MEDIA TECHNOLOGY & INNOVATION

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tech-i

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- **VIRTUAL REALITY**
- **METADATA**

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Editor-in-Chief: Simon Fell
Managing Editor: Shannon Frame
Email: frame@ebu.ch
Tel. +41 22 717 27 45

Design: Louise Tait
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What's the buzz?

PRODUCTION TECHNOLOGY SEMINAR

26-28 January 2016, EBU, Geneva

Start your year off right by joining us at the next Production Technology Seminar. A great opportunity to discuss the latest production technologies, get hands on in specialized tutorial sessions and hear from industry experts. Highlights this year will include the media factory of the future, the impact of OTT, virtual reality, UHDTV and more!

https://tech.ebu.ch/events/pts2016

RADIOHACK

08-09 February 2016, EBU, Geneva

Are you a software developer, integrator or engineer from broadcasting? Maybe you are a service provider, network operator or manufacturer? If so, you will most likely be interested in our annual RadioHack event. The place to be to learn from like-minded peers, share best practice and contribute to developments in radio. After the event, we make the tools available for you to use.

https://tech.ebu.ch/events/2015/radiohack-2016

DIGITAL RADIO SUMMIT

Following the RadioHack event, the Digital Radio Summit brings together key players from the radio community to share ideas, experience and inspiration. It's all about how technology can serve the radio services we love and how these will evolve over time to match the changing listening patterns.

https://tech.ebu.ch/events/drs2016

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With the right engaging content, public service media can raise a substantive amount of energy.

Simon Fell, Director, EBU Technology & Innovation

This year the EBU stand at IBC 2015 hosted a number of demonstrations that reflect the diversity of projects we are engaged in with EBU Members.

The Sandbox LiveIP Project exhibit, prepared by VRT with 10 manufacturer partners, proved a big draw and garnered a "special recognition" award at the IABM Design & Innovation Awards. This collaboration between manufacturers, the EBU, and hosted by VRT in Belgium, showed just what is possible using state of the art technologies to inter-connect studio equipment using Ethernet and IP routing.

Another award winning subject exhibited was the High Dynamic Range (HDR) approach jointly developed BBC and NHK: HLG (Hybrid Log Gamma). HLG is a backward compatible transfer curve used in production. It gives good results with both HDR and SDR (Standard Dynamic Range) displays. Unlike the alternative proposals, HLG does not require metadata to be carried through the production chain. This will be particularly valuable for live production. The BBC authors of the technical paper given at the IBC conference, and accompanying this demonstration, were awarded 'best IBC conference paper of 2015'.

The MPEG-DASH demonstration on the stand showing seamless switching of UHDTV-HDR also caught the eye of many visitors. This was UHDTV delivered over IP utilising HbbTV. However, the bit rates needed for UHDTV may be around 25Mbps, and this may put pressure on today's broadband networks.

A further demonstration was made showing how native (true) HFR image performs compared to an HFR image derived by motion compensated interframe conversion in the TV set. Demonstrations were given with and without compression, which showed that using the true HFR would result in a lower bit rate for a given quality.

The speakers in the EBU session, 'The Media Factory of the Future,' covered such diverse topics as the NRK-produced 'The Summer Boat' programme, which saw a ship sail the length of Norway visiting about 30 ports with full local coverage at each location. People came out in small boats to welcome the production with a flotilla of small craft. This was a '360' degree production where the opportunity was taken to make a drama as well as the factual and local content, which was broadcast nationwide. This programme showed just what energy a public service broadcaster can raise in their country with the right engaging content.

In the same session, Richard Friedel shared with us the progress made at Fox in Los Angeles with IP-based distribution of studio signals. The paper from Thomas Saner of SRG demonstrated the value of the just published JT-NM Reference Architecture model setting down the requirements for IP Studio facilities, the culmination of the last year's work from the Joint Task Force on Networked Media a joint effort between SMPTE, VSF and EBU.

The month of November sees the ITU World Radio Conference begin. The EBU will be hosting a booth throughout the month to demonstrate to attendees the range and diversity of television services that can be delivered terrestrially. The conference concerns the future of radio spectrum and the effects on broadcasting will be far reaching. The agenda will also include the prospects for additional spectrum for IMT. The 700MHz band will be released to mobile services following the release of 800MHz at the last WRC. There is continued pressure on broadcasters to release even more spectrum.

The common position of European administrations and most of the International regions is for no change to be made to spectrum usage below 700MHz - allowing the broadcast industry to develop new services and maintain the quality for which they are well regarded by the public. But there is pressure from some countries to relinquish even more spectrum - the 600MHz band. It is to be hoped that reason will win out at the conference, and this position will not gain wide support.

In preparation for this conference the EBU held its annual Forecast event. Keynote speakers such as Jonathan Thompson from Digital UK made the case for spectrum to remain for broadcasting so that compelling new hybrid services such as the recently launched Freeview Play in the UK can harness the best of broadband and free to air television.

Finally, some reflections on the third annual EBU Devcon conference which took place just before Forecast. This celebration of open source software development, and the spirit of collaboration and co-development it brings, bodes well for the future of broadcasting. We can see new companies and developers finding ways to bring services to market without having the resources and premises of a larger company.

Until next time… Simon

EBU @ IBC 2015

"IBC unites the technologies and business models powering the creation, management and delivery of all forms of electronic media content to consumers in a world where content is everywhere. From OTT delivery, mobile TV and Cloud production to the economics of Ultra HD, digital cinema innovation and the rise of social television, IBC sits at the forefront of all the recent major changes in the industry." ~ **IBC 2015**

IBC IN NUMBERS

- **55,128** total attendees
- **34** average visitors to the EBU stand (every 30 minutes)
- **8** technology demos
- **2** papers accepted
- **2** EBU sessions
- **18** IBC Daily articles
- **22** EBU TECH articles
- **16** Demo/Fact sheets

