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DTV4ALL

D3.1 - A Shortlist of Emerging Access Services

1 Table of Contents

2 Summary

This Document is based on Annex 1 of the contract for the Digital Television for All (DTV4All) project, the Description of Work. It outlines the tasks that have to be completed so that the detailed scope of the pilots of emerging access services that the project will undertake can be determined and approved by the Commission.

The document includes:

- An overview of emerging access services
- Practical issues to be addressed
- Summary and final remarks
- Implementation methods and test plans

The Description of Work of the project (c.f. pages 64-67) requires DTV4All to complete work in 5 main areas:

- Identification of Emerging Services, Devices, and Platforms
- Plans for Implementation and Testing
- First and Second Phase Demonstrator for Emerging Access Services
- Expert User Tests of Emerging Access Services
- Recommendations for Emerging Services, Devices, and Platforms

In order to complete this work, a framework for setting the objectives and the scope of the work the project will carry out on emerging access services is needed. The purpose of this document is to present the required framework..

3 Background and introduction

The DTV4All project makes a clear distinction between mature and emerging access services. In some cases, innovative services are planned to be run on mature technologies. Mature services are considered in DTV4All to be Teletext plus subtitles, DVB subtitles, audio description, and in vision sign language attached to a video and audio TV stream, as such services are well established in some European countries.

The primary focus of DTV4All is on making access services more widely available, the technologies used to deliver them are important in this context only as enablers. However, there are two distinct dimensions to the work of DTV4All. The first is promoting the uptake of existing mature access services in European Union countries that do not currently provide them. The second is promoting emerging access services. Emerging access services are driven by technological developments in broadcasting in two ways. The roll out of more advanced technology makes it possible to provide access services that go beyond what is currently available. However, crucially, it also requires that new access services be developed to replace some existing access services which will cease to be viable. This is in part because, in the near term, the roll out of more advanced broadcasting technology will take place in two distinct though overlapping phases. Firstly, the analogue switch-off forces a move away from analogue TV to standard definition digital television (SDTV). However, in a second phase there is a move from SDTV to high definition digital television (HDTV) which necessitates a review and possible revision of access services.

An example of the issues raised by the move to HDTV is that the ability to generate mixed text, graphics and pictures, as for example, but not exclusively, with MHEG needs revisiting. This is because, in general, an HDTV user will expect high definition graphics. As there are two planes in the provision of digital television services, the graphics plane and the text plane, an update to the graphics plane needs to be matched by a corresponding update in the text plane if a truly HDTV access service is to be provided.

The issues under consideration are not exclusively technical issues but may be driven by business and regulatory models. For example, those mature signing services currently delivered over dedicated terrestrial broadcast channels will need to be revisited. HDTV services increase the demand for bandwidth in existing multiplexes putting pressure on the bandwidth allocated to access services delivered over dedicated terrestrial broadcast channels. An example of the sorts of solutions to such issues that will be considered in DTV4All is moving the delivery of dedicated channels for access services to emerging platforms such as hybrid DVB-T/IP receivers with broadband connections in regions where there is little or no spectrum available for dedicated terrestrial broadcast channels for access services.

In contrast to mature TV access services the so-called emerging access services may be dependent upon the availability of new platforms and devices.

Particularly exciting possibilities for the provision of enhanced access services are raised by the advent of hybrid DVB-T/IP receivers with broadband connections and of HDTV, which brings with it large screen diameters and high resolution displays.

The emerging access services considered in DTV4All might be derived from mature access services but are not yet available. This means, they are not currently in service but some probably will be towards the end of the life time of DTV4All. The consortium plans to perform tests and to implement proof-of-concept solutions of selected emerging services. Results will be discussed between the partners and other stakeholders. Implications for adaptations of workflows necessary to establish these services will be considered.

4 Overview of emerging access services

4.1 Text services and subtitles for the deaf and the hearing impaired

Subtitles mainly consist of textual representations of spoken dialogue. There are significant national differences governing the way in which dialogue and non-linguistic communication are represented in subtitles. Sometimes they are accompanied by textual comments describing noises or background music. Subtitles are usually displayed at the bottom of the screen and can help viewers who are deaf or hard-of-hearing to follow the dialogue. In the Nordic countries, subtitles are the main means of helping viewers follow dialogue in a foreign language. In general, an increasing number of television programmes are accompanied by subtitles.

