The future of DTV Access services

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This is the third of three articles on television "access services" to be published in EBU Technical Review.

The first article looked at the current nature of the European Commission's e-Inclusion challenge and included an overview of mature and emerging access services for digital television. The second explored some of the *whats* and *hows* ... what kinds of issues emerge when offering access services and how broadcasters can address these production and delivery issues.

This final article in the series addresses the question: *"Where do we go from here?"* **and is a personal interpretation of the options facing digital television when striving for e-Inclusion.**

As the two previous articles showed, considerable progress has been made in the "noughties" (the first decade of the century) with the provision of access services. 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.

Firstly, we need to have a clearer idea of what we have achieved and what remains to be done. 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. In terms of objectives for future work, 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.

Secondly, 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.

Thirdly, 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.

When discussing policies, strategies and implementation, what is needed is some kind of strategic toolkit. This needs to contain pointers as to the kinds of issues that should be explored and provide examples of good practice, while taking into consideration the maturity of access provision and the economic circumstances of the stakeholders in the territory in question.

The strategic steps that need to be considered include:

1) Optimizing what is already in place;
2) Scaling up access provision and use;
3) Demonstrating "proof of concept" for new access services or old access services on new platforms in the short to medium term;
4) Looking at demographic scenarios and their implications for television in the medium to long term.

I will explore each of these steps and the actions they entail in turn.

Optimizing what is already in place

There are several things that need to be done in the immediate future to make our existing television programmes and access services better than they currently are.

Make television programmes themselves accessible

It is perhaps a truism to say that making television accessible is not just a question of access services. 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.

When it comes to the sound, common sense and making use of the know-how of our sound engineers can go a long way to making the sound intelligible. Something similar goes for the television 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. Those involved with television production will invariably do what is necessary once they have seen what a difference such details can make to their viewers.

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

Make the viewing of live subtitles worthwhile

The proportion of television programming that is produced live is increasing both in absolute and relative terms. In some countries such as the UK, subtitles are available for all programmes on the major television channels, and others such as the Nordic region plan to reach this target in the next year or two.

The issue here is the *usefulness* of live subtitles. As there is a delay between the programme and the subtitles appearing, of anywhere between 5 to 15 seconds, this is a significant problem for a majority of viewers with hearing impairments as was shown by studies done at the University of Roehampton in the UK and by DR in 2009 as part of DTV4ALL. More than half of those for whom subtitles were intended did not find them useful because of the delay.

Subsequent experiments indicate that the delay is approximately constant for a given subtitler and programme. "Resynchronizing" the programme by delaying the signal in the receiver but not the

subtitles by a fixed offset (e.g. 7 seconds where the delay is 7 seconds) for that programme is usually enough to rectify the problem.

Given the thousands of hours of live subtitles produced annually, it would make sense to identify and standardize a solution that could buffer television content and resynchronize it in the receiver.

This action is not easy, neither is it cheap nor quick. Nevertheless, live subtitles in their current form are not achieving what they are intended to do.

Extend the metrics of access service provision

National regulators of television are primarily concerned with supply-side metrics – what proportion of television programmes on the various channels in their territory should be aired with subtitles, audio description or visual signing for a given channel. In some cases, regulators fund studies to monitor awareness of the existence of a given access service, such as the OFCOM-funded study in the UK on audience awareness of audio description in 2008.

> ***"Awareness is just the first of several stepping stones or pre-requisites for an access service to reach its intended audience"***

Awareness is, however, just the first of several stepping stones or pre-requisites for an access service to reach its intended audience.

Two studies in Denmark, on how people with hearing and visual impairments learn of the existence of subtitles or audio description, show that a year after analogue shutoff, awareness levels among the target audiences of such services is still quite low. They highlight the importance of understanding how people become aware of access services, both direct sources of information (a good website explaining what is available, how to set up the receiver and to use, say, DVB subtitles) and the person's network of contacts.

In the case of subtitles, a majority of audiologists were familiar with the existence of subtitles for the deaf and heard-of-hearing. They were in the habit of mentioning subtitles as part of their consultations with clients who had come to have a new hearing aid fitted. But few if any knew about DVB subtitles and the advantages these usually have, both in terms of their legibility and ease of use (of being able to set the digital receiver so that the television always shows DVB subtitles in their language – an apparently small but significant improvement for the hearing-impaired).

