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The recent Production Technology Seminar at the EBU was as popular event as ever. However, do I detect a tipping point in the air?

What seemed heretical a year ago with talk of UHDTV Phase 2 and far-fetched features such as Wider Colour Gamut, Higher Dynamic Range (HDR), Immersive Audio and Higher Frame Rates is now firmly on the agenda. Samsung have recently launched a TV set which they call Super Ultra High Definition which now recognises the added value of Higher or Extended Dynamic Range. Producers and Hollywood Studios are waking up to the creative potential of such features, and directors will be excited to extend the palette of shading and colour achievable in the future.

Of course how do we ensure that from shoot through grading through delivery to the home we maintain that creative vision? This has always been difficult. DOPs often struggle to appreciate why their vision (finely crafted in the grading suite, or nowadays, the DI suite for cinema) looks so different when it arrives in the consumers home on their critically adjusted display. Or did they just select vibrant sport mode by mistake? Will this get any easier as we approach a more representative luminance scale that comes closer to mimicking the range of brightness available in the real world? You would like to think we have moved forward with automatic Quality Control tools to analyse our digital files as they pass by, but the home of the future will be equipped with what? Plasma seems to have moved on as LCD becomes the norm, however, just around the corner we are confronted with such technologies as Quantum Dot, IPS, OLED: which will it be and what are the different benefits/drawbacks? It appears as we introduce more complexity there are just too many levers in the end to end chain where signals can be bent out of shape delivering a poorer result than intended by the director. As this multiplicity of displays take hold we must be vigilant to understand the effect of all these elements on the overall entertainment experience.

During the PTS seminar, experiments were carried out on the assembled golden eyes to determine the impact on black levels of varying average room light level when viewing TV, especially with HDR in mind. This joint effort by the research bodies coordinated in the BTF Group was presented back to the meeting and provided much food for thought - is it time to revisit the PLUGE line-up tool and what level of maximum luminance is now the norm for the UHDTV future? There is much still to do, and this is even more apparent in the developing world of object-based audio. We had an interesting demonstration of MPEG-H object-based audio courtesy of Fraunhoffer in the EBU Digital Living Room, showing the shear exciting potential of object-based audio in an immersive environment. Yes, you need many speakers, but the effects are amazing: from separation of audio sources with accurate positioning through to fabulous soundscapes created in the mix. There are many levers here as well and we need to be certain that the consumer will have a superior experience in the end, and not just a confusing one.

So complexity and too many levers – let's ensure we get these right for future generations of TV professionals and the consumers who will enjoy all of this on their bigger and better pixel screens. Mind you, it seems I have HDR on my phone so why does it produce two photos instead of selecting the best one and why does the memory on phones never seem to be enough for all the images and videos we fill them with? Is the cloud big enough for all of our digital data and where is it stored exactly? Can I assume it will always be available - let me know if you have the answers.

Simon Fell, Director, EBU Technology and Innovation

What's the buzz?

BROADTHINKING
18-19 March 2015, EBU, Geneva
This year's Broadthinking will focus on Hybrid Broadcast Broadband TV. With the upcoming release of HbbTV Version 2.0, the event will provide participants with an opportunity to share best practice on current deployments including new functionalities like the synchronisation of connected devices, live and on demand DASH support and more!
https://tech.ebu.ch/events/broadthinking2015

WIRELESS MEDIA DISTRIBUTION BEYOND 2020
06 May 2015, ETSI, Sophia-Antipolis
This event aims to identify the necessary steps to facilitate distribution of media services in the future 5G ecosystem, keeping in mind the consumer interest as well as the requirements of other stakeholders.
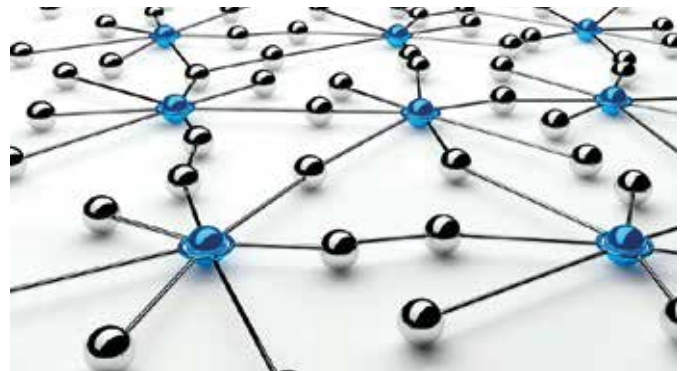**https://tech.ebu.ch/events/Wireless_Media_distribution**

MDN + SCAIE WORKSHOPS
9-11 June 2015, EBU, Geneva
A good way to get updated on the use of metadata, automatic metadata extraction, and participate in hands-on demonstrations.
https://tech.ebu.ch/events/mdn-workshop-2015

NETWORK TECHNOLOGY SEMINAR
23-24 June 2015, EBU, Geneva
The EBU Network Technology Seminar is the annual rendezvous for broadcast experts dealing with IT infrastructure, as well as for IT network and storage specialists that deal with broadcast media content.
https://tech.ebu.ch/events/nts2015

Who are our disrupters?