With analogue television, optional subtitles (also called *closed caption* subtitles) can be activated via a certain Teletext page (typically 888 in the UK, 399 in Denmark or 150 in Germany) on the TV set.

In the run up to the analogue switch-off as it is currently planned across Europe, Teletext services have been discontinued in some regions (e.g. the UK) though in most regions Teletext is still distributed together with the TV signal. Teletext is sometimes regarded as outdated or inadequate for the digital TV world. However, most European countries have decided to retain this technology for the time being. Although Teletext can only offer very restricted services with fixed-width fonts and no real graphics, this technology is widely accepted. Workflow issues will be analysed with a focus on implications for coexisting play-out solutions, e.g., analogue and digital (standard definition and high definition) distribution channels.

For the UK market, with the adoption of digital terrestrial television, Teletext was fully replaced by services based on MHEG-5 (ISO/IEC 13522-5) which includes subtitling functionalities.

While subtitling in DVB is specified (ETS 300-743 and ETS 300-472), it is not widely implemented so far apart from the Nordic countries where it is mandatory. As of 2008, TV stations in certain European territories still appear to be reluctant to send DVB subtitles. At the same time, many set-top boxes either do not support DVB subtitles or hide the functionality in sub-menus.

However, as DVB subtitling is an existing technology which is already deployed the DTV4All project considers it to be a *mature service* (see DTV4All Deliverable D1.1 – A Detailed Workplan for the Full-Scale Deployment of Mature Access Services).

4.1.1 2nd generation digital text services for high-definition television including subtitling

With the introduction of HDTV on the horizon, many players are planning to replace classic Teletext technology with more recent and flexible technologies. This will also allow for the introduction of improved subtitling services.

Figure 1: Mock-up of 2nd generation DTV text service

Figure 2: Mock-up of overlay in reduced-size format of sample DTV text service

The DTV4All project will study different technology streams in this context which mainly are:

Standardisation of DVB subtitling for HDTV

DTV4All will explore how DVB subtitling and its identified variants could be used with HDTV. As DVB subtitles are designed for SDTV, further improvements in legibility and presentation for sight impaired viewers are feasible. The BBC has developed high definition extensions to DVB subtitling (ETS 300-743 v1.3.1), but no implementations of these have yet been reported. DTV4All will survey real life implementations of DVB-subtitling which are enhanced with such high definition extensions.

Solutions based on 2nd generation digital text

The market will be surveyed for upcoming trends and technologies for television services which have the potential to replace Teletext. DTV4All will review solutions based on HTML amongst others. This activity is closely connected to Section 4.1.2.

4.1.2 Improved text services and subtitles with increased flexibility

The move to HDTV and the introduction of new additional services will allow improved subtitling solutions to be developed. DTV4All will demonstrate conceivable improvements, such as user-controlled rendering options, including:

- positioning
- (re-)sizing
- font style selection

- colour palette

These improvements can make subtitling and text services much more attractive, especially for people with both hearing and visual impairments. The type of presentation on a TV screen is not any more fixed by the broadcasters, but can be adapted to personal needs and preferences by the user. This could help improve the legibility of existing text services like Teletext, MHEG-5 etc. Together with techniques like "spoken interfaces" (see Section 4.6.2) 2nd generation text services make ideal candidates for future access services on digital television.

4.1.3 Subtitles and speech synthesis – audio subtitles

In certain territories such as the Netherlands, audio subtitles are being used on an experimental basis. Given the interest in adding speech synthesis chips to digital television receivers as an integral part of the interface, making Electronic Programming Guides more accessible by combining subtitling with speech synthesis may represent a cost-effective way of delivering a wider range of access services to those with visual impairments than is currently the case. What is important is the acceptability of the synthetic speech to its potential users. Given the problems facing spectrum use due to the bandwidth demands of Audio Description, there is interest among certain broadcasters in evaluating the potential of this approach.