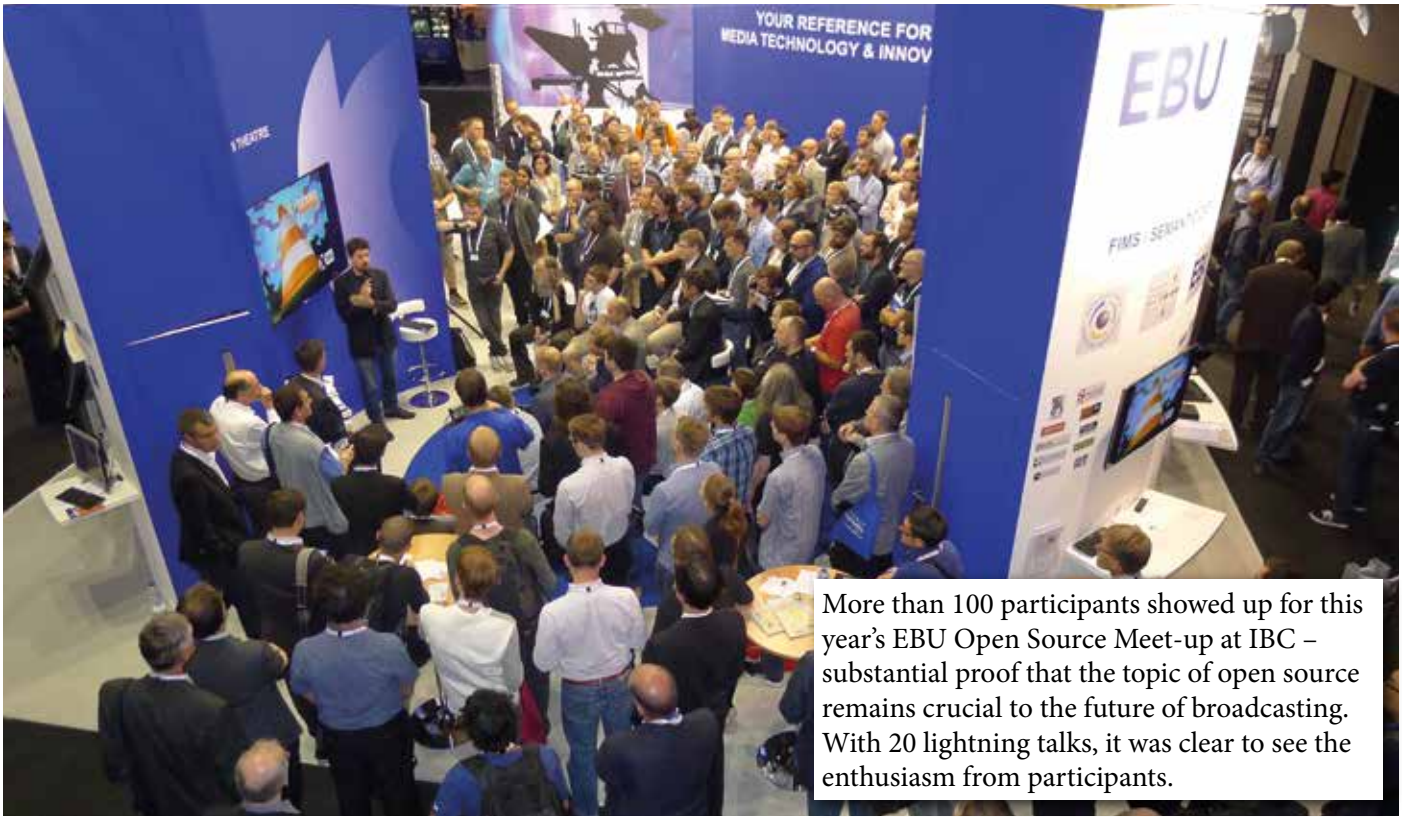
UHDTV, hybrid radio and the world's first Live IP TV production studio were just some of the demonstrations exhibited at the EBU stand this year. In collaboration with Members, the EBU also showcased key topics for public service media, including: FIMS, semantic data, quality control and personalization.

The LiveIP Project is a collaboration between the VRT, the EBU and a group of innovative Broadcast Technology partners. The objective of the project is to build and operate a Live TV production studio with state of the art IP-based and IT-centric hardware and software. A scaled down version of the studio was shown as a proof-of-concept at the EBU stand at this year's IBC and was awarded special recognition at the IABM Design & Innovation Awards.

The traditional production environment is undergoing transformation.

The resulting 'Media Factory of the Future' will continue to build on the work broadcasters are currently doing to integrate platforms, services and data and will add more flexibility, the ability to produce new live and on demand content and reduce costs. This year's EBU Session at IBC, "The Media Factory of the Future" addressed the topic of transformation. How will broadcasters continue to integrate platforms, services and data to add more flexibility and produce new live and on demand services while also reducing costs?

This session was chaired by Simon Fell, EBU Director of Technology & Innovation. Panellists included: Geir Børdalen (NRK), Richard Friedel (Fox Networks), Thomas Saner (SRG SSR) and Wouter de Cuyper (VRT)



More than 100 participants showed up for this year's EBU Open Source Meet-up at IBC – substantial proof that the topic of open source remains crucial to the future of broadcasting. With 20 lightning talks, it was clear to see the enthusiasm from participants.

Delegates work together during the hands-on sessions to learn from one another

Gilles Marchand kicks off the evening event at RTS

Mozilla presents at DevCon 2015

Applying the open source ethos in your company

Broadcasters play a much wider role in fostering communities than ever before. As media technologies continue to develop and new applications become popular, audiences expect broadcasters to provide their content on a multitude of different platforms and devices. Being able to access the content with "no strings attached" or using a single sign on is a must.

So how do we make this happen? The EBU Developer's Conference (EBU DevCon) kicked off with a keynote speech from Cornelius Suermann (PayPal) who touched on this very topic. For the past few years, PayPal has used the concept of "InnerSourcing" to take the ethos of open source and bring it into their company. Why?

In order to face the complex world of multiple platforms, devices and an increasingly global workforce, companies often struggle to share knowledge among and across teams, not to mention across continents. The idea of InnerSource is not new. The term was coined by Tim O'Reilly 14 years ago and PayPal is only one of a growing number of companies taking a step forward in this direction.

"Fostering a culture that values craftsmanship is absolutely critical. Engineers need to have an inner desire to produce high quality code and management needs to actively support them," said Cornelius Suermann (PayPal).

This view was actively supported by delegates and speakers throughout the day. "Individuals and interactions over processes and tools" advocated Aleksi Rossi (YLE) in his presentation on the agile culture experience of YLE.

Dietrich Ayala (Mozilla Firefox) showcased how their company works to unlock innovation and bridge the gap between hardware and the web with Firefox OS. "Be where the users are. This is increasingly mobile" said Dietrich Ayala. Delegates ended the day by getting hands on in two break-out sessions taking a closer look at cross-platform authentication and how to build amazing reactive interfaces.

The future of broadcasting discussed at FORECAST 2015

In the lead up to the World Radiocommunications Conference (WRC-15), high level delegates gathered at this year's EBU Forecast seminar to discuss the challenges and opportunities that broadcasters face in 2015. A crucial year for the future of terrestrial broadcasting, the seminar focused on future strategies for delivering services and asked broadcasters and regulators whether or not the industry is heading in the right direction.

Regulators acknowledged the importance of terrestrial broadcasting as being a unique platform for the delivery of free-to-air services with universal coverage. But they questioned the need to use frequencies, a limited and scarce resource, for the delivery of services that are to be received by large HDTV screens in the living room where signals have difficulties to penetrate indoors and require large capacities to deliver high quality image services. They see such type of services being delivered by optic fibre in the future and using frequencies for services on the move. In Europe, the 470-694 MHz will be kept for broadcasting services until 2030 (following Pascal Lamy's report to the European Commission) and regulators are asking broadcasters to use this time to define how they could refocus digital terrestrial television (DTT) after 2030.

Broadcasters, and in particular public service broadcasters, have to deliver linear services to all citizens independently of their social status. Currently, they do not see alternative platforms to terrestrial broadcasting that can provide this with the same flexibility, quality and costs. Broadcasters are, however, conscious that they also have to deliver free-to-air on-demand services to remain competitive in the media market. Broadcasters have to analyse all models and the associated costs to get the strength of both terrestrial and broadband models.

Regulators also explained that when defining spectrum allocations they have to find solutions for new entrants taking into account: the needs of incumbent services (to secure the investments made), the political requirements (e.g. coverage of rural areas) and the potential economic growth that new services can create. Both broadcasting and mobile services are dynamic in the sense that they continue to develop new services and as a result, their spectrum requirements are growing. However, broadcasters have the feeling that the spectrum squeeze they are suffering is not justified: mobile services have many frequency bands allocated which are not fully used and they have to increase the efficiency.

Is 'flexibility' the solution for this situation? Flexibility in the use of spectrum needs to be regulated and needs a stable framework to avoid chaos. Flexibility should be used to open spectrum to new business opportunities but, should respect incumbent services and not be used to destroy existing business, broadcasters mentioned during the seminar.