"Those who will not adapt quickly enough are the ones who will be actually disrupted!" – **Félix Poulin**

"Friends in Silicon Valley say the next 'big one' will be microsatellites – hundreds and hundreds of low orbit satellites providing low cost internet and broadcast services across the world... The driving force is a youngish California entrepreneur with a name that could be an After Shave – Elon Musk. The satellites would be provided by his company SpaceX, and his Tesla electric cars at least would be served by them. In theory he could short circuit ISPs, network operators, and broadcasters across the world into the home. Now that would be disruption." – **David Wood**

"We're so comfortable now that disruption always appears too risky, we have so much to lose that we study a long time all potential consequences before doing anything. But then it's generally too late..." – **Bruno Tézenas du Montcel**

PRODUCING SMARTER AT THIS YEAR'S PRODUCTION TECHNOLOGY SEMINAR

The annual EBU Production Technology Seminar kicked off in Geneva with a record participation. Two keynotes opened the seminar. First a presentation from Robert Amlung, journalist and Head of Digital Strategy at ZDF German Television, and then Thomas Saner, Senior Advisor at SRG SSR, the public broadcaster in Switzerland. "Publishing online is not just a change of technology. It's a change in the way we as broadcasters conceive ourselves" said Robert Amlung. Audiences have started using media in more diverse ways and this has had (is having) a big impact on broadcasters' technology and workflows. In response to this, Amlung stressed the need for broadcast technology to become more software centric in the future.

Publishing on a multitude of linear and non-linear platforms also calls for new production and distribution architectures. Thomas Saner shared his experience of developing a layered architecture approach. This allows broadcasters to decouple infrastructure and applications, thereby reducing costs. It also permits an intelligent use of cloud and internet technologies in media production and distribution.

File-based digital archives, media clusters, publishing content and the optimization of IT broadcast systems were some of the key themes discussed during the use case sessions throughout the day. The IRT presented the MXF profiles used by ARD in practical use and participants also had the opportunity to hear about the Montreux Jazz Festival Digital Archives Project from Alain Dufaux, EPFL.

Before breaking for tutorials, the afternoon session finished with two talks on producing for the internet and social media. Two presenters (each taking the user perspective) took to the stage to speak about "What's the buzz with social media?" and how to meet the needs of young audiences with new short forms of content. Emmanuel Rottey, responsible for the news website, social media policy in the newsroom and digital first workflows at VRT, emphasised why it is more important than ever before for broadcasters to consider and use social media and how this affects production.

Elger van der Wel, currently working on new innovative ideas and products at the NOS Lab, continued the discussion on how to attract young audiences to content. First and foremost, it is important to understand the needs of young audiences and their preferences. In his experience, he pointed out that young audiences are interested in getting information but, on the platforms of their choice. They also want to be entertained and participate more in the process (for example, sharing and commenting on content).

Day 1 came to a close with a set of parallel tutorials on low cost radio and TV production, investigating object-based production and delivery, creating services and applications using FIMS standards and the elements of a media network architecture. Throughout the day, participants also had the opportunity to visit a large range of demonstrations and participate in a test of our black level activity.

FOSDEM 2015

FOSDEM 2015: 'THE IBC OF FREE OPEN SOURCE SOFTWARE'

Broadcasters don't really have anything like FOSDEM, the Free and Open Source Software Developers' European Meeting, that took place end of January. Many probably are not even aware of it. Maybe the best comparison is to describe FOSDEM as the 'IBC of Free Open Source Software', but then 10x smaller, non-commercial, open, free, without marketing people, no salesmen, no smoke & mirrors, but with lots of technology, brilliant minds and passionate people.

FOSDEM is the ideal thermometer to measure what the Free & Open Source community has to offer. At FOSDEM this year, the EBU co-organised an Open Media Devroom, bringing together the key people behind well-known projects such as VLC, Vimeo, and XBMC (now: Kodi). The idea was to get an update on software of direct relevance for professional media use.

The result was a packed Devroom with over 150 people following the talks and many waiting outside for an empty seat. More importantly the talks reflected current themes in broadcast facilities: how to optimise encoder workflows (Vimeo), how to handle the wide diversity of file formats (VLC), how to deal with MPEG-DASH

ANDREAS TAI INTRODUCES THE SUBTITLE CONVERSION FRAMEWORK WHICH EBU MEMBER IRT RELEASED AS OPEN SOURCE IN JANUARY OF THIS YEAR. (FOSDEM 2015)

(GPAC, Gstreamer) and subtitling (IRT), how to set up DAB networks (Open Digital Radio), how to monitor your facility (TraceTV), why the open Daala video codec is badly needed (Mozilla), etc.

The success of the Open Media Devroom follows the strong interest in the EBU-hosted Open Source Meet Up at last year's IBC. There over 100 people joint an informal series of lighting talks to learn what others had programmed (be)for(e) them already.

Although many organisations find it hard to change tradition, it is clear that Open Source software is becoming increasingly fashionable. And while they won't always admit it, this is also true for manufacturers.

Many professional product providers actually are building upon the openly available code to develop their own.

