# COMPETITIVENESS AND INNOVATION FRAMEWORK PROGRAMME

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## Context

DTV4All is project that promotes making television accessible. It focuses on the use of resources and technologies that are already in place to make television as accessible as possible to viewers with functional impairments. Access services of high perceived quality are the main vehicle of this accessibility.

Considerable progress has been made in the first decade of the century with the provision of access services in Europe. As digital switchover takes place country by country across Europe, we have a good understanding of what is required and how to produce and deliver access services such as subtitles, audio description and visual signing.

But we still have a number of challenges to face. In particular, we need to have a clearer idea of what we have achieved and what remains to be done.

Much has been done but much remains to be done in some member states on making regular programming on digital television more accessible irrespective of access service provision just by taking a little more care with the audio and the video layers. It should be possible to access basic functions of digital television without the assistance of other people, such as the electronic programme guide (EPG).

There is an abundance of experience with a variety of solutions for producing and delivering access services that can be tapped into, so that those getting started do not have to begin from scratch each time. Generally speaking, the technologies and solutions for broadcast television are mature, and the outstanding challenges are predominantly organizational, political or economic in nature. Yet the access service field is riddled with ignorance and misconceptions that lead to poorly-documented business cases.

Very few countries have achieved 100% coverage of subtitles for the deaf and hard-of-hearing and supply-side targets for audio description and visual signing are more modest. What we hope to achieve and how fast that progress is made varies considerably across the continent

In terms of achievements, there is a lack of solid statistics needed to assess progress in television access services, although the EBU has taken steps to plug this gap with surveys of European broadcasters.

Crucially at the European level, one size clearly does not fit all when it comes to access services. Europe is a diverse continent when it comes to national and regional societies, their cultures and economic means. Some territories have come far with access services and are looking to consolidate and optimize them. Others have only just begun to offer one or more of these services and are feeling their way.

## Generic recommendations

### *Optimise existing television and access service production*

- *Optimise existing television production*

As television coverage of the 2010 World Cup Championship in South Africa showed very clearly, making sure that the picture and sound do their jobs makes all the difference to the viewing experience, especially when thousands of fans in the stadium are blowing Vuvuzela trumpets.

In less than two decades, television production has moved from being highly complex to being a field where nearly anyone can produce some content resembling television. Professional norms and skill sets that were universal are not necessarily in place among those working with desktop-based TV production.

When it comes to the programme sound, making use of the know-how of sound engineers and basic common sense can go a long way to making the sound intelligible. Something similar applies with respect to the programme picture. Accessibility improves if someone checks that the picture, captions, graphics and subtitles are all aligned so that one visual element does not mask another and that the captions and graphics are legible.

Formalised design heuristics and guidelines can be of help, but this assumes that there is a mechanism to ensure that they are being followed. However, those involved with programme production will invariably take the steps necessary to optimise the viewers' experience of the programme once they have seen what a difference such details can make to their viewers. Therefore, the real challenge is to get the programme production team involved in a process of applying such guidelines in a few representative cases where their impact is clear.

This action is relatively cheap and easy to do and could make a big difference.

- *Optimise existing access service production*

There are a number of actions that can be followed to improve the efficacy and efficiency of access service production. These are listed in the section on "specific recommendations".

- *Extend the metrics of access service provision*

There are issues to do with targets that need to be resolved. Today these are mainly supply side metrics, with some measurement of access service awareness. There is a need to extend user targets to include use of and satisfaction with specific access services. This requires:

- Consensus-based action at national level to extend access service metrics
- Make resources available at national level to improve awareness and use of existing access services based on analysis of behaviour of the various target groups when seeking out information on this subject.

The public sector across Europe needs to be able to demonstrate value for money is a consequence of fiscal restraint. Both supply and demand-side metrics will be needed if access services are to be truly accountable. This action is not particularly expensive, but requires a significant investment of time and effort to achieve consensus on changing metrics.


### Scale up access service provision and use

- *Consult a range of national stakeholders*

Striking a balance between the needs and interests of the various stakeholders has never been an easy matter. Given the current economic climate, the challenge is even greater.