Programme Making and Special Events (PMSE) services like wireless microphones and cameras are also suffering from this spectrum reduction to broadcasting services. Regulators recognised that there is no solution yet for PMSE and that without UHF spectrum it would be very difficult (impossible!) to cover peak events.

Independently of the crucial decisions that WRC-15 will take, broadcasters and regulators will need to work together during the coming years to build a hybrid broadcast-broadband future that delivers free-to air content to all.

David Hemingway (BBC) welcomes participants to Forecast 2015

Investigating consumer trends at Forecast 2015 - How many of you own a big TV?

Dutch Public Broadcaster NPO's Signing Avatar Makes a Gesture

JOOST NEGENMAN (NPO), **INGE ZWITSERLOOD** (RU NIJMEGEN), **JOHN GLAUERT** (SCHOOL OF COMPUTING SCIENCES UEA) AND **MARTIN PRINS** (TNO)

In 2012, the Research and Development (R&D) team at NPO was asked: "What is the state of the art on automated sign production?" We decided to take a closer look and lead a market consultation on the topic. Soon after, we discovered that providing automated sign language was far from possible at any reasonable level of quality. However, we did find one solution that was being used in several European projects which caught our eye.

These projects used a technique generating animated signing based on a structured mark-up language called 'SiGML' (Signing Gesture Mark-up Language). We also took note of other international projects using animated sign language i.e. some were starting to use motion capture. The graphical results were good and probably better than the SiGML approach, but creating signs this way was more content creation than a sustainable broadcast c hain solution. Therefore, it was time to investigate SiGML further.

We found that featuring items like NPO news or talk shows was not feasible due to the complexity of the programmes (i.e. vocabulary, rate of speech). So the search for a programme where animated signing does offer support for the hearing impaired began. While scrutinizing our accessibility programmes we became aware that there was one target audience that was not supported – children. Because young deaf and hearing impaired children in the youngest age group are incapable of reading subtitles, we decided that we should focus on this age group. Very soon the choice was made to use the NTR title 'Sand Castle', an educational series with limited speech and few characters (puppets) as a pilot.

NPO consulted several interested parties that, at first, were reluctant, fearing that this might replace human interpreters. After emphasizing that we sought various ways to create added value for deaf children, a common goal was recognized.

The project

The main aim of the TNO-led project was to develop and evaluate a proof of concept for a signing avatar service using SiGML. Our goals was to identify to what extent a signing avatar service could be developed with existing technologies, and to evaluate to what extent a signing avatar service could be of added value for hearing impaired children. Finally, we aimed to establish guidance on the possibilities and limitations of existing technology, with respect to usefulness, technical readiness, user-friendliness, and suitability for a broadcasting environment.

It was clear from the start of the project that automatic translation of speech or text (i.e. subtitles or a transcript) to a sign language was an unsolved issue. Sign languages are visual languages with their own grammar constructs, in which the (3D)-signing space plays an essential role. Speech and text often do not contain all the necessary information (metadata and context) that would allow a sign translation algorithm to establish how subjects and objects are interrelated (as these relations may need to be visually shown). If you don't have the context, it is difficult to address something that occurs in the TV-programme.

It was decided that we would not focus our proof of concept on the translation problem, but instead, on aspects that could realistically be provided. The trade-

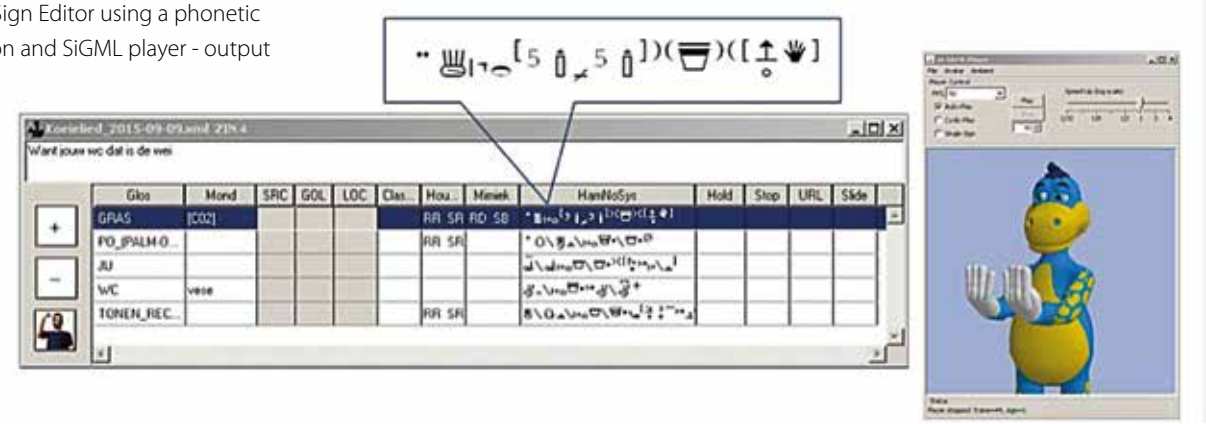
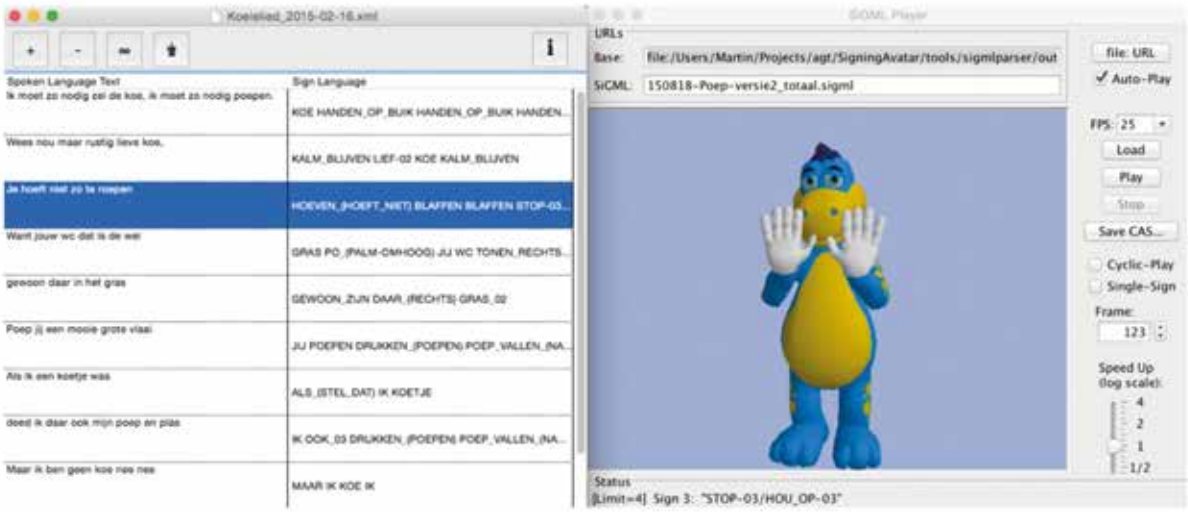


Figure 1: eSign Editor using a phonetic transcription and SiGML player - output

Figure 2: eSign Editor constructing sentences and SiGML player - output



off was to use Sign supported Dutch (Nederlands met Gebaren – NmG) instead of the Sign Language of the Netherlands (Nederlandse Gebarentaal – NGT). NmG uses signs from NGT for content words and Dutch grammar. This allowed us to look at a transcript of a 'Sand Castle' episode and use text analysis techniques to filter out words and grammatical aspects that were not expressed in NmG. This reduced the transcript that was used as input for the signing. Additional reductions were achieved by asking a deaf person to compare the episode with the transcript and to highlight the sentences that the child would probably comprehend merely by looking at the episode. These results were used to construct the signs and sentences that would be rendered by the signing avatar.