For the EBU, open software is a means to avoid doing things twice, to share the results of publicly-funded projects, to quickly provide reference/example implementations and to help bootstrap new services. Good examples include the EBU's Common Platform Authentication protocol and RadioDNS activities. And although broadcasters are not yet known for their track-record of sharing code, this may change in future. New 'media' players such as Netflix and Twitter have already aggressively embraced Open Source projects to build their services and brands and to contribute back to the developers community. Broadcasters of tomorrow may do the same...

The FOSDEM Open Media presentations are available from: fosdem.org/2015/schedule/track/open_media/

To stay up-to-date on upcoming EBU activities in this domain, join the EBU Open Source Community: http://tech.ebu.ch/groups/opensource or contact: Mathias Coinchon (coinchon@ebu.ch).

SPECTRUM

SPECTRUM UPDATE

Many EBU Members are concerned about the availability of radio spectrum for terrestrial broadcasting, in particular the UHF band that is essential for TV services. A great deal of our effort has been directed to ensuring that the UHF band remains available for terrestrial broadcasting services in the future.

Regulators across the world are currently pondering the future use of the UHF band which is sought after by the mobile telecommunications industry. A crucial decision on whether or not the UHF band shall be allocated to the mobile services will be taken at the next ITU World Radiocommunication Conference (WRC-15) in November this year in Geneva.

European regulators were particularly active and have carried out a number of studies to determine the most appropriate future use of the UHF band. Perhaps the most influential ones are the Lamy Report, the study on convergence by Plum and Farncombe for the European Commission, the ECC Report 224, and the upcoming RSPG Opinion on the future use of the UHF band.[1]

EBU has actively contributed to the abovementioned studies. We argued that digital terrestrial TV platform (DTT) is very valuable because it provides both economic and social benefits that need to be preserved and the UHF band is the only spectrum where DTT can develop. The broadcasting industry will make the necessary investments in DTT only if the regulators provide a long term certainty of spectrum access. Allowing a mobile allocation in the UHF band would take that certainty away.

As the international negotiations continue a common European position started to emerge. The band above 700 MHz will most likely be allocated to the mobile services sometime after 2020. This may happen earlier in some countries and later in others. Most of the EBU Members feel comfortable with 2022, while some would prefer a much later date.

As for the rest of the UHF band (470-694 MHz) below 700 MHz there is a growing consensus that it should be retained for DTT and that no mobile allocation should be allowed until 2013. This, of course, would not mean the end of DTT after that.

There are many other open issues to be addressed, such as: How to minimise interruption of DTT services during transition our of the 700 MHz band? How to ensure cost compensation to broadcasters and the public? How to protect DTT services from the mobile interference in the future? How to ensure the viability and future evolution of DTT platform in the remaining spectrum?

EBU activities in the spectrum domain include not only technical work but also advocacy and public communications. They are coordinated in the Strategic Programme on Spectrum Management and Regulation (SP-SMR) and in the Spectrum Steering Group (SSG).

A key tool is the EBU web site (tech.ebu.ch) which has recently migrated to a new technical platform. In addition, a lobby package has been provided to assist the EBU Members in their efforts at the national level.

The next big step is to ensure that the European common position against a mobile allocation in below 700 MHz band is formalised in the WRC-15 proposals but also in European regulation. The outcome of the WRC-15 is unpredictable and surprises are always possible. But for now, the things are looking fairly good. We will keep you informed.

[1] Lamy's Report http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=6721

RSPG Opinion on the future use of the UHF band http://rspg-spectrum.eu/wp-content/uploads/2013/11/RSPG14-585rev1-Draft-Opinion-UHF.pdf

Study on convergence by Plum and Farncombe for the European Commission http://ec.europa.eu/information_society/newsroom/image/smart-20130014_final_report-v002_8222.pdf

ECC Report 224 http://www.erodocdb.dk/doks/filedownload.aspx?fileid=4109&fileurl=http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP224.PDF

TECHNICAL COMMITTEE UPDATE

SOUTH KOREA FACT FINDING MISSION

TC MEMBERS, TLOs AND SENIOR MANAGERS FROM EBU HAD THE OPPORTUNITY TO UNDERTAKE A FACT FINDING MISSION IN SOUTH KOREA. **EGON VERHAREN**, CHAIR OF THE EBU TECHNICAL COMMITTEE SHARES HIS EXPERIENCE.

From 19-23 January 2015, Members of the TC, together with the TLO of RTE and Simon Fell and Hans Hoffmann of EBU Technology & Innovation, visited South Korea to study TV- technology and services developments there. With visits to Samsung (no. 1 TV maker) and LG (up and coming CE maker), the broadcast and telecommunication research institute ETRI and the Korean broadcasters KBC, MBC and SBS we learned of strategic choices and developments and discussed strategic topics for EBU Members and their planning.

On the development of UHDTV Samsung agreed with the route taken by EBU to strive for "better" pixels, instead of just more

pixels (4K resolution).Their new line of TVs support Higher Dynamc Range and a wider color gamut. LG could not commit to HDR yet, but introduced QuantumDot screens with enhanced color and did commit to work with EBU on the definition of UHDTV parameters and specifications. They both are developing connected home and Internet-of-Things devices and work closely with us on HbbTV. Research done by ETRi and prototypes by Samsung and LG showed an interest in UltraWide HDTV as a new screen format. This might shake up the TV industry considerably.