Those representing people with various functional impairments would naturally like to see as much progress as fast as possible in the direction of full access services for all channels. But this is clearly something that cannot be done from one year to the next. Service level agreements reached during a time of economic restraint should be easier to scale up at a later point when European economies emerge from this period of fiscal restraint.

- *Allow access services to move with the times*

Regulators in most European countries that mandate access services and service level agreements usually specify targets for the proportion of television programmes on specific channels for which there has to be access services. The targets not only specify the channels but also the technical solutions that need to be used.

When television was predominantly delivered in analogue form through the ether to digital terrestrial receivers this may have made sense. In a world of multiple digital delivery platforms, however, this makes less sense.

Access services and users' needs and requirements are fairly clear and understood, and are largely independent of the delivery network and device on which they are required. As the technologies used at any time and on any platform will depend on both technical and economic factors (which can include the shortage of bandwidth on broadcast networks) it makes good sense to define services in terms of who they should serve and what they should do rather than provide a detailed specification of the technological solution to be used.

Using a service approach that can adapt to new technologies without significant impact on the service provider and whilst delivering the user-requirements (and measuring the outcomes with demand side metrics) ultimately will be beneficial for all those involved.

This action requires concerted efforts on the part of all those concerned but the outcome would hopefully justify such a commitment.

**Specific recommendations**

In terms of the issues identified by the project Pilots of Mature Access services carried out in the DTV4All project the following recommendations are made:

1. **Respect cultural and national characteristics.** For accessibility purposes a difference must be drawn between the three modes of media content translation in Europe: subtitling countries, dubbing countries (France, Germany, Italy and Spain), and voice-over (lectoring) countries such as Poland where they neither subtitle nor dub but use lectoring/voice-over as their preferred mode.

2. **Each member state needs to participate in a "technical forum" with regulator(s), broadcasters, manufacturers and user representatives that issues "implementation guidelines" and checks "compliance".** DVB subtitles and audio access services can be made available in each member state without drastic changes in transmission, the DVB and MPEG standard are in place to achieve this. Some Set-Top-Boxes may need some changes, but high-end Set-Top-Boxes are ready for access services. Some EU member countries have managed to implement access services with a help of a "technical forum" with regulator(s), broadcasters, manufacturers and user representatives. e.g. UK: DTG, Nordic Countries: NORDIG, c.f. Japan: ARIB.

3. **The "digital television receiver product cycle" must be taken into account for a functionality update for access service provision.** A "reasonable" Set-Top-Box/Integrated Digital Television Receiver replacement cycle is every 5 to 10 years. Products more than five years old may not function properly when new access services are provided with existing programming, this issue has to be disseminated and legal backing has to be arranged to allow broadcasters to provide new access services. Dealing with this issue is the responsibility of the national technical forum which can address

consumer regulations and the production cycle into order to provide clear roadmaps for the introduction or enhancements to existing access services or a comparable mechanism that handles public service obligations.

4. **Each member state needs to participate in a "user forum" which prioritises access services, sets "quotas" and imposes "quality control".** Supply and demand-side targets need to take into consideration the resources available and will require some frank discussions of priorities as services are ramped up to their final levels.

5. **Ensure that metadata used to provide both Electronic Programme Guides and other programming listings contains accurate and timely information on the access service(s) available.** It is a truism to say that if the viewer cannot find the access service for a given programme then for all intents and purposes it does not exist. For services such as audio description and visual signing that are available for a limited number of television programmes, it is essential that metadata workflows generate information in electronic form that specifies the existence of access service(s) for a given programme. If the metadata is created along with the service for a programme, it can find its way into the "food-chain" for EPGs and programme listings, both for the initial airing and programme repeats. If this is not done, the risk of omitting to tag a programme as having an access service is significant. In countries where there are a modest number of television channels, one potential solution is to create "virtual" television channels with audio description delivered using the broadcaster mix. Those requiring AD can tune to this virtual channel that will always offer AD when present, rather than relying on viewers who are blind or have visual impairments to know when a programme with AD is available and then selecting "alternative audio" each time with their remote control devices. (The use of virtual AD channels is now standard practice in Denmark for digital terrestrial television and the largest digital cable operator).