Creating the Avatar

Signing is constructed in several steps. First, the form of each sign is coded in an editing programme (eSign Editor), using a phonetic transcription system (Hamburg Notation System: HamNoSys) with symbols for the shape, orientation, location, and movement of the hand(s). The hand in a sign may be a fist, flat, rounded or have any number of extended and curved or bent fingers. The sign can have a variety of movements, for example: straight, circular, or opening of the hand. The hand may move towards or away from a body part such as the shoulder or the side of the head or in the space in front of the body.

Second, sentences are created by selecting the desired signs in the database and placing them in the correct order. They are then provided with additional codes for prosodic and affection facial expressions and postures or movements of the head and body. Third, the finished text is translated into an XML application language such as SIGML (developed at the University of East Anglia), that is based on HamNoSys. Specialised software generates animation data for an avatar from the SiGML for a sign. Signs can be played in sequence and the software inserts smooth transition movements from the end of one sign to the start of the next.

Figure 3: Avatar designs – from human-like to cartoon-like

Virtually Certain? Will virtual reality ever be part of a TV programme offer?

DAVID WOOD (EBU)

'Virtual Reality' (VR) is a buzz word of the time. It usually implies using a headset that engulfs the viewer's field of vision. But, is it just a fashion that will arrive at dawn and leave at dusk, or will it be a permanent fixture for the media world? No one knows yet. Today, some broadcasters ponder whether it could be a new kind of 'content,' but content nonetheless, which could be delivered by broadcasting or broadband.

For sure, VR can be very attractive for video gamers. Wearing a headset, the idea is that when you move your head, the scene you see moves correspondingly. The headset detects your head movement and adjusts the picture you see accordingly. You get a sense of being included in the scene. This facility can be great for games in virtual worlds like "skydiving from space".

There may be more to VR than games. One particular type of linear TV programming that could benefit from a 'VR broadcast' is stadium sports viewed in real time. The headset-wearing viewer may like being immersed together with the supporters in the stadium. He would be able to look at whichever player he chooses. This would be a major departure from a 'normal' sports' broadcast where a Programme Director continuously decides what you watch (even so, there could still be subtle ways in which the broadcaster could direct our attention). Is it something viewers would go for?

VR images can be 2D or 3D. 3D sounds as if it is made for the job, but we should not rule out 2D. If the quality of the 2D images is high there are 'depth cues' such as texture gradients and occlusion that give some sensation of depth. Furthermore, the energy expended in the brain's visual cortex to fuse the left and right eye 3D images, and to separate convergence and accommodation, is not needed, so 2D is a more relaxing experience, which may be welcome for long VR viewing sessions.

But the raw images needed for VR need to be sufficiently wide and detailed so that we see a different real-looking perspective when our gaze or head turns. It may be that they could be provided by images with a very wide aspect ratio – maybe three 16:9 images that can be stitched together in the set. Best of all could be raw images that make up to 360 degrees around the shooting camera. Sound good?

VR is an option for broadcasting in future, but there are also some negative omens, so success is not certain.

Ten years ago the 'second life' website offered a combination of VR and social media. The site looked certain to succeed – yet it did not. The 'realism' of the figures and scenery was not great but, even so, the processing power needed to make it work was beyond that found in tablets and smart phones. The rise of the tablet, the smart phone, and other social networks stole the audience. These could still be media pulling you away from using a VR headset.

In recent times, 3DTV itself has not been a success. One of the reasons may be because when we watch a 3D programme we are obliged to wear glasses. Multitasking with a tablet on your lap and watching 3D at the same time is near impossible. The same reluctance to dedicate ourselves to only one thing – the VR programme – may still be there.

Furthermore, if it proves attractive to supply viewers with a panorama of the scene, we would still need to serve it up reliably to the headset. Satellite broadcasting may have the capacity to give viewers the image equivalent to three or four HDTV or UHDTV images at the same time, but it would be much more difficult to do this reliably in an Internet delivery channel.

So what are the chances for VR broadcasting? It could be attractive for some sports or other events, principally broadcast by satellite. But, all in all, it's unlikely to be a full time service for broadcasters. One thing is certain – we do need to watch out for developments.

VRT LiveIP: A first attempt at live production over IP

MICHEL DE WOLF (DWESAM), **WOUTER DE CUYPER** (VRT), **KAREL DE BONDT** (VRT) AND **FELIX POULIN** (EBU)

What is LiveIP?

Awarded special recognition at the IABM awards at IBC 2015, LiveIP is finally becoming a reality. But what is it really?

LiveIP is one of the many projects hosted in the VRT 'Sandbox' environment, a VRT initiative supported by the EBU and the Belgium technology accelerator iMinds, to accelerate innovation and foster co-creation. The VRT 'Sandbox' brings technology companies into the eco-system of the broadcaster, by means of short-term innovative collaborations (typically three to four months).

It is a collaboration of the Flemish Public Service Broadcaster, VRT, the EBU and a group of broadcast technology partners: Axon, Dwesam, EVS, Genelec, Grass Valley, Lawo, LSB, Nevion, Tektronix and Trilogy. *"Together we've built a studio, based on open standards, to show the interoperability that is available today on IP." – Karel de Bondt (VRT).* The LiveIP studio is operated by VRT's operation and production crews, thus providing the much needed end-user feedback that is valuable to participants.

Why LiveIP?

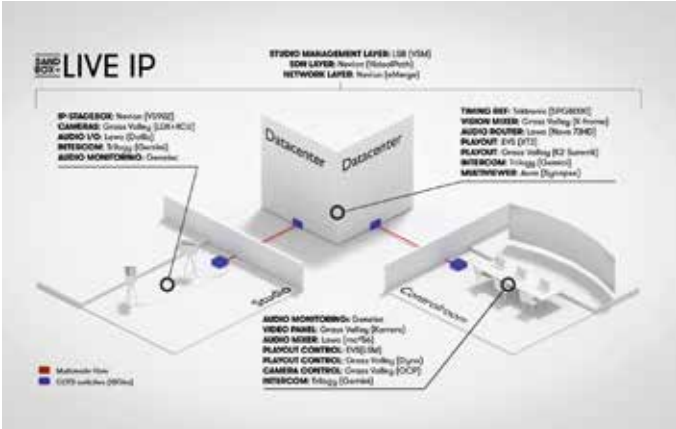
As a broadcaster and content provider, the VRT is confronted with the digital shift. Almost everyone has their own mobile device on which content is consumed, and people are moving away from linear TV. For many broadcasters, important decisions on future infrastructure have to be taken in the next few years. To do so, they need answers on the maturity of the technology i.e. the feasibility of using IP for business critical applications, and new workflows.

The digital shift calls for a shift in content production as well. Content must now be produced in a quick and flexible way. Public service broadcasters can no longer do everything themselves. Instead, they will have to do it together with people and partner companies. The LiveIP project is a practical implementation where we can start learning to use the new technology, evaluate its benefits and feedback to vendors so they can improve their products and ensure interoperability.

How is LiveIP built?

The LiveIP high level architecture includes the studio floor, the control room and the data center, all connected by only a few glass fibers. This architecture is the foundation for remote and distributed production.

This set up enables the enables the broadcaster to share and re-purpose their resources of resources.