What this Danish study shows us is that many elderly viewers get their information about access services both through family and friends and also through various professionals who work in retailing, special education for adults and the heath care system. If we can raise the awareness of such services amongst professionals, this will have an important knock-on effect for their customers and clients.

The studies in 2009 on the use of live subtitling mentioned earlier show the importance of monitoring demand-side metrics such as access service awareness, access service use and user satisfaction. If these had been in place, the problems facing live subtitles would have been identified far earlier and could have been remedied years ago.

In the public sector across Europe, being 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. Focusing on both, and finding resources to ensure that access services actually get used, need further consideration.

This action is not particularly expensive, but requires a significant investment of time and effort to achieve consensus on changing metrics.

If we can address these three issues (making television accessible, making the use of live subtitles worthwhile and extending the metrics of access service provision) we can put existing access services on a stronger footing, before moving to scale up access service provision and use.

Scaling 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. 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.

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.

Nick Tanton, Head of Technology at the BBC Switchover Help Scheme, argues that the regulatory pressures and the timing of the introduction of new services vary not only from country to country but also from platform to platform. 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.

> ***" ... the regulatory pressures and the timing of the introduction of new services vary not only from country to country but also from platform to platform "***

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.

Produce systems for live subtitles for all European languages

One of the impediments to scaling up subtitles is technical in nature. The production of live subtitles increasingly makes use of re-speaking solutions in which the subtitler dictates a linguistically compressed subtitle into a speech recognition system. The text output of speech recognition is format-

ted and displayed in much the same way as pre-prepared subtitles.

> ***"Producing and maintaining the modules that handle language modelling and speech recognition requires a considerable up-front investment"***

Producing and maintaining the modules that handle language modelling and speech recognition requires a considerable up-front investment. As the number of suppliers of such systems is limited, the result is that re-speaking systems are not available for many of the less-widely spoken European languages.

The response in countries such as Sweden is to get stakeholders to work together on the language modelling and to evaluate the extent to which open-source presentation modules can be used with their language modules. Where such re-speaking systems exist, there is a need to constantly update and upgrade the speech recognition capabilities so that the proportion of linguistic errors can be brought down to acceptable levels.

There is a need for a more general discussion between stakeholders at national and European level to discuss public-private collaboration to assure the availability of high-quality re-speaking systems not only for television but also for other public services including coverage of parliamentary debates on other platforms such as the Web.

This action is extremely demanding from an organizational and political perspective.

Scaling up access service provision is ultimately an economic issue and requires careful consideration of funding models. In many European countries, access services are funded out of existing television production and distribution budgets.

In some countries, access services are subsidised or paid for in full from public funding. In the USA, sponsorship of subtitling is a well-known business model for access services that has not been fully explored elsewhere.

And yet there are examples of visual signing with a "dancing signer" on a programme with video clips for young people that is sponsored by a local paint retailer in the London area, and television commercials that are provided with DVB subtitles on free-to-air television in New Zealand.

We would benefit from thinking out of the box and from coming up with some original business models to supplement public funding.

Demonstrating "proof of concept" for new access services or old access services on new platforms in the short to medium term

The access services we offer today were originally conceived in a world where standard-definition broadcasting (terrestrial, cable or satellite) was the dominant means of distributing television.

The introduction of high definition television (HDTV) and three-dimensional television (3DTV) are disruptive technologies in one sense. What works with standard definition does not necessarily make as much sense on HD. Operating visual signing in a virtual, standard-definition channel is a case in point.

> ***"What works with standard definition does not necessarily make as much sense on HD"***

The significance of 3DTV is less clear to judge. If it were to become mainstream, there are a series of narrative conventions and editorial decisions that will need to be addressed at channel, broadcaster and operator level, not least banal decisions such as where in the depth plane to position subtitles, and whether captions and graphics should be an integral part of the background or "float" somewhere between the back plane and the front of the image.

Make visual signing an opt-in solution

Visual signing is currently delivered in a number of configurations. Most of them involve a visual signer being superimposed in a small window somewhere on the screen. This is broadcast to all viewers. Other configurations have a virtual channel in which the signer stands to one side of a window on the screen where the programme is displayed.