4.1.4 Partner involvement in work on "Text services and subtitles for the deaf and the hearing impaired"

Institut für Rundfunktechnik (IRT)

IRT will provide a test implementation of a new type of ancillary service tailored for HDTV screens. Such a service could become the successor of today's Teletext service. This service, called HD text, combines text and stills and may contain interactive elements similar to those of MHP. The service is based on a subset of HTML (current with the working name TV-HTML, it is basically a derivative of CE-HTML). The content will be delivered either via a classical terrestrial DSM-CC Object Carousel or over a dedicated IP broadband connection. The advantage for the users is that they will be the ones controlling the size of the images and the font of the text presented on their TV screens. This makes its use attractive for access services for sight impaired viewers. Standardisation is in progress under the umbrella of DVB.

Rundfunk Berlin-Brandenburg (RBB)

RBB will contribute test material and will undertake local user laboratory tests. The content will be in the German language.

Danmarks Radio/Danish Broadcasting Corporation (DR)

DR will take responsibility for the collection of requirements, the document gathering and dissemination work.

4.2 Video signing solutions

Currently in vision signing (sometimes called broadcast mix signing or closed caption signing) is in use on a selection of TV channels. In this service the signer is always visible and covers a large area of the screen. This can be annoying for the large majority of users who do not want to see the signer as was documented in Deliverable D1.1.

An alternative that is deployed in some countries is to broadcast two versions of the television programme on two separate channels:

- Channel 1: showing the original picture with no signer
- Channel 2: showing the original picture plus the signer in one of two variants:
  a) Video picture of the signer as an overlay over the full picture of Channel 1
  b) Signer is recorded in front of a TV screen showing Channel 1 (see DTV4All Deliverable D1.1 – A Detailed Workplan for the Full-Scale Deployment of Mature Access Services)

Both solutions have the disadvantage of requiring a full second channel for each TV programme that is offering signing services. Under most conditions, this is usually not considered economically feasible.

Consequently, there is a need for "open caption" services, sometimes called receiver mix signing, for signing for the deaf. Similar to the well-known open caption subtitling services, an open signing service would allow the user to switch the signer on and off. The signer can then be transmitted at a lower data rate than the programme being signed because the video frame of the signer is in general of a smaller size than that of the original picture. The optimal height of the signer from the user's perspective and from that of other stakeholders needs to be identified.

Figure 3: Reference of receiver-mix signer (signer video enabled)

Figure 4: Reference of receiver-mix signer (signer video disabled)

4.2.1 Receiver-mix signing – broadcast based solution

DTV4All will demonstrate how the video of a signer can be delivered as an additional component of a DVB service using an MPEG-2 Packetized Elementary Stream (PES). A suitable DVB set-top box which supports this functionality will then allow the user to simply switch the signer on or off by pressing a dedicated button on the remote control. The solution should be backwards compatible with existing set-top boxes such that they would simply ignore the data related to the signer as unknown data.

Compared to existing solutions where an additional full channel is allocated to each TV channel which is equipped with a signer, this solution is capable of saving significant bandwidth while offering the option to turn the signer on only when required. For the end-user, use of such solutions will require set-top boxes with modified software modules for synchronisation and simultaneous decoding of the two video streams etc.

4.2.2 Receiver-mix signing - hybrid broadcast and broadband solution

The receiver-mix solution described in Section 4.2.1 saves a large portion of the bandwidth compared to the transmission of a full second TV channel for the signer. However, in general spectrum availability and thus broadcast channel capacities are highly limited even additional broadcast bandwidth for a low-bitrate video is usually expensive. Thus, even such optimised solutions still result in noticeably higher transmission costs per programme than an unsigned programme.

Therefore, DTV4All will demonstrate a hybrid broadcast/broadband approach, where the additional signer video for a broadcast service is transmitted synchronously via a separate IP broadband connection. This can give rise to several forms of delivery and presentation as it effectively represents a video-on-demand alternative to receiver-mix signing.

The main demonstrator is based on the results of the SAVANT project[1], the general architecture of SAVANT is shown in figure 5. For the end-user, such solutions will require a hybrid broadcast/broadband set-top box with modified software modules providing a return channel, synchronisation and simultaneous decoding of two video streams etc.