The Korean broadcasters are set to launch UHDTV (4K) services having tested them already.

Korean broadcasters, both public and commercial are facing many similar challenges as EBU members. For development of their terrestrial UHDTV services they are fighting for protection and use of the 700 Mhz band. They have to

come up with attractive services to compete with offerings from others, including the network operators, in the less regulated cable and IPTV market. And they have to be relevant in the most advanced mobile and broadband market in the world. As in Belgium and the Netherlands the public and commercial broadcasters work together to provide an attractive OTT service (POOQ). Their linear services are available and used by many on mobile devices by means of T-DMB. With the device makers we discussed the possibility to make more mobile devices available in the European market for reception of our DAB services, as well as DVB-T(2,lite) services.

The shared interest in and fight for better TV was formalised in the signing of a Memorandum of Understanding with KOBETA (Korea Broadcasting Engineers & Technicians Association) promising to share knowledge and information on the development of TV technology and services.

Media Production Tools in the Cloud

MAURIZIO MONTAGNUOLO (RAI) OFFERS INSIGHT ON SUPPORTING WORKFLOWS ON AN ADVANCED
CLOUD MEDIA STORE

The media industry is facing daily challenges in storing, managing and facilitating collaboration using spiraling amounts of data. At the same time, increasing quality factors such as high frame rates and Ultra HD resolution video raise the need for a growing amount of dependable storage and for efficient and scalable computation. Although data I/O from directly attached storage systems no longer constitutes a barrier to fully digital media workflows, there still remain critical issues concerning the efficient management and sustainable use of large-scale, distributed data stores. One solution to the problem is to provide a unified storage layer with a set of advanced functions to manage, process, and access the audiovisual content without the need to transfer huge quantities of data. Also, content metadata, including relationships among media objects, should be transparently associated with the corresponding content to avoid effects of misaligned data. The system resulting from this approach can be defined as a Media Storage Cloud.

IBM and RAI are working together to meet these challenges. Based on the typical professional requirements of modern broadcasting, IBM developed the Active Media Store, a unified cloud object store to support media artefacts across their entire lifetime. Concurrently, RAI is implementing media workflows over it including material ingestion, metadata extraction, quality checks, content transformation and archiving. This work builds on the results of the EU FP7 project VISION Cloud, which won the IBC 2013 Special Award for its pioneering work on cloud storage for media.

The Active Media Store supports rich user-defined metadata for media objects and provides powerful search capabilities, including content-centric access (i.e. the ability to find stored media objects based on their semantics and mutual relationships, rather than on their position in a storage hierarchy). Furthermore, computation units called "storlets" enable typical workflow functions, such as transcoding, automated metadata extraction and quality checks to run close to the stored content, thereby reducing data transfer costs and latency times typically associated with cloud storage. Supporting the full lifecycle of media artifacts, the Active Media Store allows digital information from diverse sources to be seamlessly and efficiently ingested, processed, and used for production by team members working collaboratively at geographically distributed sites.[1]
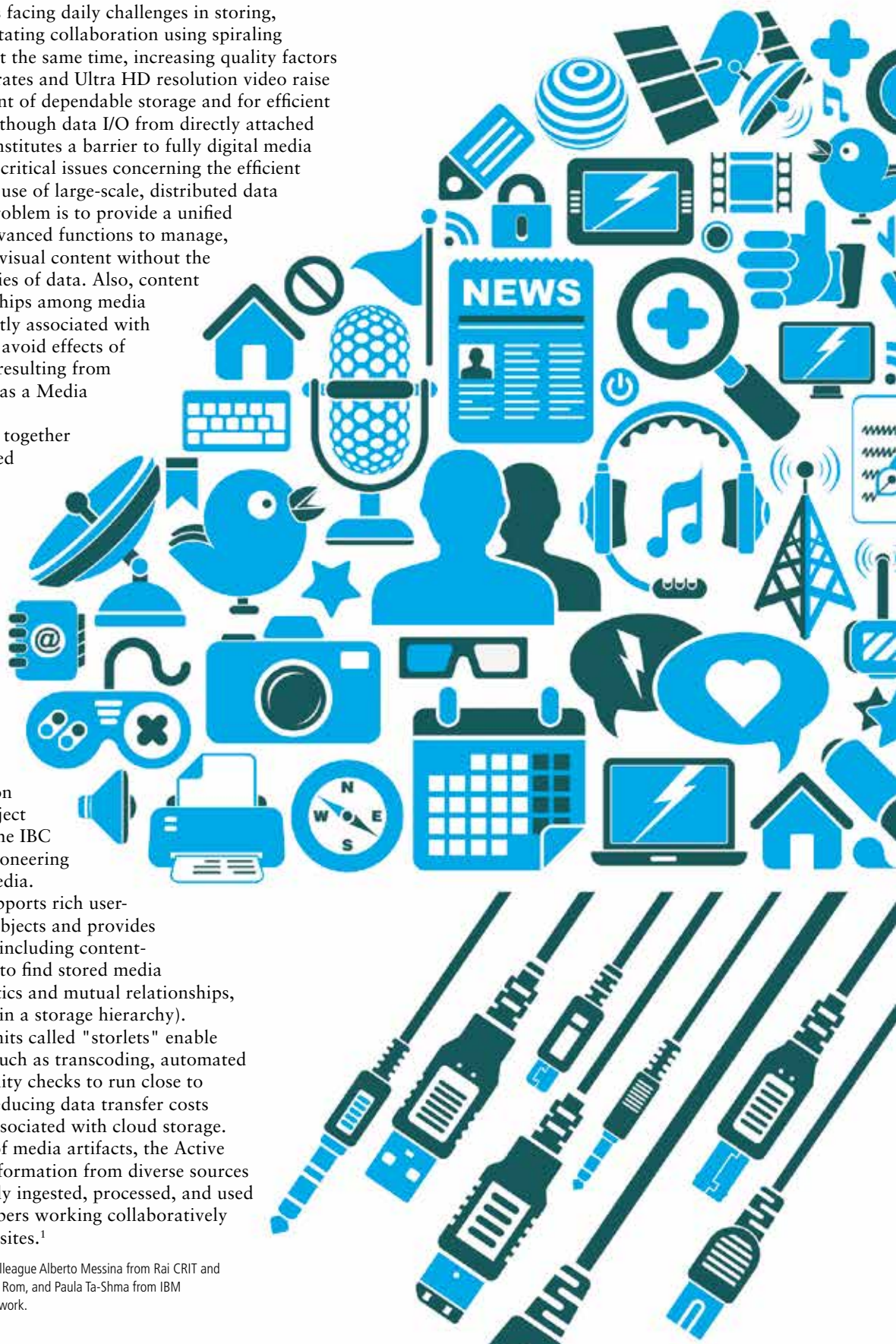
Smart production