There is no longer the need to scale up studio gear to handle the most demanding productions that happen only once in a while. . The distribution of resources can also support redundant infrastructure and disaster recovery scenarios. And with some automation, all of the provisioning and management of the infrastructure can be easy to use and reconfigure as required.

Project phases

To achieve the LiveIP project's ambitious objectives in a short timeframe, we've chosen a practical multi-phase approach.

In Phase 1, we built a simple, single camera studio to reach the necessary interoperability to produce content in an IP environment. The three locations are interconnected with only 3 fiber cables and the studio was accepted by our operational team. We are no longer using one big SDI router, but are using distributed routing over the network.

At the time of writing this article, we are proceeding with Phase 2. We have expanded the system to 4 cameras and introduced new partners to the project. Since we are producing a 4 camera talk show in a real TV-set with multiple screens, the required bandwidth is higher and the network will become more complex.

In early 2016, we hope to start Phase 3 which aims to see an uninterrupted programme production of 45 minutes with live streaming on the internet.

The future

This project is an important showcase of what can be done when public service broadcasters and industry collaborate. More work needs to be done, especially in terms of improving standards for interoperability, but we are on the right track! Stop by the VRT to see the set up or visit our project webpage for more information: sandbox.vrt.be/liveip

Metadata will be your primary asset in the future

GEIR BØRDALEN, HEAD OF INVESTMENTS (NRK)

Over the years, traditional broadcasting houses have evolved to become publishing houses. This, of course, creates a challenge for the keepers of metadata. If the public wants to be able to find our programmes and news clips in the future, they must be able to search for it and actually find it! Tagging has to be clear and follow a simple logic that any user can understand when they search. As we saw at IBC 2015 in the EBU Session, the 'Media Factory of the Future' will rely on metadata.

Metadata is your "primary asset" (not your primary problem)

Journalists often experience broadcasting systems as ineffective and time-consuming. They are often burdened with the task of adding metadata to a clip in editing, repeating this process for publishing and then again for archiving. This unnecessary repetition "kills" efficient production and publishing processes. Handling the lack of structure within legacy systems is also challenging.

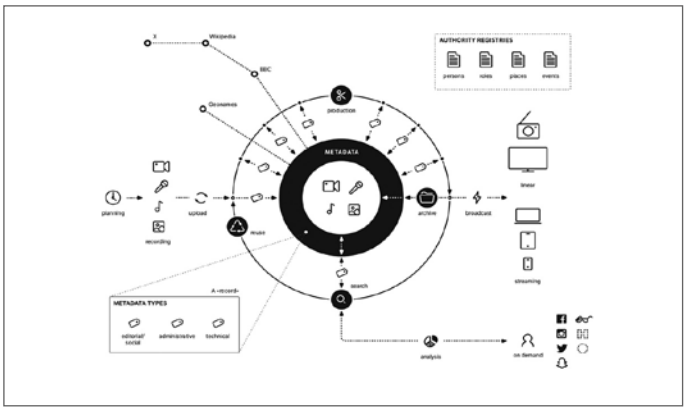
In the Norwegian Broadcasting Corporation's (NRK) Origo Project, we have discovered many inefficient workflows that need to be addressed by new system implementations. For example, in drama production, we need to gather the metadata as close to the camera as possible and retain the metadata structured all the way through ingest, editing, and publishing to multiple media platforms. In news production, we have to ensure that journalists no longer need to manually transfer metadata between newsroom and editing platforms.

Improve your workflows!

As a publishing house, NRK's main goal has changed from focusing on "TV first" to "Web first." Our audiences now search for content online by accessing our internal metadata systems. They want to be able to easily find what they are looking for without hassle.

> *"It's no point having fabulous content, if viewers can't find it"* (BBC Jupiter Project – 25 years ago)

To achieve this, NRK built a "Metadata Bank." Based on open source software and a semantic graph structure, we have made it easier for our audience to find our content. 'Places,' 'names' and 'events' now take their source from NRK authority registers to make sure that we don't end up with 11 different spellings of the name of our former Minister of Culture or 44 different name variations of our former Prime Minister (we're not kidding!). Unique IDs for both clips and metadata sources also make it easier to find, view and use all the material from our archives



and from current productions in-between platforms – all done without a lot of manual labour to make it work!

Better metadata from machine learning

NRK's new radio archive which hosts 700,000 items launched this autumn. The metadata for this project comes from an old free text database and the audio files from the National Library storage. We structured the data using EBUcore (EBU Tech 3293) and CCDM 1.1. The entire Metadata Bank holds about 25 million objects… so far.

All clips may get additional metadata as we run them through different plugins analysing the audio material in different ways. The plugins come from other EBU Members – or from our own development. One plugin makes loudness normalization (EBU R128) and future proof of concepts planned later this year may implement "speaker recognition" (LIUM – Universit´e du Maine, France) or audio-music recognition (several possible plugins).

If we can match this with IDs from the 'person' authority register, this will make the old files a lot easier to search. We hope that these technics also improve video clip metadata – together with better versions of face recognition software.

In living memory

"I manns minne" (or "In living memory" in English) is the term often used in Norway to describe how much information is commonly known about a subject. NRK still benefits from having employees who were there when Norway beat Brazil at football in 1998 or when the Scandinavian Star Ferry caught fire in 1990. But gradually, these memories slip out of "living memory" by people who were there. To find them in the future – and to remember and understand the details – we need high quality metadata with a common structure with unique IDs. If not, both our journalists and the public will be lost in time.

Broadcasting and Spectrum

DAVID HEMINGWAY (BBC)

Over the last few years, the EBU has been working hard to ensure that public service broadcasters retain access to the spectrum to deliver the free-to-air quality programmes that our audiences value so much. At the time of writing, before the World Radiocommunication Conference (WRC-15), we still don't know the outcome of the discussions that will have gone on throughout November, so I'm not going to risk any predictions here. Instead, with the luxury of knowing that these words won't appear until after WRC-15 has ended, I will take a step back and think more generally about why broadcasters need spectrum, and whether that will continue forever.

Firstly, and perhaps most obviously, broadcasters use spectrum for broadcasting. Whether that's radio on long wave or satellite TV in the Ku-band, it's still all spectrum and has historically been used by broadcasters as the most convenient way to reach audiences. Overwhelmingly, our audiences still access public service broadcaster content by tuning into a broadcast transmission, delivering huge social and economic value.

Secondly, the spectrum used by broadcasters for digital terrestrial TV allows other users to share some of the "white spaces" that lie between the transmissions. Broadcasters themselves are one of the main users of this, with radio microphones being a key part of many, perhaps most, programmes made today. Other parts of the creative industries, from professional theatres to village halls, rely on the same spectrum for the radio microphones they use. Some administrations are also investigating the use of the white spaces for more generic commercial applications, using geo-location databases to assign frequencies in these bands while ensuring that interference to broadcasting is avoided. The creative industries generate important economic benefits, and future white space use could drive additional rewards.

Despite all this, the broadcasters' use of spectrum has come under increasing pressure over the last decade or so, with slice after slice being repurposed by administrations for mobile broadband data services. Broadcasters have responded by adopting more efficient technologies and in some countries reducing the number of programmes on offer. So far, we've largely been able to squeeze down into the reduced spectrum, but that can only go so far.

But does spectrum matter anymore? Doesn't everyone watch TV online these days? Online services like Netflix and YouTube are doing well, so why can't the "old broadcasters" do the same, and go online only? After all, the BBC's iPlayer is a very successful online service – couldn't we just use that?

