

Services for impaired and disabled users

Gordon Hunter discusses the role technology plays in making broadcast content accessible to all and outlines the range of services currently provided.

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Content providers and broadcasters have a moral, commercial, and increasingly legal motivation to make their video programmes and commercials accessible for as wide a range of viewers as possible. Morally, it isn't right to exclude viewers from enjoying content because of their visual or hearing impairments or the language they speak. Commercially, opening up potential pay-TV revenues and advertising to as large an audience as possible just makes sense, and in many countries there is now legislation that defines the minimum accessibility of programming to impaired viewers.

In the context of broadcast television, the accessibility challenge comes down to how to best make the rich content that most of us take for granted (in the moving pictures we see and the sound we hear) available to those who do not see or hear well, or those that do not understand the language of the broadcast audio.

Our industry has shown great commitment and pro-activeness in the design and development of effective solutions to increase viewer accessibility, and readers may be surprised at the broad spectrum of services currently provided – hard of hearing subtitling, localisation subtitling, localisation audio dubbing, audio description, in-vision signing, and even speaking programme guides. The migration to end-to-end digital TV services has made it easier to allow viewers to 'opt in' to accessibility content without impacting the mainstream viewer. Opt-in services are often referred to as 'closed services,' whereas services such as overlay subtitles for all to see are referred to as 'open services.'

Softel's expertise lies in the supply of end-to-end tools for the creation, re-purposing, processing, management, and transmission of subtitling and audio description content. I will use this subset by way of example to discuss the role that technology can provide to optimise and enhance the accessibility of content in production and for broadcast.

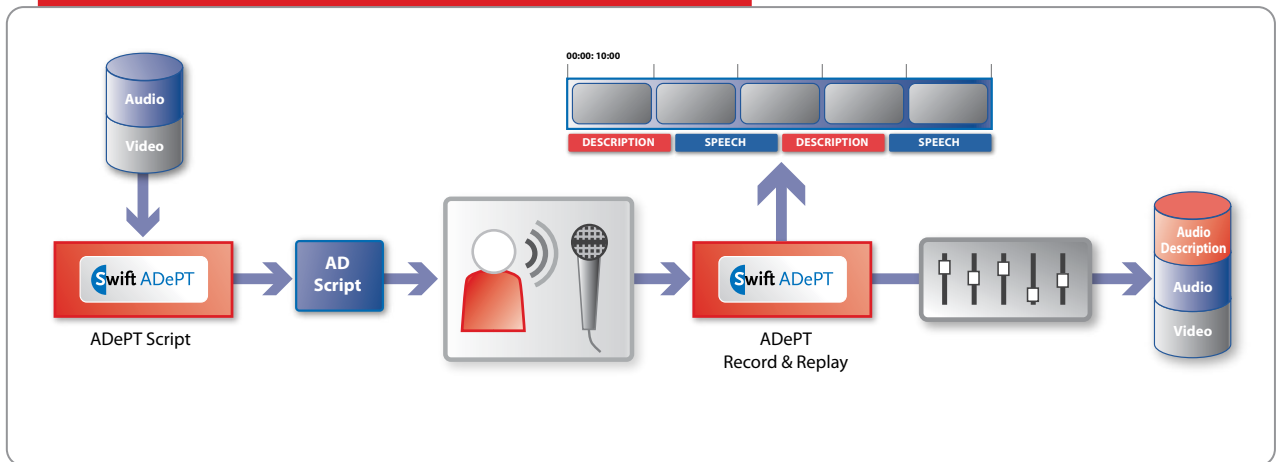
A common question our subtitling products team get asked at trade shows is whether the company has technology to automatically transcribe commentary from

the TV audio stream into closed 'hard of hearing' subtitles in real-time. Unfortunately, while speech-to-text innovations are constantly improving, most real-world TV programming has background noise and/or music as well as a wide selection of accented and overlapping spoken voices. Nothing on today's market exists to satisfy this obvious need.

As a result, the creation of subtitle content continues to be handled in one of two ways. For pre-taped content, subtitles are typically pre-prepared (although in the US there is an active live transcribing community from courtrooms, so content of both types is often live-captioned in this market). For live programming, subtitles are primarily created and cued to air in real-time. Keep in mind that some live programming, such as news broadcasts, is often pre-scripted, so advanced preparation of subtitle content can sometimes be performed.

