content itself, across delivery platforms.*
>
> *– However, it must be noted that technology and tools for a service alone are not enough, and the effectiveness of subtitles is also related to how well they are prepared, how much they cost to use, and the extent to which the user community is informed about them. Guidelines for the optimum editorial usage of subtitling, and awareness issues, are needed.*
>
> *– Such services may alternatively be provided as 'burned in subtitles' (US: open captions), which may be more possible where there is no technical provision or capacity for optional subtitles. This consumes a TV or video channel, and may be annoying for viewers without hearing disabilities, so is less valuable.*
>
> *– It should be noted that following caption/subtitle text and the video narrative at the same time can be more mentally taxing than following a video narrative alone.*
>
> *– Optional audio descriptions (US: closed video descriptions, described videos) and audio subtitles are probably the second most valuable access services for society as a whole, and help considerably users with disabilities. They make a major difference to users following AV content with sight impairments.*
>
> *– Compatible audio description and audio subtitling systems should be useable with all video media delivery systems for broadcasting, IPTV, Internet, and hand-*

held units. In this way, they can be transferred across media delivery systems together with content.

– The best arrangement for audio descriptions is to allow the user to adjust the volume balance of the programme to normal audio and the audio description,-the so-called 'receiver mix' approach. This requires two audio decoders in the receiver. The alternative method of 'broadcaster mix' provides a complete second audio track that has both the normal audio and the audio description combined into a single track.

– Technology alone is not enough, and the effectiveness of audio descriptions is also related to how well they are prepared, and the extent to which the user community is informed about them. Guidelines for the optimum editorial usage of subtitling, and encouraging awareness are needed.

– Where the content has a foreign 'native' language, spoken subtitles that provide local language can be valuable for those with, and without, disabilities. Following a video narrative with spoken subtitles can be less mentally taxing than following text subtitles.

– Optional signing services (the use of sign language to tell viewers what is being said and done in the scene) would be the third most valuable access service for society as a whole, though technology is not yet standardized for this.

– Technology alone here will not be enough, and the effectiveness of signing will also be related to how well they are prepared, and the extent to which the user community is informed about them. Guidelines for the optimum editorial usage of signing and encouraging awareness are needed.

– Signing services can be provided as 'burned in' to the video, thought this can be irritating to viewers without disabilities. Subtitles (US: captioning) for radio can allow those with hearing disabilities to follow radio programmes. Report ITU-R BT.2207-130 for such systems, to work with both analogue and digital radio, is available. In principle, this could be the basis of a worldwide system of radio subtitling. However, the current Report is rather weak, and has not been widely adopted in practice.

– Virtual speech rate control, which provides a mechanism for (apparent) 'slowing down' of speech rate, while keeping overall timing, would offer benefits for those with hearing disabilities, and the elderly. This system can be implemented entirely in a receiver without the need to broadcast a new signal, and thus requires no new technical specification. Guidelines on the speed alteration range to be provided by set makers would be useful.

– Clean audio-the facility for the listener/viewer to adjust the balance between a central audio such as a commentary and a background-would be very valuable for those with hearing disabilities and the elderly. The clean audio could be arranged by a system in the receiver itself which extracts the central audio, or by a broadcast signal which facilitates the receiver's task. It would be valuable to have a common system for 'studio generated' clean audio to allow a common system in receivers.

– Smart phones would benefit from a range of features which will help users with disabilities to gain most from audio visual services. These include the same kinds of access services as are relevant for broadcasting and for services intended for larger 'second screens'. Special measures in areas such as the letter size are needed to take account of the screen size and the usual viewing distance. Script mining is the provision of the script of a pre-recorded television programme on a web page accompanying the images and sound from the programme. Users can follow the programme and the script at the same time to facilitate their being able to follow the programme. It could be valuable to agree on usage guidelines for such systems.

– Many access services for AV media could be provided by using the Internet channel of a hybrid broadcasting system. In order to facilitate this service, it will be necessary to agree on a common system of synchronizing the television or radio content with the arrival on screen of the related data from the Internet services. This may be a time stamp or time code which is included both with the broadcast and the Internet content.

– The provision of a reliable wireless system for supplying hearing aids with audio would be a major benefit for those with hearing disabilities. This will call for a specific frequency allocation for this service.

– A fundamental requirement for accessibility is the recognition that access technology alone is not enough. There must be a recognition that successful provision requires an awareness campaign about the system-for both content providers and viewers and listeners, and they must be aware how to navigate and use the system-"if they cannot find it, it is not there", "if they don't know about it, it is not there":

– Equipment designed to receive audio visual services must be designed to be 'friendly' to disabled users. There should be a common arrangement of controls for access services on all equipment.

– It has been observed that the greatest barrier today to the wider use of access systems is the lack of an economic basis for providing the services. Broadcasters and content providers need to be able to finance the provision of the services. Creative and innovative methods of doing so are needed.