In the UK, over 90% of BBC content is watched "over the air," and broadcasting accounts for something like 85% of all TV viewing (including those online service like Netflix and YouTube). Five years ago, respected UK industry figures were claiming that by now, over half of all TV content would be viewed on demand. That turned out not to be true, and I don't believe it would be true if they made the same prediction today either. It's clear the BBC's online audience will continue to grow, but they will do so alongside broadcasting.

The truth is that broadcasters can introduce new delivery technologies – we did that with iPlayer. But we can only transition to them totally at the pace our audiences determine. Younger people do watch more TV online than their parents, but even they watch a majority on "live" TV via broadcast.

In our recent response to the UK Government's consultation on the future of the BBC, we outlined our vision of how we foresee development over the next 10 years. In that document, we said we will have to "ride both horses," broadcast and online, for the whole of that period. And no one's making any bets about what things will look like at the end of that time.

In the meantime, however, the mobile broadband industry continues to make claims about the huge increases in data traffic forecast over the next 10 or 15 years, and therefore says it needs more spectrum to satisfy that growing demand. According to some of their calculations, by 2030, every single person on the planet could be watching ultra-high definition TV on their mobile-device for 30 hours a day! I'm all in favour of increased leisure time, but this might be going too far.

In fact, what we find when we examine the actual data is that overwhelmingly, online TV viewing is delivered via fixed-line and Wi-Fi connections. Mobile traffic makes up less than 10% of BBC iPlayer data use (and thus, makes up under 1% of total BBC TV viewing), despite falling costs for mobile data. As broadcasting heads towards an online only world this domination by fixed IP, or by Wi-Fi for the last few metres, is likely to persist. The role to be played by mobile services is so far unknown.

I believe that a hybrid broadcast/broadband world is likely to emerge in the next 10 years or so. Products like Freeview Play will make integration of those two platforms much easier and convenient. But for the foreseeable future, viewing habits are likely to change only slowly, so the broadcast element of that hybrid is going to remain essential.

New requirements on networked device management

PETER BRIGHTWELL (BBC)

As the transition to fully networked media production happens, many questions arise. And when EBU Members are short of answers, the Strategic Programme on Future Networked Systems (FNS) has a mission to investigate.

For discovery, control, monitoring and configuration of network-connected media devices (e.g., cameras, microphones, network-based vision/audio mixers, encoders/decoders/transcoders) a number of approaches exist as well as some standards, including Ember+, OCA/AES210, SMPTE 2071, FIMS and the BBC IP Studio discovery mechanism.

But how well are these approaches suited to Members' expected requirements? How well are they suited for differing applications such as TV versus audio-only or live production versus file-based? And how can they be applied beyond physical to devices to "virtual" devices such as transcoders running in a data centre or "cloud"

To learn more from each other and to share experience and understanding about these problems, FNS organized a one-day workshop that was hosted at the VRT in February 2015. A series of presentations of possible technologies were interwoven with open discussions regarding the above topics.

As an outcome of the day, the group developed an initial list of user requirements and a small ad-hoc group was put together with the task of finishing the list. It took a few web meetings, some wiki-based authoring, and some more consultation with experts and industry to finalize the work. But in the end, the group was able to turn it into an EBU publication: Tech 3369 – Requirements on Networked Device Management.

This list of requirements can now be used as a tool to evaluate the technical fit of each solution and to guide industry towards standardisation and harmonisation. It is also in line with other work like the EBU/SMPTE/VSF Joint Task Force on Networked Media.

To find out more, see EBU Tech 3369: https://tech.ebu.ch/publications/tech3369

FIMS: out of the box components for interoperable media workflows

JEAN-PIERRE EVAIN (EBU), **LOIC BARBOU** (TRISKEL), **RICHARD CARTWRIGHT** (QUANTEL) AND **ABBE WIESENTHAL** (TURNER)

FIMS is a joint project of the Advanced Media Workflow Association (AMWA) and the European Broadcasting Union (EBU) with a membership of more than one hundred participating companies.

Why FIMS?

With increasing consumer expectations and a proliferation of delivery platforms and formats, business models need to be easily adaptable to sustain change and support content creativity as well as technical innovation.

Streamlined media supply chains must be put in place for generating and managing large quantities of video and audio in different formats to suit the requirements of different regulatory environments, regional and cultural audiences and distribution platforms. This must be simplified to achieve modern efficiency, hence the creation of FIMS.

Improving broadcaster services

FIMS defines open services that are loosely coupled, enabling multi-vendor services to be integrated and creating "best-in-class" media systems. The bottom line is that implementing FIMS' framework provides agility, interoperability, interchangeability and reusability of media related services. In order to achieve this, great attention is devoted to the decomposition of systems into business processing units that are highly re-usable if exposed as services through common interfaces.

Two services that expose the same interface can be considered interchangeable and equivalently, two services that implement the same business function must expose the same interface. This greatly reduces the number of interfaces that must be implemented to connect different components on a composite system. Another important characteristic of this Service-Oriented Architecture is to keep business process logic separate from service implementation. FIMS interfaces can abstract vendor interfaces but vendors can also natively implement FIMS.

The FIMS specification has been developed for media and is aware of long-running processes. FIMS supports processes to run synchronously or asynchronously. Associated job management functionalities include control for prioritization, status monitoring and fault management. A job request contains all the parameters needed for its execution, optionally a description of the media content on which the command operates, and the execution parameters grouped into profiles. It also provides an extension mechanism for the inclusion of vendor/user specific parameters where needed. The Orchestration System calls Media Services via FIMS interfaces over the IT network using a web services protocol such as SOAP, or accessing RESTful HTTP resources, and combines them in agile workflows.

FIMS supports the management of partial content and will soon support "growing" content in the context of live IP production. Beyond the service-based infrastructure, FIMS is also a strong data model for flawless management of technical and descriptive information in the workflow. The FIMS data model is based on EBUCore: https://tech.ebu.ch/MetadataEbuCore.

FIMS 1.2

FIMS 1.2 provides the definition of the following interfaces for basic media services:

- *Transfer service*: to copy or, optionally, move one or more files to another location. Five different transfer protocols are permitted: HTTP, HTTPS, FTP, SFTP and FILE.
- *Transform service*: to alter essence and container formats.
- *Capture service*: to convert stream-based real-time input such as HD-SDI or RTP to one or more files.
- *Repository service*: provides the basic CRUD (create, read, update, delete) functionalities needed to manage persistent assets and their related metadata.
- *Quality analysis*: The QA interface provides the basic mechanisms to identify the capabilities of a quality control tool, control commands and also a common report format and was developed in cooperation with EBU Quality Control.
- *Partial content*: Content parts defining long varying timelines can now be combined for uses such as non-linear editing.

FIMS 1.3

FIMS 1.3 is already announced with more:

- *Automatic Metadata Extraction*: The AME interface allows discovering capabilities and drives automatic metadata extraction tools.
- *Semantic metadata*: The intention is to extend the existing FIMS data model into a semantic model to benefit from scalability and extensibility of semantic web to facilitate mapping and customisation.
- *Extended discovery of service capabilities*: The work on service capability discovery started for quality analysis will be extended to other services.
- *Support of IMF, UK-DPP AS-11, etc.:* work is already in progress.

With FIMS, there is now an interoperable solution for interfacing orchestration engines and services.