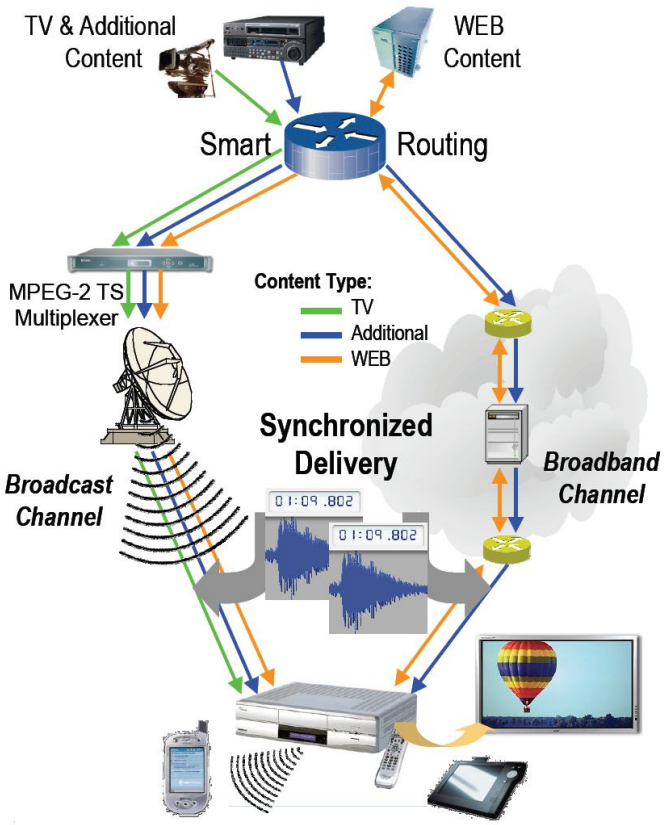

Figure 5: General architecture for broadcast/broadband solution (taken from IST project SAVANT)

Figure 5: General architecture for broadcast/broadband solution (taken from the IST project SAVANT)

Focused video provides automatic and intelligent zooming to region of interests specifically for TV on mobile phones. The poTiVity project has developed a solution where on-screen objects can be moved to access the next interactive information level. Such solutions potentially offer a way to access a video signer on a mobile phone but are beyond the scope of DTV4All.

[1] The collaborative research project SAVANT (Synchronised and Scalable Audio Visual content Across NeTworks) was co-funded by the European Commission under Framework Programme 5 (IST-2001-34814). Within the project the consortium developed integrated broadcast and Internet technologies that allow end users to access and retrieve synchronised multimedia content in an intelligent and transparent manner on a range of devices (e.g. television, personal computer and personal digital assistant) under varying network conditions. The project also aimed to provide more interactivity with broadcast content and personalisation of the services.

4.2.3 Partner involvement in work on "Video signing solutions"

Institut für Rundfunktechnik (IRT)

IRT will work on a receiver-mix signer solution based on experience gained from former projects (e.g. SAVANT). Receiver-mix means, the viewer's display will contain a mixture of two independent video streams: the original video which is received as standard DVB content and the secondary stream containing the "Signer" transmitted via an IP connection. Synchronisation is achieved with the help of a software component in the receiver (hence the use of the term receiver-mix to describe this solution).

Rundfunk Berlin-Brandenburg (RBB)

RBB is committed to providing test material in the German language and will undertake local user laboratory tests.

Universitat Autònoma de Barcelona (UAB)

UAB will carry out trials with volunteers in the Catalan and/or Spanish languages. Technical equipment will be provided by IRT.

Brunel University (Brunel)

Brunel plans to reintegrate a solution for hybrid broadcast and broadband scenarios based on SAVANT. Software components will be updated and/or replaced to allow for more flexible and stable demonstrators.

Danmarks Radio/Danish Broadcasting Corporation (DR)

DR commits to contribute to the information gathering process and to the requirements definition in the field of receiver-mix signer solutions.

Radiotelevisione Italiana (RAI)

RAI plans to contribute to the provision of test material for scenarios using DTV sets in conjunction with mobile phone services in the Italian language.