HOW DOES PUBLISHING ONLINE AFFECT OUR WORKFLOWS AND TECHNOLOGY? ROBERT AMLUNG (ZDF) TAKES A CLOSER LOOK.

For broadcasters, publishing online is anything but new. Our first websites date back to the mid-90s, and they've become an integral part of our distribution environment.

But still, twenty years later, we are struggling to understand what this dubious online world is really all about, and many of us still see online as some add-on that has nothing to do with our core product: linear broadcasting.

In this article, based on a keynote for the EBU's Production Technology Seminar in January, I'd like to develop three basic ideas about the influence the online world exerts on our classical business.

1. Publishing online is not just a change of technology. It's a change in the way we as broadcasters conceive ourselves.

Let's start with the obvious: for a broadcaster, the possibility to offer video content on-demand is the biggest change so far that comes with going online. In unprecedented ways, people now have an enormous choice of content right at their fingertips. The fragmentation of the audience, already heavy in linear, digital broadcasting, will increase even further.

Combined with the rise in bandwidth of the open Internet, the distribution world of TV is changing profoundly. Broadcast distribution always involved scarce resources, establishing a high entry barrier to the TV market. Now, the barriers are falling rapidly. And new players are beginning to seize these opportunities, entering "our market".

Companies like Netflix, Amazon or Google challenge the traditional broadcast industry. With their money, speed and technical prowess they force change upon the incumbents. We have to redefine our products, because the content we are producing – especially for younger audiences – is going to change. The new players lead the way towards "projects that resonate powerfully with groups of people", instead of "mega hits that appeal to huge audiences", as Roy Price from

Amazon Studios has recently put it.

Again, this is not fundamentally new. Channels for smaller target audiences are as old as cable TV. But in the online world with its limitless distribution channels, this trend is becoming much more forceful. Producing "House of Cards", with its horizontal storyline specifically tailored to accommodate the needs of an on-demand audience, now makes economic sense.

But it's not only distribution that is changing, it's also devices. Again, especially for younger audiences, the dominance of the big TV screen is fading. Video is consumed on whatever device is on hand. There are many devices out there, nowadays. And in most cases, these devices are computers using Android, iOS, MacOS or Windows. Or, to put it the other way round, they are not using any of the operating systems we know from the broadcast world.

For technical people in broadcasting, this is a big challenge. Many TV manufacturers and broadcast technicians are at odds with the implosion of their traditional TV dominated world.

They are not the only ones to be at odds. On the editorial side, there are challenges as well. The traditional One-To-Many of linear broadcasting is still there, and it's still powerful. But it has lost its monopoly. Today, everyone can be a TV producer. The cost of equipment is low, and for distribution there is YouTube. So it's no surprise that for certain younger age groups, YouTube stars are more important than people they know from TV. If they know people from TV at all … Surely many TV people don't like this intrusion on their exclusive home turf.

So this is the way the digital world has been unfolding for a number of years now. Astonishingly, traditional media companies still struggle to adapt. Why?

There is one element I'd like to single out. We as broadcasters are on our way from being huge and 'All-Important' to become huge but only 'also-important'. This seems a loss, to be avoided at all cost.

So let me sum up my first chapter. We have to let go of our old self-perception as the undisputed leader of the media gang. Only if we fully and realistically embrace our new position in a diversified, heavily competitive digital market, will we be able to succeed.