Figure 1
The Belgian solution is to overlay the signer to the right of the "programme window", which does not cover the full screen area. In this set-up, the signer is big enough not just to convey hand movements but also to clearly convey facial expressions. The challenge is that all viewers have to see the news with signing.
(Credit: La Trois, Belgium)

Both these solutions have drawbacks. The small window is often too small for viewers needing the service to see facial expressions and hand movements, both of which are an important part of sign language. There are often adverse public reactions to signing which has to be seen by those who do not require it. The virtual channel solution is a good one for viewers of signing, but as digital television migrates from standard definition to high definition, there may well not be enough bandwidth to continue the virtual channel solution.

With the advent of the ETSI HbbTV standard and the increasing availability of good broadband services, it would be both feasible and cost-effective in many European countries to offer an opt-in virtual channel with visual signing that was simulcast to television screens via broadband.

Offer spoken subtitles for television programming in a foreign language

Where subtitling for the deaf and heard of hearing is already in place, it is a small and inexpensive step to offer spoken subtitles using speech synthesis and delivery on an additional mono audio track using the same set-up as audio description (receiver mix).

Offer access services for catch-up television and on-demand services

Over time, an increasing proportion of television viewing takes place asynchronously, not when the programmes are broadcast but when the viewer chooses to see the programme.

Figure 2
As part of its work on the DTV4All project, RBB and the IRT implemented an HbbTV prototype application that enables viewers to access on-demand TV programmes. In this case the viewer can select signing on his/her TV as an overlay delivered to the screen via the Internet. Once a TV programme begins, the application automatically starts and informs viewers that an enhanced version with signing is available. If chosen, the signed version of the show is delivered to the TV screen via the hybrid broadcast-broadband Internet connection.
(Credit: RBB, Berlin)

Free-to-air Personal Video Recorders (PVRs) in the UK and the Nordic region already record and replay associated data types such as subtitles and audio description. This needs to happen on all the networks and devices on which we deliver catch-up television and on-demand services.

The BBC i-Player is one of the first multi-platform players to do just that, in the same way as DVDs published by the BBC usually offer an Audio Description option when the disc starts to play.

Set up a task force to look into access services for 3DTV

As was mentioned at the top of this section, 3D standardization has focused on the technical aspects of producing and delivering the signal. A number of narrative conventions for the handling of graphics, captions and, indeed, access services that use the screen have not been fully addressed.

The 3DTV user experience – in particular the paucity of data about the long-term impact on viewers of watching 3D – is already the source of concern in several quarters.

The action here should be evidence-based and make use of empirical studies of the viewers of 3DTV including those with functional impairments. Research of this kind is already underway in Australia (Murdoch University) and in Disney's research labs in the USA.

Looking at demographic scenarios and their implications for television in the medium to long term.

As the noughties drew to a close, the population of Europe[1] stood at approximately 500 million. Davoudi et al (2010) reported that the population was ...

> ***"… experiencing only very slow growth … This situation has been brought about by three decades of low fertility rates, producing shrinking cohorts of young people, and in turn generating a 'negative momentum' … While the birth rate had plummeted, a long-term rise in longevity had suppressed the mortality rate and hence created an ageing population…"***
>
> ***"The increase in longevity has been a continuous feature of recent European history. On average, life expectancy at birth has risen from 67 years in 1955 to almost 78 years in 2008. Within Europe, however, there has been a divergence in this trend evident in most Central and East European countries where the life expectancy of men has fallen during the post-communist period… The proportion of people over 65 rose from 9.5% of the total population in 1950 to 17.08% in 2008. This, together with the proportion of the population over 80, is expected to continue to grow. Consequently, the old age dependency ratio in the EU27 is predicted to reach just short of 30% by 2015 and nearly 40% by 2030…"***
>
> ***"Migration has been the main driver of population change in Europe, accounting in 2007 for more than 85% of population growth in the EU. Indeed, the rise in international immigration to Europe has been crucial in maintaining the size of the EU…"***

The authors go on to talk about two scenarios for the coming years in Europe – the "Silver Century" scenario, referring to the increase in the number of 'grey haired' population, and the "Open Borders" scenario, in which European leaders instigate specific measures to compensate for the perceived demographic deficit by actively encouraging immigration.