4.3 Improved audio for the hearing impaired

Introducing an additional audio channel which is focussed only on dialogue and narrative speech can help improve the intelligibility of dialogue for users with hearing impairments eliminating the need for them to read subtitles. Clean audio means that only dialogue without any other audio components is to be heard. This is also called "dialogue-only". Improving the audio signal of TV-programmes (called improved audio) can help people with hearing impairments to better understand speakers.

A completely different approach to providing improved audio for the hearing impaired would be to use a headphone-based Binaural Room Scanning (BRS) auralisation system[2]. The system can provide a virtual representation of a stereo or multi-channel control room to realise optimal virtual conditions in real inadequate conditions. Thus, potentially it could be used to provide optimal listening conditions for hearing impaired users. However, such a radical step is beyond the scope of DTV4All.

Different approaches to clean audio will be investigated and demonstrated. Results of the EBU/DVB AVC group will be taken into consideration.

4.3.1 Clean Audio on currently existing distribution links

The existing DVB standard allows several audio tracks to be assigned to a video stream. When a broadcaster provides a clean audio service this should be easily selectable by the users in the same way they can select an alternative language track for a movie. Currently the ease of use depends on the implementation of the set-top box or TV-set.

4.3.2 Customisable receiver mix

Dolby Digital Plus (DD+) is an evolving digital audio source coding scheme, which enables a second audio stream to be decoded simultaneously with a 5.1 surround sound stream and for them to be mixed in the receiver according to the individual needs of the listener. This will allow the user to set up a preferred trade-off between normal hearing mode including ambience sound and fully clean dialogue. Slightly hearing impaired listeners will still be able to distinguish some ambience sound.

The speech coding standard Adaptive Multi Rate – WideBand (AMR-WB) is standardized for future use in UMTS mobile phone networks. It operates at nine different bit rates where the higher rates are intended to make speech clear in adverse background noise environments where there is background noise and/or music. Ideally customisable receiver mix needs to be compared to AMR-WB to establish its benefits.

4.3.3 Production of the Clean Audio Generation of a Clean Audio signal during recording or production

Normally the tracks feasible for clean audio are available at the stage of production of any audio material. An additional mix with pure dialogue only has to be preserved beside the usual final mix.

[2] Spikofski, G. and Fruhmann, M. (2001) "Optimisation of Binaural Room Scanning (BRS): Considering inter-individual HRTF-characteristics", AES 19th International Conference, Schloss Elmau, Germany

Generation of Clean Audio signal based on pre-mixed multi-channel surround material

Most of today's audio materials, produced as 5.0 or 5.1 multi channel, have a good source for clean dialogue, the centre channel. Most of the dialogue is focussed on the centre channel while the loudspeakers on the sides are mostly used for ambience sounds and sound effects. Only a few portions of the dialogue appear in these other channels and have to be considered separately, because they might be mixed with ambience sound.

Generation of a Clean Audio signal based on pre-mixed mono or stereo material

Implementations of speech distilling systems for pre-mixed mono or stereo material are not considered in the DTV4All project. The reasons are as follows: The greatest challenge is given by audio channels carrying dialogue mixed with ambience audio, e.g. music. Usually TV and movie sound tracks are produced without any "voice track". This offers the possibility of adding dialogue in different languages. If there is no footage available containing "clean audio" DTV4All will demonstrate an enhancement of audio for clarity of dialogue. Special audio processing strategies are the only way to separate the mixture of wanted and unwanted sound, i.e. distilling the speech signals from the other audio signals. These kinds of strategies are not yet fully implemented for this purpose. There only exist limited implementations in digital audio workstations and in hearing aids.

Even though there seems to be a lot of usable knowledge referred to in many publications from universities and research centres it would be a lot of work to exploit it for a speech distilling system.

4.3.4 Hybrid broadcast and broadband solutions for Clean Audio

Distribution of clean audio content over IP networks will not be dealt during this project. Currently none of the partners is able to contribute to that issue.

4.3.5 Partner involvement in work on "Improved audio for the hearing impaired"

Institut für Rundfunktechnik (IRT)

The focus for IRT will be to derive a Clean Audio signal from 5.0 or 5.1 multi channel productions. Reconstruction of the dialogue track from mixed mono or stereo channels will not be investigated in detail. Existing solutions will be analysed and presented if suitable.