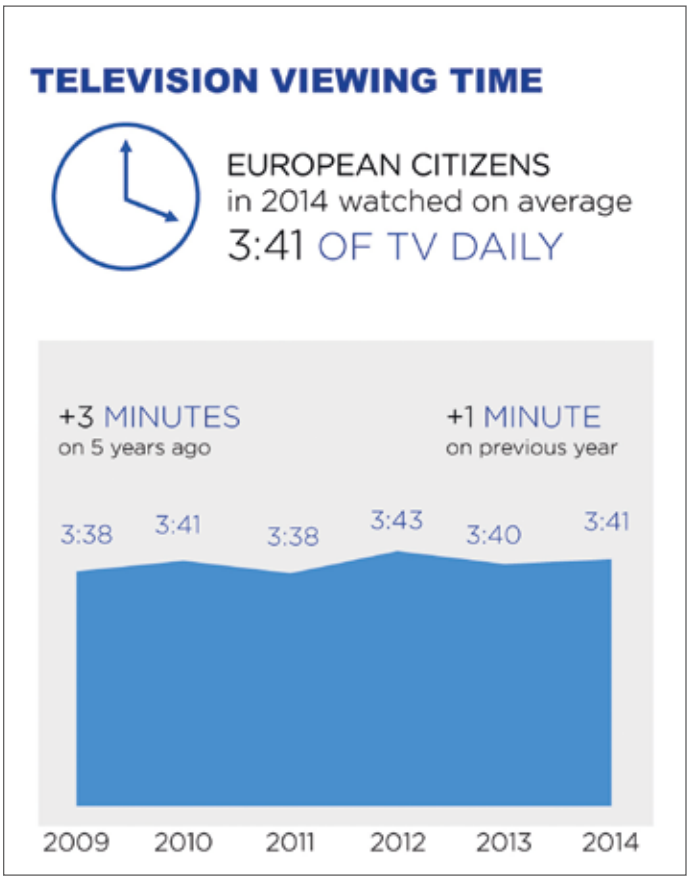
The Strength of 'Old Media'

MEDIA INTELLIGENCE SERVICE (EBU)

Each year, the Media Intelligence Service of the EBU puts together two reports focusing on radio and television audience trends. These annual reports present figures for viewing and listening times as well as the reach and market share of radio and television services.

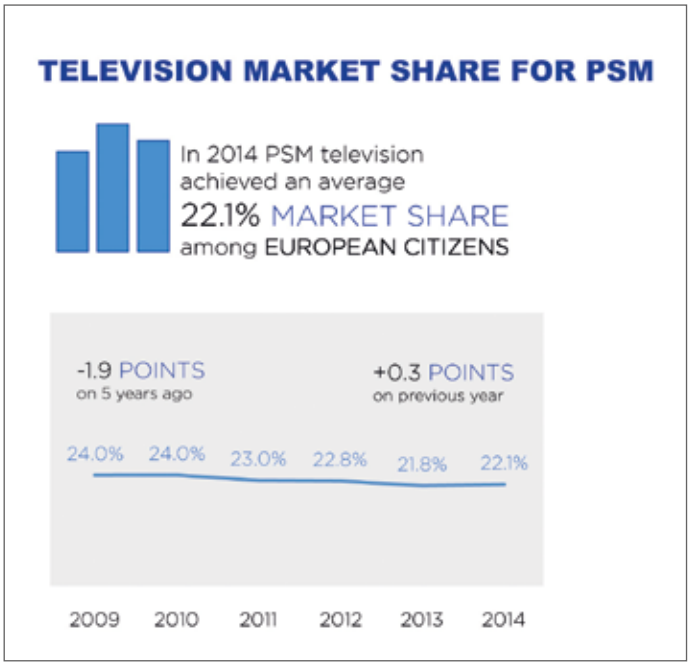
"What we've seen from the reports is that despite the rise in new technologies and on-demand services, the strength of so-called 'old media' or traditional forms of media like radio and television continue to shine through," said Francesca Cimino and David Fernandez Quijada (EBU).

Below are some of the key trends that come out of the Audience Trends Reports 2015. EBU Members can access the full reports on the Media Intelligence Portal at: www.ebu.ch/mis



Source: EBU based on Members' data

- Daily viewing time of television in the EBU area increased by 1 minute in comparison to 2013;
- 88% of European citizens watch television every week with 60% reached weekly by Public Service Media (PSM) television.

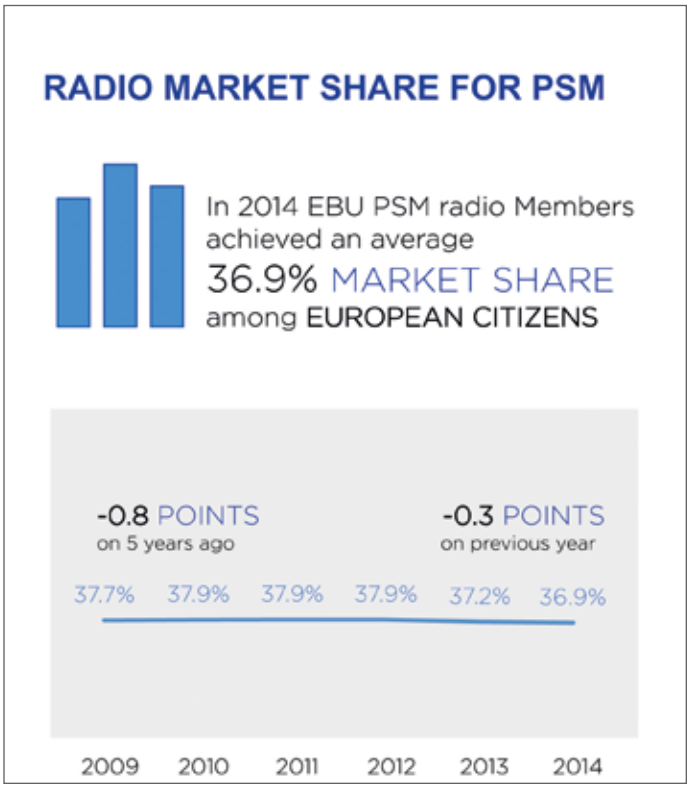


Source: EBU based on Members' data

- PSM television had an average of 22.1% of the market share among European citizens;
- Among young audiences, PSM television had an average of 14.3% market share.

Source: EBU based on Members' data

- Daily listening time in the EBU area remained stable, decreasing by just 1 minute in 2014;
- More than 420 million individuals listened to radio in Europe every week (including 40 million young people).



Source: EBU based on Members' data

- PSM radio achieved an average market share of 36.9%;
- PSM radio achieved an average market share of 22.1% among young audiences.

Latest News from ABU Technology

DR AMAL PUNCHIHEWA, DIRECTOR OF TECHNOLOGY (ABU)

ABU continues to educate its Members on hybrid broadcasting

Traditional broadcasting provided audiences with great content but there was little opportunity for interaction since there was not an integrated return channel. But today, broadcasting can make use of broadband as a return channel to interact with broadcast services. There are a number of technologies and standards available that offer hybrid or integrated broadband broadcast services. The Asia-Pacific Broadcasting Union (ABU) is a leader when it comes to sharing knowledge and expertise with its Members to make the most of new hybrid broadcasting technologies.

Integrated broadcast broadband

The Union's Technology Department conducted a workshop in Kuala Lumpur, Malaysia, on Integrated Broadcast Broadband (IBB) and Over-the-Top (OTT) Services from 29 September to 01 October 2015. More than 65 participants from 15 countries shared their experiences during the 3 day event.

This year the ABU partnered with the Asia Pacific Institute for Broadcasting Development (AIBD) to conduct the IBB-OTT workshop. The workshop provided an introduction to three key IBB technologies – HbbTV, Hybridcast and OHTV – and touched on services such as catch-up, on-demand and live streaming that can be offered through the Internet.