6. **Promote the introduction of spoken subtitles to help multiple target groups.** Greater emphasis needs to be placed on providing audio subtitles because subtitling is a modality that is already accepted across the board by the broadcasters and their audiences. Since we are aiming at 100% subtitling of programming it is counterintuitive not to implement audio subtitling. The additional costs of providing spoken subtitles through speech synthesis for a television channel are comparatively small and the cost-benefit of doing so – increasing accessibility for significant number of viewers – is substantial.

   a. Spoken Subtitles (Audio Subtitles) are more mature than is generally realised.

   b. Spoken subtitles can supplement interlingual subtitling to reduce the exclusion of persons who do not understand the language on the sound track and who do not benefit fully from subtitles because of poor reading skills or impairments such as receptive aphasias.

   c. Spoken Subtitles can supplement interlingual subtitling to the benefit of those with impaired sight, a group which includes a large number of older viewers, and some immigrants since for them the subtitles are in a "foreign" language which they may speak better than they read.

   d. Spoken subtitles are of particular benefit to the blind since, in the short term, targets for audio description are unlikely to exceed 20% of programming. Spoken subtitles are an acceptable complement to audio description to increase the

proportion of programmes accessible to the blind without a commensurate increase in budget.

7. **Promote the existence of opt-in same-language subtitles that are already offered but not widely used**. Intra-lingual subtitles for prerecording television programming face some challenges, depending on whether the country belongs to a region that traditionally offers dubbing or subtitling for foreign language television programmes. As the service is not in-vision but optional (closed subtitling) the major challenge is the lack of awareness of their existence.

   a. Awareness level studies demonstrate this among the deaf, the hard-of- hearing, those who find it difficult to follow spontaneous, fast paced dialogue in their own language.

   b. It is important to hold in mind that the target groups for awareness raising activities go beyond the traditional disability groups. Significant groups to be considered include immigrants for whom subtitling could facilitate comprehension and indirectly promote social cohesion and students of languages across the EU.

      o It has been shown (by several EC EU projects such as VOICE, NET4VOICE, e-Title, LvS) how subtitling is a powerful tool for learning languages for standard students across countries and ages.

   c. Persons with age related impairments are a large and growing group with particular awareness needs since, in general, they are neither deaf nor blind but both their sight and their hearing are impaired to a degree.

8. **Support the provision of re-speaking software for the creation of live subtitles in all European languages.** The BBC achieved by 1 April 2008 almost 100% intra-lingual subtitling. This was achieved thanks to the technique of "subtitling by respeaking". Though the quality and accuracy of this type of subtitling is still to be improved subtitling by respeaking has proven to be a potent tool towards accessibility. In order to take on board this technique Speech Recognition (SR) Software must be available in the language used. Some commercial firms offer quality SR programmes, such as Dragon (Nuance) or ViaVoice (IBM), but for minority European languages there are no SR software available and its creation is not guaranteed. A pool of European languages SR software should be created in order to promote 100% subtitling.

9. **Address current issues facing the production of live subtitles**. There are significant issues with the effectiveness of intra-lingual subtitles for live television: unresolved issues to do with the accuracy of subtitles produced through re-speaking; unresolved trade-offs between reading speed and the degree of text compression (ranging from verbatim transcriptions to considerably compressed subtitles that match the reading speed of a greater proportion of the audience)

10. **Address current issues facing the delivery and presentation of live subtitles**. Live subtitling in its current state does not lead to significant improvements in accessibility for a significant proportion of viewers due to the delay between the signal and the subtitles. This is a major issue for the target audience (those with serious hearing impairments) and was identified independently in three different studies (RNID, Roehampton, and DR). Buffering the video and audio streams to resynchronise the content in programmes with

live subtitles represents a realistic option to take corrective action. The presentation of subtitles one or two words at a time rather than in blocks has a negative impact on reading. When a solution for resynchronising live subtitles is in place, it would be natural to revert to block presentation of subtitles which is found in pre-prepared subtitling.