Universitat Autònoma de Barcelona (UAB)

UAB will undertake trials with volunteers in the Catalan and/or Spanish languages. Technical equipment will be provided by TVC and/or IRT.

Danmarks Radio/Danish Broadcasting Corporation (DR)

DR is committed to deal with dissemination actions for "Improved Audio".

Radiotelevisione Italiana (RAI)

RAI is committed to assist with the provision of test material in the Italian language.

4.4 Enhanced Audio Description services

Audio Description is an additional audio track with narration for blind and visually impaired people. The service can present variations depending on the type of mix of the basic soundtracks with the additional descriptive track (broadcast-mix, user mix), or the channel used for AD (broadcast-broadcast or broadcast-broadband, for example). If the AD audio is delivered using a mature technology, for example, as a secondary audio channel in a DVB-T TV channel, then the service provided is a mature service. If AD audio is delivered using technologies that are not currently used for this purpose then it is an emerging access service.

4.4.1 Audio Description service over a DVB-IP TV channel (AD-IPTV)

If a DVB TV channel with AD is delivered through an IP connection, a crucial question is whether the audio channel containing audio description will reach the user in a convenient and usable format.

DTV4All will provide a demonstrator that will show the impact of routing, allow for the checking of operational problems, especially those related to usability, and the impact on usability of using different TV-IP receivers,

4.4.2 Audio Description over video on demand (AD-VOD)

For a Video on Demand service where some of the videos offered have Audio Description elements associated with them (probably created primarily for DTT), a crucial question is whether or not an audio description service can be provided over this platform.

A demonstrator will be provided that will allow the decoding of videos by means of a IP set-top box for presentation on a TV set to be tested, and diverse platforms for the delivery of the VOD services to be evaluated. Reception of AD-VOD on a PC will also be tested. In particular, videos will be downloaded to identify operational problems for AD and their possible solutions.

4.4.3 Audio Description of web page videos

The possibilities for providing optional AD accessibility services with videos delivered via the Internet will be explored: AD to accompany videos streamed using proprietary technologies such as Flash, Windows Media, Real Video, will be investigated.

4.4.4 Partner involvement in work on "Enhanced Audio Description services"

Televisió de Catalunya (TVC)

TVC will implement and demonstrate emerging Audio Description services as described in Sections 4.4.1, 4.4.2, and 4.4.3. The tests will include technical evaluations and expert evaluations on working demonstrators. Recommendations will be prepared to bring the services and related workflows towards a mature level. The tests will be carried out in the Catalan and/or Spanish languages.

4.5 Reduced playback speed

Dyslexics and some people with cognitive impairments could benefit from receiver sets that allow the playing speed of the video/audio content of a programme to be reduced. To realise this, storage media must be available on the receiver e.g. a hard disk. Two methods of reducing playback speed are considered.

4.5.1 Uniform slowdown

This first method involves the uniform slowing down of the audio and video using time-shift recording at the receiver. Consequently, its use can result in the start of the next programme being missed. However, the slowed-down programmes could be delivered using an application without time schedule constraints such as TV Anytime or "trickle cast" (downloading the programme while watching another – BBC R&D).

This slow down method is basically similar to slow-motion videos: it is achieved by repeating video frames. However, for conventional audio productions, slowing down of the tape speed, or repeating each sound sample on the digital format, causes pitch shift and harmonic distortion. To avoid these effects, at the production end, the audio part has to be treated in the same manner as the video by repeating a corresponding group of sound samples for each repeated "frame"[3]. Due to the processing power required for time-stretching by granulation, it is not feasible to implement time-stretching on a STB at home as a real-time time-stretching of receiver mix. Thus, this functionality would be implemented as a broadcaster mix and could be delivered as a secondary stream in the private section, or in parallel over IP.

DTV4All will demonstrate this functionality to increase awareness and acceptance of the provision of a reduced playback speed facility. Also, this would be subject to an expert test for its viability.

[3] Itagaki, T. (2000) "Sound Compression/Interpolation by Granulation." presented at *the 108th Audio Engineering Society Convention*, February 2000, Paris, FRANCE, preprint No. 5126 (J-5).