2. People start using media in much more diverse ways, requiring us to establish new production workflows.

When you look at workflows, you'd better start by looking at the needs and ways of your customers. This sounds trivial, and you find it in every textbook on change management. But it still needs to be said, as we tend to look at workflows from our own needs and traditions as broadcast people …

So let's begin with a basic question: Why do people use media? When given the choice, people will not necessarily prefer receiving something preconfigured for them by higher authority. Yes, people are lazy, but they still want to decide for themselves. Above all, they want to be part of the wider world, and this is one of the main reasons they use media. With the technical limitations of broadcast media going away, there is a much wider scope for people not just to listen to the wider world as told by the media, but to participate in it.

"The people formerly known as the audience…" These words by Jay Rosen, Professor for Journalism in New York, describe it in a short and concise way.

But there is a generation gap. Today, people under 40 tend to use media in much more diverse ways then people aged 40+. They still use media the old way, but less so. They want to use media in a more participative way, producing and consuming media at the same time. Sure, not everyone will be a "pro-sumer" every time, but many will be some of the time, and more and more so.

This new diversity in the way our viewers use media has consequences for our workflows. Producing content in these environments means that we need to repurpose, reformat and iterate what we produce much more intensely and in many varieties. We need to listen carefully to what the audience is giving us back.

All this requires handling lots of data. And we need lots of technology to help us cope with this enormous task.

So, this is my conclusion for the second chapter. The increased flexibility of production and distribution – and the new feedback loops – require adapted workflows that are much more iterative than before.

3. The intelligence of workflows is expressed in software, not in hardware. Broadcast technology needs to become software centric.

My third chapter deals with an issue the broadcast industry has been debating for many years: hardware versus software. And as we all know, it's a long way from hardware-based, TV-specific engineering to beyond-TV, software-based technology.

As an industry, we have already gone quite far, but we still have far to go. Let me give you an example of what state-of-the-art software development means today: "Thanks for using Facebook! To make our App better for you, we bring updates to the App Store every two weeks". This is how Facebook announces to its customers that it has switched to continuous, agile development of its App that is now updated at the end of every sprint.

This is far from where we are in the broadcast industry.

So it's not enough to leave hardware and go to software. What we're talking about today is to become agile. The flexibility and speed of change required in the digital market as outlined before lead to using agile methods. Having the right software becomes critical for a media house's success. And this means to always have the right software, not only at the time of investment.

TV technology investment traditionally means investing big sums of money in big projects every couple of years. This brings long procurement, long development and intensive testing before any new system goes live. Which means by the time it's live it's already outdated. Continuous development is the alternative way to go. Project management, procurement and depreciation rules need to evolve to keep up. And there is yet another important aspect to agile development. The eventual users of the software need to be a continuous part of the development team! Given our traditional broadcasting culture, this is a big change. Journalists and technicians inhabit different worlds, don't they? We need some cultural change and a lot of mutual empathy to make this happen…

As technology and content grow much closer, professionals from both areas have to collaborate much more. Whether they like it or not.

On the project level, agile software development is well defined and generally established in the IT world. In my view, agile thinking should not stop there. Thinking iteratively, in feedback loops also helps media companies to get their overall objectives right.

In a digital world, media companies need to continually redefine where they are going, and which resources to allocate accordingly. The market, the viewers, and technology – they all evolve much faster than in the past. In these conditions, agility is a requirement for all levels of the company.

So let me draw my final conclusion, which – I know – is a sort of a dream of mine. A software centric broadcaster is an agile company, where editorial and technical people continuously work together to improve the product.

Contact: Robert Amlung | Head of Digital Strategy, ZDF | amlung.r@zdf.de | @ robertamlung

An Approach for Future Broadcasting Architectures

HOW DO BROADCASTERS COPE WITH MORE AND MORE USER REQUIREMENTS IN DISTRIBUTION AND PRODUCTION? **THOMAS SANER** (SRG) HAS AN IDEA.

According to the findings of the EBU Vision 2020 project and the strategic programme on Integrated Media Production Strategies our customers are using media in ever more diverse ways. They want to have our content everywhere at any time and on any platform. Thus, broadcasters are confronted with more and more new user requirements in distribution as well as in production. We have to produce adapted content for the internet, mobile devices and new media platforms at an ever growing pace without increased but rather decreasing, budgets.

If these requirements are to be addressed with today's technology architectures, the complexity as well as costs will increase dramatically. Furthermore, the costs increase even further because the high percentage of IT-technology leads to shorter life-cycles for actual media systems.

So what is the solution? Only the use of systems that are widely used in industry for both the technical infrastructure, as well as the processes, will allow broadcasters to cope with the requirements.

FIGURE 1: FROM SILOS TO PLATFORMS

FROM SILOS TO PLATFORMS

As we can see, the conventional systems used to date are highly vertically integrated into so-called 'silos' (i.e. they are integrated from application to server). As a result, there are many different systems that need to be operated in different ways. Due to varying formats, any processes that involve multiple systems result in manual conversion work, duplication and a waste of valuable time.