11. **At the multiplex use the statistics of subtitle bit-rate usage to monitor correct operation of the subtitles.** The statistics of subtitle bit-rate usage can be used both to reduce the overall bit-rate required in a multiplex of several services and to monitor correct operation[1]. At BBC R&D a system was implemented on two PCs each with an ASI transport stream interface which performed analysis on all the services within the multiplex on two sites and correlated the two to identify and log potential subtitle faults in the particular context of the (then) BBC DTT distribution architecture (i.e. in a simple expert system).

12. **Recommendation for the design of DVB-subtitles.** For countries introducing DVB-subtitles, a design recommendation is given. This recommendation is based on a large scale empirical field test which was conducted by broadcaster RBB in Germany in the framework of DTV4All. In this test a representative target group of 52 hearing impaired and deaf users evaluated a large scale of different DVB-subtitle design variations with a weekly questionnaire over 36 test weeks. The evaluation was based on a method that allowed those solutions which found the broadest acceptance of all testers involved to be found. (For the methodological and technical details of the test and its results please see DTV4All Deliverables D2.4 and D2.5). Based on the final results for the single design parameters *font type, font size* and *output style (background of subtitles)* "the winner" of each parameter category was combined into one look and feel:
   * Font: Tiresias Screenfont
   * Font size: Average, (45 points)
   * Background style: normal box with average transparency 80 (FAB Subtitler XCD): RBB's subtitle department was asked to evaluate this user vote. They recommended using a slightly less transparent solution in order to grant optimal contrast also for subtitles overlaying writing and graphics on the TV screen. The transparency factor recommended by them was 60. Please see the respective illustrations below. This recommended solution was presented to the testers and agreed by them.

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[1] These ideas are enshrined in a patent GB2396069 (laconically titled "Analysis of digital signals") filed in 2002, dated 2004 and granted 2005.

As a final recommendation we therefore suggest the following solution:
- Font: Tiresias Screenfont
- Font size: Average, (45 points)
- Background style: normal box with average transparency 60 (FAB Subtitler XCD)

Transparency Factor 60:



Transparency Factor 80:

13. **Offer opt-in visual signing for mainstream television programming by using emerging hybrid digital broadcast/broadband television standards.** Visual signing is a truly mature access service where the issues with service production are well-understood, but where there are challenges, usually due to resistance from hearing viewers who resent in-vision signing in prime-time programming and who make their opinions felt to broadcasters and regulators. There are currently two kinds of visual signing programmes: assistive programmes made specifically for deaf viewers whose mother tongue is visual signing, and inclusive programmes, where visual signing is added so that deaf viewers whose mother tongue is visual signing can also benefit from watching (e.g. news and current affairs programmes). Being able to offer opt-in visual signing solutions (delivered on emerging hybrid digital broadcast/broadband television receivers) represents an avenue could release resources from distribution budgets that could be re-invested in increased visual signing services.

14. **Promote the existence of audio description services.** Audio Description for prerecording television programming faces some challenges, depending on whether the country belongs to a region that traditionally offers dubbing or subtitling for foreign language television programme. As the service can be either an opt-in Broadcaster Mix or Receiver Mix, the major challenge is the lack of awareness of the existence of such a service, compounded by the lower availability than, say, intra-lingual subtitles (even in the UK, less than 15% of programmes on major channels have AD compared with 99% SDH).

15. **Establish demand-side metrics for each access service being offered.** Raising awareness should be the first but not the only metric for the success of an access service; a more adequate list of metrics would include:
    a. Proportion of target group/population aware of existence of the service

    b. Proportion of target group who intend to use the service in the next six months.

    c. Proportion of target group who currently use the service infrequently.

    d. Proportion of target group who have tried the service and stopped using it.

    e. Proportion of target group who have been using the service regularly for less than six months

    f. Proportion of target group who have been using the service regularly for more than six months.

16. **Use an evidence-based approach to the provision of promotion of access services for television**. The role of other stakeholders in creating awareness and providing relevant and up to-date information to citizens coming to terms with their impairments after accident or illness should be examined. In some Member States this is predominantly bodies and associations representing those with disabilities. In others, there are professionals in adult education and healthcare whose job it is to help individuals. There would seem to be synergies of working both on television campaigns and on information and dissemination activities targeting these other stakeholders who may have a significant impact on awareness of impairment and access services for digital television.