4.5.2 Adaptive speed depending on content/scene

A second approach is to slow down audio to make conversations easier to understand while not extending the overall duration of a TV programme. The audio segments of dialogue are stretched (including pitch correction) while those segments without dialogue are compressed.

This requires the modified sound to be prepared by the broadcaster which then transmits the modified sound on a second sound channel.

To maintain synchronicity, it will be necessary to adapt the video speed accordingly.

A mock-up will be presented to demonstrate this functionality. Extensive tests are expected to be necessary before a service of the type described above can be provided. DTV4All will only demonstrate the concept.

4.5.3 Partner involvement in work on "Reduced playback speed"

Institut für Rundfunktechnik (IRT)

IRT will test implementations and provide demonstrations using content in the German language.

Universitat Autònoma de Barcelona (UAB)

UAB will arrange expert tests in the Catalan and/or Spanish languages. Technical equipment will be provided by TVC and/or IRT.

Brunel University (Brunel)

Brunel will implement, demonstrate and test solutions for slow playback and a time stretching mechanism in the English language.

Danmarks Radio/Danish Broadcasting Corporation (DR)

DR will participate in dissemination actions for "Reduced playback speed" solutions.

RAI-Radiotelevisione Italiana (RAI)

RAI will provide demonstration material mainly in the Italian language.

4.6 User interface aspects

The user interface is the aggregate of the means by which the user interacts with their digital receiver. The user interface provides the means of communicating with the receiver. The design of a user interface affects the amount of effort its user must expend to provide input to the system and to interpret the output of the system. The key words associated with user interface design are usability, psychology, physiology of the users, and ergonomics.

4.6.1 Simplified graphical user interfaces

Graphical User Interfaces (GUIs) provided on the TV screen that can be interfaced through a handset remote controller are not currently commercially available but will be relevant to the provision of access services when the consumer electronic industry starts to implement such solutions. Broadcasters will not necessarily be involved in this process. However, one or two applications could require the preparation of metadata by the broadcasters, for example, for the provision of talking EPGs and GUIs. Metadata is data about data.

4.6.2 Spoken interface and talking EPG

Audio User Interfaces (AUI) can convert speech to text and/or text to speech for the visually impaired. In other domains, this technique is in use and widely accepted, e.g. in elevators to announce the floor numbers or in telephone networks for directory assistance. An example of an AUI in the broadcast environment is an electronic program guide (EPG) provided by a text-to-speech engine. Also known are implementations in TV receiver sets allowing Teletext to be converted into spoken words as mentioned in Section 4.1.3. Research will be carried out in the project on how spoken interfaces are applicable for the use in the world of digital television in terms of access services.

4.6.3 Braille interface

Braille is a system of embossed type for blind and partially sighted people. Arrangements of raised dots representing letters and numbers can be identified by the finger of the reader.

For access to digital TV, electronic Braille displays could offer textual information, e.g. derived from subtitles or websites. Electronic Program Guides (EPG) containing content description and programme schedules could be converted to make them suitable for Braille displays. Such devices are already on the market and can be adjusted and extended for the purpose of DTV access services. The project will investigate the state of the art of automatic transcription to Grade 2 Braille, as opposed to Grade 1 Braille where each cell of six (or sometimes eight) dots represents a single character, Grade 2 Braille uses contracted representations of certain words or letter combinations to save space and allow for a higher reading speed.

Investigations will be made by the DTV4All project to analyse the extent to which Braille interfaces are applicable for the use in access services for Digital Television.

4.6.4 Partner involvement in work on “User interface aspects”

Institut für Rundfunktechnik (IRT)

IRT will evaluate test implementations for advanced remote control sets, possibly in co-operation with RedBee/BBC (language-independent).

Rundfunk Berlin-Brandenburg (RBB)

RBB will provide SI data for speaking EPGs in the German language.

Televisió de Catalunya (TVC)

TVC will collaborate in the tests in the Catalan and/or Spanish languages.

Danmarks Radio/Danish Broadcasting Corporation (DR)

DR will participate in the dissemination actions for “User Interfaces”.