Figure 1 illustrates this example of silos and the move to platforms. In the first image, you see an example of dedicated devices for different business applications and in the second image; you see a smartphone with the same (software) applications on a common platform.

By organizing the technical infrastructures in layers, common platforms can accommodate and connect different business applications.

In Figure 2, this same view is transferred to our world of media production technology. On top of an infrastructure layer with network, storage and virtualized computing power sits a platform layer that allows a multitude of applications to use common infrastructure using standard services provided on standard platforms and standard infrastructures in shared media data centres that are operated in a way that is as standardized as possible (i.e. the platform layer, infrastructure layer, building and facility layer). This should allow processes

FIGURE 2: A PLATFORM MODEL FOR MEDIA PRODUCTION
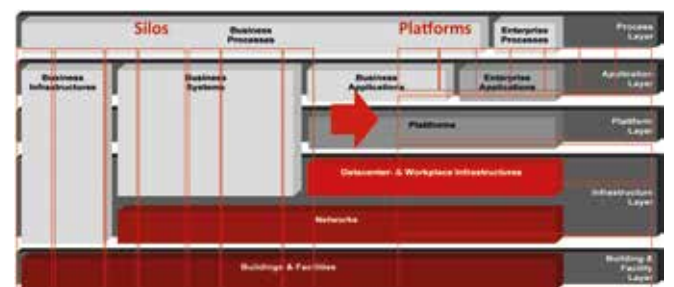
to be integrated and controlled to such a degree that they can be automated as much as possible. For many services, only one instance is now necessary, shareable or reusable by multiple applications.

The layered model helps to structure the possible courses of action in architectural decisions to reduce complexity and raise reliability and potential synergies, to promote the use of standard IT services and infrastructures in media production and to modularize the current systems. The common platform enables the decoupling of infrastructure and applications resulting in many advantages, such as:
- Decoupling of lifecycles of long term infrastructure and fast changing applications,
- Agile and flexible development of applications resulting in short reaction time,
- A modular, flexible and scalable infrastructure,
- A layered approach that is fully cloud compatible and one that common internet technologies can easily be applied,
- The platform can be realised in a private, public or hybrid cloud.

When developing a more layered approach, it is important to be aware that project decisions in such platform architecture are quite different to a silo approach. For instance:

Silo	Platforms
Buildings, facilities, infrastructure and application build for every project	Platforms are long-term investments, platform and application life-cycles decoupled
Same elements built several times	Common infrastructure
easy projects > multiple systems	Strategic projects > one common system
Straightforward decision for silo-projects	Strategic decisions for platforms

To be able to migrate from silos to platforms, it is necessary to build a first version of the platform. Next the functional blocks or applications in the silos have to be identified and how they are linked together. Applications are moved on the platform layer and linked by elements of the platform (e.g. Enterprise Service Bus). Common infrastructure functions like central storage are accessed by the applications via the platform. These functional blocks can be moved to the platform step by step when silos have to be replaced in their lifecycle.

Even Hackers Become "Smart"

ANDREAS SCHNEIDER (SRG-SSR) GIVES A BETTER INSIGHT INTO THE CYBER RISKS IN A NETWORKED MEDIA WORLD

At the doorstep of a new technology age, we witness the current "Internet of Things" evolving into a new lifestyle-driven ecosystem where smart devices take over active parts in our customers' daily life. All things connect: smart refrigerators[1], smart meters[2], smart TVs[3] and wearable devices from smart watches[4], smart textiles[5] to smart brain computer interfaces (BCI)[6] which "inspect" brain activity to control "smart" devices or to perform technology driven meditation. Customers are able to control everything from everywhere.

The underlying technology, however, is far from being new. All smart devices[7] run a basic but fully operating system (often linux based), they communicate over IP using well known transport protocols via WIFI and/or Bluetooth, and for actively accessing the "internet" they usually run a simple web browser. With the changing the lifestyle of customers, smart services[8] start feeding the new need to access and consume anything anytime – anywhere.

Media companies are reacting to these developments and in addition to traditionally broadcasting radio and TV, IP-based content delivery services are being created which range from Internet-Radio and hybrid TV to second screen and video on demand. These services all have one thing in common: they are also IP-based and accessible over the internet. Everything talks IP: audio and video content is delivered over the internet, news-feeds are collected over the internet, traditional production applications get cloud access and even studio lights are controllable via apps running on tablets or smart phones. This turns media companies into an integral part of a new smart cyber-ecosystem.

But there is a twist in this perfectly interconnected world because even hackers become smart. Beginning with the Arab Spring[9] and the Wikileaks[10] whistleblower disclosures in 2010, a growing radicalization of hackers has brought up a new type of hacker whose intent is not gaining money but destroying or manipulating systems or institutions at any price. Such activities may even often be government driven, as part of the defence departments or national intelligence offices. Today's hackers are usually well organized, and are rarely a single attacker but more likely a group of attackers. Social media provides (almost offers) required information about employees and the target organization, and Google-like search engines are used to find the weakest link in the target's content delivery chain.

So what do we do? These changes in technology and hackers' approaches require a fundamental paradigm shift to transform and actively address security risks as corporate cyber risks. Security is no longer an operational, technical issue; it is an integral part of w business decisions.