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Audio Description creation, rehearsal, repurposing and recording



The creation and re-purposing of subtitle content is a specialist skill, so the content owner, distributor, or broadcaster has the choice to either employ their own subtitling team or to outsource to one of the many subtitling facilities around the world. The technology challenge is to integrate the subtitle workflow with other broadcast operations to minimise effort, time, and cost. The advent of broadcast operations file-based video asset management – from ingest to transmission – opens opportunities to streamline the integration of the subtitling process in a couple of key areas. This includes automated generation of low bit-rate video browse clips for use by the subtitler as well as ingest of subtitles back into the broadcast-ready video files.

The modern subtitle PC workstation is configured to minimise the time needed to create timecoded subtitles for video programmes. Tools such as non-linear video access (ie: reactive play, pause, replay, and seek video controls), automated scene change and speech detecting, integrity checking (automated background checks for reading speed, overlapping captions, spell check), style-based formatting (pre-selected styles for subtitle appearance and boxing), and programme review mode (full programme plus subtitle overlay review, optionally speeded up by jumping from one subtitled passage to the next) all assist the subtitler's efficiency and productivity.

Beyond these efficiency tools, technology can also offer further assistance in breaking down the subtitling process by effectively simplifying the tasks of text input and timecode synchronisation. Transcribing or voice inputting the original programme dialogue is a relatively speedy task, particularly when leveraging programmes such as Dragon Naturally Speaking™ with Softel's Swift Create subtitle workstation. 'Assisted Subtitling' software tools are now available within Swift Create which automatically align the transcribed dialogue with matching spoken audio in the programme thus creating the timecoded subtitle file with 50% less human effort.

Programme localisation may necessitate the preparation of subtitle content in multiple languages. For example, pay TV operators in Asia have a satellite footprint which includes viewers with more than 12 native languages between them. One common workflow is to create a master language timecoded subtitle file which then may be released to native language subtitlers along with the video browse clip. This allows the subtitler to view the context of each subtitle so that a translated caption may be authored alongside each original master language subtitle. This translation task can be carried out either using a specially-prepared Word template file, or a lightweight version of the professional subtitle authoring workstation software.

There is scope for machine translation technology to be used in the creation of translated subtitle files, but as this is not yet a perfect science, there is a fine line between the time taken to check and edit automated content and the time taken to translate each subtitle in turn.

The management of these subtitling workflow tasks includes the creation of the browse video clips, allocation to individual subtitlers or subtitle houses, and the checking-in of final subtitle content in each language. This process is increasingly integrated into broadcasters' back-office media asset management systems so that the creation and QC of subtitles is treated in the same way as all other content localisation and conformance tasks, with the benefit of a single status and alert reporting framework.

The creation of Audio Description (AD) or Dubbing scripts follows a similar workflow, and specialised workstation tools are generally used by the describer or dubbing editor to author the voice artists' record scripts. It is perhaps worth emphasising the value of audio-described video programmes to visually impaired TV viewers, as this is not a service that mainstream viewers have reason to experience. A replacement audio stream is available to the viewer which carries fill-in narration covering the pertinent aspects of each scene in the programme such as scenery, clothing, and even relevant body language; essentially, everything needed for those with impaired sight to visualise the scene.

The follow-on task for both AD and Dubbing is to record the voice-over clips for each passage – again specialist tools are designed specifically to simplify this task by displaying context relevant content, such as the relevant video passage, cue points, and count-down indicators into each passage. For AD, each recorded clip is authored with associated metadata, such as main audio fade levels, for use further down the workflow.

The use of technology for the creation of signed video programmes might perhaps develop along the lines of automated ‘Avatar’ signing, but this is still some way off and signing is very much a human process for the time being. One advantage of multi-channel digital TV is that it is easier to find space in programme schedules to broadcast in-vision signed programming, and with PVRs it is simple to set up one-off and series recordings and thus build up a store of catch-up content.

Moving from content creation to broadcast operations – the next technology challenge for accessibility content as it moves up the broadcast production workflow cycle – is how best to ‘glue’ this valued content to the associated video asset so that it ‘sticks’ to the video all the way to time-of-transmission. Softel uses the term ‘binding’ to describe the different ways in which ancillary content such as subtitles are encoded or linked to video assets in a modern file-based broadcast facility.