Freeviewplus

Australia introduced FreeviewPlus, a new hybrid television service integrated with broadband, in September 2014. New Zealand followed with Freeview NZ in June 2015.

The hybrid broadcast and broadband platform is based on an HbbTV specification and offers an enhanced Electronic Programme Guide (EPG). Catch-up and on-demand content are made available in conjunction with Freeview NZ and other broadcasters. The service includes improved metadata and a content management system. Two other leading free-to-air television broadcasters, Mediaworks and Māori TV joined the project and are now able to reach more than 3.6 million viewers around their country which has a total population of a little more than 4 million.

Continuing Support for Digital Switchover in New Markets

ROSEMARY SMITH, (DIGITAG)

"Digital switchover (DSO) is the process of launching the DTT platform and switching off the analogue terrestrial television platform. National administrations in Europe, Africa and parts of Asia agreed to this process at the ratification of the Geneva 2006 Agreement which put in place an all-digital plan for the use of frequencies in the VHF (173 MHz to 230 MHz) and UHF (470 to 862 MHz) bands. This plan, which entered into force on 17 June 2015, has served as an important impetus for countries to migrate from analogue to digital technologies."

DSO and Europe

Nearly all countries in Europe have completed DSO. This monumental task will be highlighted at the upcoming World Radiocommunications Conference (WRC-15) in Geneva, November 2015.

DSO Chart for Europe

Country	Launch date	Compression format	Completion of ASO
UK	1998	MPEG-2	Completed
Sweden	1999	MPEG-2	Completed
Spain	2000/ 2005	MPEG-2	Completed
Finland	2001	MPEG-2	Completed
Switzerland	2001	MPEG-2	Completed
Germany	2002	MPEG-2	Completed
Belgium (Flemish)	2002	MPEG-2	Completed
Netherlands	2003	MPEG-2	Completed
Italy	2004	MPEG-2	Completed
France	2005	MPEG-2/MPEG-4 AVC	Completed
Czech Republic	2005	MPEG-2	Completed
Denmark	2006	MPEG-2/MPEG-4 AVC	Completed
Estonia	2006	MPEG-4 AVC	Completed
Austria	2006	MPEG-2	Completed
Slovenia	2006	MPEG-4 AVC	Completed
Norway	2007	MPEG-4 AVC	Completed
Lithuania	2008	MPEG-4 AVC	Completed
Hungary	2008	MPEG-4 AVC	Completed
Ukraine	2008	MPEG-4 AVC	2017
Latvia	2009	MPEG-4 AVC	Completed
Portugal	2009	MPEG-4 AVC	Completed
Croatia	2009	MPEG-2	Completed
Poland	2009	MPEG-4 AVC	Completed
Slovakia	2009	MPEG-2	Completed
Ireland	2011	MPEG-4 AVC	Completed
Russia	2012	MPEG-4 AVC	2018

Source: DigiTAG DSO chart, 2015

New markets

Ensuring the future of the DTT platform will be necessary in new markets, including Africa, Asia-Pacific and the Americas where DSO will be completed in the years to come (2016 – 2020). Different markets worldwide are working at different speeds towards DSO. For a complete list, see the ITU: http://www.itu.int/en/ITU-D/Spectrum-Broadcasting/Pages/DSO/Default.aspx

While the process may be complete in Europe, many markets continue to need support going digital!

How to achieve a successful switchover

Countries that have not begun the digital switchover process can learn from those who have or those who have started. The DigiTAG DSO graphic shows several factors that have been identified to help make analogue switch-off proceed smoothly.

Collaboration is needed throughout the DSO process, combined with strong leadership to help steer the process forward. Technical and financial planning is also essential as well as information campaigns to ensure that viewers are aware and prepared for DSO.

Different markets may choose to proceed in a different order than that listed on the DigiTAG DSO graphic. For example, they may choose to start with the planning and regulation in tandem and collaborate

Source: DigiTAG DSO Graphic, 2015

DIGITAG
Digital Television Action Group

with stakeholders at a later stage. The communications regarding the launch of the DTT platform may start much earlier than the communications to manage viewer migration. All steps are important and should be part of the DSO process.

No one size fits all

In the early stages of DSO, markets need support from experts, such as broadcasters, network operators and organizations, which have already been through the DSO process. There is no "one size fits all" policy. DigiTAG and its Members are often asked to visit countries at the start or during the process of DSO to share valuable knowledge and experience.

The benefits

It is now important to continue to support new markets. The migration from analogue to digital technology on the terrestrial television platform brings new opportunities for the broadcast industry and for viewers. Broadcasters can offer new services and generate additional revenue with the adoption of new business models. Viewers benefit from increased choice, not only in terms of the number of television channels offered, but also with the type of services offered.

For some national administrations, the greater efficiency of digital broadcasting has provided some reduction in the use of UHF frequencies and made frequencies potentially available to new uses. The growth of DTT standards worldwide offers new opportunities for companies currently providing services, products and solutions on the terrestrial platform.

DigiTAG launched an updated version of its DSO Guide with a focus on Africa and Asia to support these regions as they move towards DSO. This report can be found on the DigiTAG website at: http://www.digitag.org/wp-content/uploads/2015/09/0780-Guide-to-Digi-Switchover-2.pdf

EBU RadioHack 2016
08-09 February, Geneva

A hands-on event for software developers, integrators, and engineers from broadcasters, service providers, network operators and manufacturers. Join us at the next EBU RadioHack event to meet developers, learn how to set up new services, existing open tools, and contribute to developments.

In the spotlight
Lis Grete Møller

SENIOR CONSULTANT, DISTRIBUTION,
DANISH BROADCASTING CORPORATION

WHAT ARE YOUR CURRENT RESPONSIBILITIES?

I work in the Distribution Department of the Danish Broadcasting Corporation (DR), focusing on spectrum and Digital Audio Broadcasting (DAB).

WHAT DO YOU CONSIDER AS YOUR FINEST ACHIEVEMENT SO FAR IN YOUR CAREER?

With almost 40 years' experience in different areas of broadcasting, I have had the privilege to work with a great number of talented and dedicated colleagues. One of the most important tasks I have been involved in was probably as Chair of the Task Force on System Comparison (TFSC) Group when we developed the DVB-T specification.

WHAT ARE YOUR PREDICTIONS FOR BROADCASTING TECHNOLOGY IN THE FUTURE?

I hesitate to make predictions, it's too difficult! In the late nineties, some big voices were arguing that the internet was just about to take over all broadcast distribution. Whether that will happen one day remains to be seen, but we are still far from that date. I have no doubt that broadcasters will have to adapt to new systems and support a wider range of distribution technologies in order to continue to be where the audiences are in the future.

WHAT, FOR YOU, ARE THE MOST IMPORTANT CHALLENGES FACING EBU MEMBERS TODAY?

First and foremost, I would mention the pressure on spectrum, in particular the UHF band. This part of the spectrum is extremely important for distribution, but also for producing programmes (i.e. microphones and in-ear monitoring). If this valuable spectrum is to be used for mobile broadband instead of DTT we will lose both terrestrial free-to-air TV and the possibility to use the same spectrum for production. It is difficult to see where suitable alternative spectrum could be identified.

TELL US ABOUT SOME OF YOUR INTERESTS AWAY FROM THE WORKPLACE.

I enjoy outdoor activities such as cycling and walking and, of course, spending time with my family and friends.

PRODUCTION TECHNOLOGY SEMINAR 2016

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