5 Practical issues

5.1 Cooperation with the CE-manufacturers

Some realisation of the ideas triggered by DTV4All on the receiver side could be done now by the Consumer Electronics (CE) manufacturers where no actions by the broadcasters are required. This is particularly true for receiver enhancements such as:

- Just-in-time solutions and solutions for reduced playback speed with the help of storage media in the receivers, i.e., set-top boxes.
- Modification of remote controls for easy access to TV
- Easy access to a second sound channel, if this service is available, through a dedicated and thus easy-to-use button on the remote control rather than via hidden sub-menus

From the start of DTV4All it is desirable to cultivate contacts with the CE industry and to convince the stakeholders to support the project. Support could be offered in many ways, e.g. by providing the partners with hardware, software, and by supporting them with dissemination matters. The exchange of information between, broadcasters, users and CE manufacturers is essential to tackle incompatibility issues. This should happen as early as possible, i.e., during the prototype phase.

5.2 Tests with the help of UAB

In contrast to mature access services, it is not clear if the emerging services will be accepted by the users they are intended for. Hence, user tests are of great importance for DTV4All and are required for all implementations of “emerging services”.

5.3 Dissemination issues

The point of view of the DVT4All partners is that all the technical aspects of DTV4All are not new but rather well known to the relevant experts and many broadcasters, the EBU included. However, the general public is not aware of the technical aspects of DTV4All and, more importantly, to some extent neither are the CE manufacturers and parts of the European Commission. To overcome this lack of awareness, dissemination of these issues by DTV4All is essential and perhaps of primary importance for the success of the project. Experience with former projects shows that access services are under the scrutiny of the media and arouse public interest.

6 Summary and final remarks

The proposed plan for pilots of emerging services is closely related to and derived from the "Description of Work", dated June 2008, for "emerging services" and might be altered or adjusted during the identification of services phase. The plan does not address mature services but may overlap with the pilots of mature access services to be carried out in DTV4All. For instance, this might be the case with DVB-subtitling which is a mature service and HD-subtitles which is an emerging service because HD-subtitles are an extension to the existing DVB subtitling specification. The effectiveness of the teamwork between the partners doing the mature services pilots and those doing the emerging services pilots, some partners are involved in both types of pilots, will impact on DTV4All.

The arguments in the section of this document on "practical issues" mostly also apply to the "mature services". For the emerging services the crucial point is that dissemination matters and the field tests are of great importance if the project is to be effective in this area of its work.

Glossary

AMR-WB	Adaptive Multi Rate – WideBand
BBC	British Broadcasting Corporation
CE	Consumer Electronics
CE-HTML	Consumer Electronics – Hypertext Markup Language
DSM-CC	Digital Storage Media Command and Control
DVB	Digital Video Broadcasting
DVB-T	Digital Video Broadcasting – Terrestrial
EBU/DVB AVC	Advanced Video Coding due to the specifications of EBU and DVB
ETS	European Telecommunication Standard
GSM	Global System for Mobile Communications
HDTV	High-definition television, regarded to be at least 1280 pixels at 720 lines (active

	picture)
HTML	Hypertext Markup Language
IEC	International Electrotechnical Commission
IP	Internet Protocol
ISO	International Organization for Standardization
MHP	Multi Media Home Platform
MHEG	Multimedia and Hypermedia Experts Group
MPEG	Motion Picture Experts Group
RSS	Remote Syndication System
SDTV	Standard Television 720 pixels at 576 lines (active picture)
TV-HTML	Television – Hypertext Markup Language
UMTS	Universal Mobile Telecommunications System

7 Definition of terms

In vision sign language - picture in picture feature (PiP)

Two independent video streams on a TV display with an established relationship to each other implemented with the help of the picture in picture technique (PiP).

Open signing or receiver mix signing

Two independent video streams on a TV display. One screen contains a human signer using sign language for the deaf. This screen is under control of the user, this means the signer can be switched off by the user independently of the main video screen.

Closed signing or broadcast mix signing

Two independent video streams on a TV display. One screen contains a human signer using sign language for the deaf. This screen is not under control of the user, this means the signer cannot be switched off by the user.