‘Early Binding’ of subtitles with video is the term used to describe the process whereby subtitles are encoded to video in advance of the programme’s first live broadcast; ‘Late Binding’ encoding occurs just before the time of transmission; and ‘Live Binding’ describes the process whereby ancillary data such as subtitles, closed captions, or Audio Description audio streams is generated and encoded to video at the time of programme transmission.

Much of the single or multi-language subtitle content broadcast today is live-bound to the video – subtitle processors are pre-loaded with the programme-related subtitle files and await commands from channel automation to commence time-code synchronised encoding of subtitle streams at time-of-air. Subtitle content for live TV programming is live-bound to video and is generated by highly skilled single or multi-operator subtitle facilities.

Two technology trends are influencing broadcast operations at the moment. Video file players are fast becoming the norm for near-live and live programme storage, and video file format standards such as MXF are making it possible to encode ancillary data streams alongside video. These innovations enable ‘Early Binding’ of accessibility content to video assets a tangible prospect, and coupled with related workflow benefits (such as the means to archive broadcast-ready assets with associated accessibility content, and the opportunity to QC the complete video asset in advance of transmission), it is clear that broadcast facilities will be taking a serious look at this option going forward.

The late edited programme is every transmission controller’s nightmare and creates an interesting dilemma for when and how to encode late availability subtitle content. Softel’s approach is to offer a Binding Decision Engine which takes responsibility for determining whether there is time to late bind the subtitles to video using a software encoding platform (based on knowledge gained from reading the channel automation playlist count-down and by calculating the soft encode process time), or whether to route the subtitle event to the ‘live bound’ time-of-air subtitle processor hardware.



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By the nature of the content and the need for extensive QC, audio accessibility content including Audio Description and Audio Dub streams, will generally be early-bound to video assets through the addition of one or more audio streams.

The most common transmission standards for hard of hearing and localisation subtitle streams on digital TV networks are Teletext in Europe and Australia, closed captions in the US, and DVB format ‘bit-map’ subtitles. Open, burnt-in subtitling is also commonly deployed, but there is likely to be less open subtitling in the future as consumer receivers increasing support the closed ‘opt in’ DVB subtitle format.

To accommodate this range of transmission formats, we advocate the use of a multi-language subtitle mezzanine format for the encoding and storage of subtitles within video files as part of the early and late bind process. This process allows the mezzanine format subtitle streams to be carried within the VBI (SD video channels) and VANC space (for HD channels) of the SDI video as it leaves the video file player. Simple downstream subtitle processing hardware is thus able to decode the individual language subtitle streams and transcode them into transmission-ready open or closed format subtitles. This process is done in real-time and without the need for complex automation or timecode-synchronised systems.

The increasing legislative and regulatory requirement for subtitles, signing, and audio description places a considerable burden on broadcasters and content providers who need accommodate the increased workload demanded. The addition of this ancillary content has been until recently a very labour-intensive process, but the general move towards file-based workflows now allows a far more integrated and cost-effective approach in subtitling, particularly with a high degree of automation and the ability to manage and distribute the workload between specialists who often work outside the broadcast facility.

As broadcasting and media provision becomes more and more globalised, there are further pressures. Providers increasingly need to consider how to shape their workflows efficiently for multiple-platform output. As media organisations extend the reach of their services and take in a

wider range of communities, the necessity for multi-lingual versioning increases every year. Even within established territorial limits and broadcast footprints, changes in population profile can sometimes mean an increased need for multi-language content, such as for the growing Hispanic communities in parts of the US.



Subtitle creation with Softel Swift Create

More than ever before, media organisations are also more conscious of revenue creation opportunities. Hard, fought-over advertising revenue can be maximised if the advertiser is confident that the message is getting through to the widest possible audience with the help of subtitles and other ancillary content.

Digital TV creates the opportunity for accessibility services without inconveniencing the majority of viewers, but the challenge for the industry remains the additional workload. Without the advanced integrated systems now available, broadcasters and media providers would find it difficult to meet the regulatory obligations and commercial opportunities within ever-tightening budgets. Fortunately, the technology exists to ensure that accessibility can be guaranteed in a cost-effective and streamlined work process.

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