These scenarios also have implications for digital television access services and the robustness of existing policies and provisions.

The authors explain the implications of the Silver Century scenario in greater detail:

> ***"The European population will continue to age and immigration will be very limited and controlled. The shrinking workforce will have to work longer hours and pay higher taxes to support the rising costs of health care and pensions for a growing number of older people. The fiscal demands of this 'ageing Europe' place tremendous stress on the 'European social model' of welfare provision which is based on a choice made to accept lower economic growth in return for more social protection and leisure time. The social model may be modified to meet the needs of older people, yet will not help redress the continued falling birth-rate. Older people will move in increasing numbers to rural areas, and from North and West to Southern 'retirement destinations', where they use their 'grey' voting power to shift public spending away from nurseries, schools and playgrounds towards health care and retirement homes. Core–periphery and east–west demographic polarization further accentuates as a result of depopulation and loss of labour force."***

One of the implications of this scenario for the current decade is the rising costs of health care and pensions for the elderly and their moving to live in rural areas and in retirement destinations. If they live in non-urban parts of Europe, they will most likely have difficulty gaining access to fixed-line broadband services, giving television a decisive role.

A significant proportion of the elderly will have modest literacy, numeracy and ICT skills, even in Scandinavia where literacy levels are high. Television with the necessary access services can therefore play a central role in keeping the elderly informed, educated and entertained, allowing them to remain in their own homes if they choose to do so, rather than move into public or private old people's homes. A combination of careful inclusive design to make the house or flat "liveable", and accessible television – combined with some degree of home help – is clearly more attractive and less expensive than having to move into a public or private home for the elderly.

1. For practical reasons, the term "Europe" will be equated with EU27 as there is a sizeable body of research for this group of countries.

Peter Olaf Looms is a senior consultant in the commissioning body of DR in Denmark. For the last few years he has been working on access services for digital television so that as many people as possible can get the full benefit from watching television. Much of this work is related to the EU project called DTV4ALL.

In addition to his work at DR, Mr Looms teaches digital media on postgraduate programmes at several universities.

The Open Borders scenario is explained as follows:

> ***"At the turn of the century there is a perceptible, continued decline in Europe's share of the world population. This shrinkage, combined with the ageing of its population, contributes to growing concerns about the competitive future of the continent … European leaders instigate … a proactive policy change in response to predictions that the population of Europe will continue to age as mortality rates decline and birth rates continue to fall. This [is] in sharp contrast with neighbouring regions, such as the countries of the Maghreb, where a relatively young population would continue to rise. Measures are taken following a series of specific triggers, in addition to responses to these general trends, to reduce the restrictions on external immigration and manage an increased volume of immigration drawn from outside of Europe. Migration between countries and regions is however allowed to develop in a laissez faire manner resulting in the impact of the scenario being felt differently from region to region."***

One of the implications of this scenario for television is the challenge of multi-ethnic, multi-cultural nation states with significant minorities speaking languages other than that of the state or country in which they are living and working. Television could be used as a vehicle of social cohesion as we already see it in Catalonia or in Finland where multi-lingual subtitles are provided for prime-time television programmes to encourage immigrant groups to watch locally-produced television rather than relying exclusively on satellite television from their country of birth.

The importance of the two scenarios is that they are plausible stories about possible futures. They allow us to explore how existing strategies and plans would hold up if either of them were to become a reality.

What the "Silver Century" and the "Open Borders" scenarios show us is a continent coming to terms with the economic implications of demographic change, and a diversity of cultural, social and economic circumstances as far as ageing and migration are concerned. Countries across Europe will need to review their current policies and strategies to see how changes in television access services could contribute to the well-being of the elderly who choose to live in their own homes and how they could contribute to improved social cohesion in a society in which immigration is a reality.

References

[1] Davoudi, Simin, Michelle Wishardt, Ian Strange: The ageing of Europe: Demographic scenarios of Europe's futures
Futures 42 (2010) 794–803, Elsevier.
Available online since 21 April 2010 at **http://www.elsevier.com/locate/futures**

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