First and foremost, it is key to create awareness for the topic, especially among senior management. A company's security advocate is required to have the necessary skills and competencies to address security related topics. If appropriate, a security team or board should be institutionalized. By defining scenarios based on probable hacker attacks covering the whole big picture of the content delivery chain, the subject becomes tangible and a realistic threat. Based on these scenarios, potential security risks can be derived for feeding the corporate risk management, thus making security an active part in the corporate decision making process. As a result, security aims for being a business enabler, not a business preventer, outgrowing today's hackers in smartness and speediness.

[1] https://blogs.mcafee.com/consumer/internet-of-things-cyberattack
[2] https://blog.trendmicro.com/trendlabs-security-intelligence/smart-meter-attack-scenarios/
[3] http://www.computerworld.com/article/2473544/cybercrime-hacking/hacking-threats-to-big-screen-smart-tvs.html
[4] http://en.wikipedia.org/wiki/Smartwatch
[5] http://iswc.net/iswc14/
[6] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3304110/
[7] http://www.csoonline.com/article/2134252/fraud-prevention/smart-devices-get-smarter--but-still-lack-security.html
[8] http://www.7layers.com/#!/industries/smart-services-iot-internet-of-things
[9] http://www.theguardian.com/world/interactive/2011/mar/22/middle-east-protest-interactive-timeline
[10] http://en.wikipedia.org/wiki/WikiLeaks

FOR MORE INFORMATION, SEE:
- http://www.theguardian.com/world/interactive/2011/mar/22/middle-east-protest-interactive-timeline
- http://www.csoonline.com/article/2134252/fraud-prevention/smart-devices-get-smarter--but-still-lack-security.html
- https://blogs.mcafee.com/consumer/internet-of-things-cyberattack
- http://www.trendmicro.com/vinfo/us/security/news/internet-of-everything/smart-technologies-are-linked-to-threats
- http://www.computerworld.com/article/2473544/cybercrime-hacking/hacking-threats-to-big-screen-smart-tvs.html

The Impact of the Release of the 700 MHz Band in Europe

WITH WRC-15 AROUND THE CORNER, THE USE OF THE 700 MHZ BAND IN EUROPE IS THE HOT TOPIC FOR BROADCASTERS. **ELENA PUIGREFAGUT** (EBU) TELLS US MORE.

Figure 1: Percentage of frequency usage (allotments or assignments) in different countries

Source: Replies to ITU-R questionnaire on spectrum requirements for terrestrial television broadcasting in connection with WRC-15 agenda item 1.2
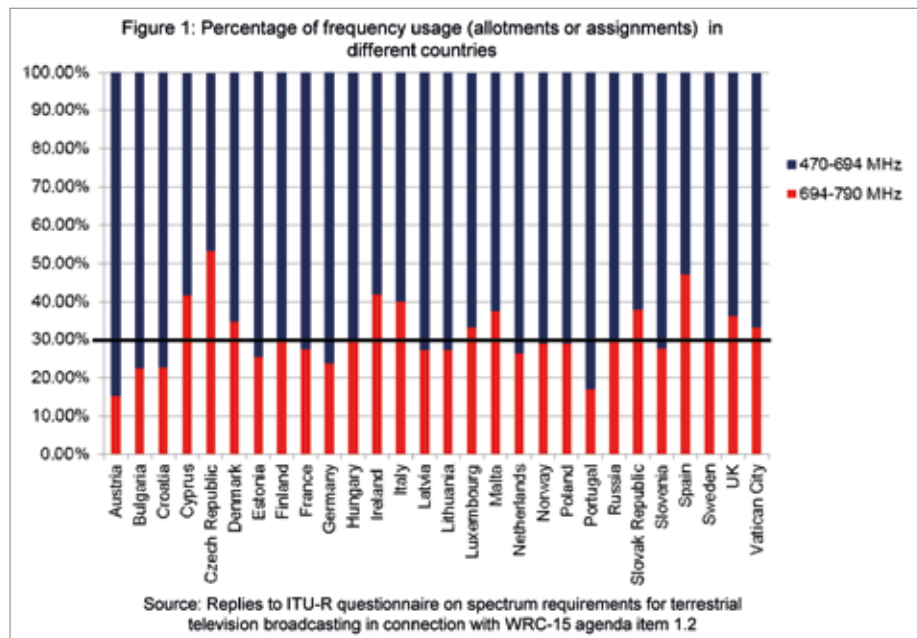
At WRC-12, it was decided that at the next conference in 2015 the 700 MHz band (i.e. 694-790 MHz) would be allocated to the mobile service on a co-primary basis after completion of the sharing studies. In the long term, there will be a similar situation as with the 800 MHz band and broadcasting services will have to release the 700 MHz band due to the sharing difficulties between mobile and broadcasting services.

CURRENT USE OF THE 700 MHz IN DIFFERENT COUNTRIES

The 700 MHz band represents 12 frequency channels of 8 MHz each and its release would leave 28 frequency channels for DTT in the UHF band. The platform would lose 30% of the frequency channels currently available for DTT (i.e. after the release of the 800 MHz). This represents around two DTT layers of the platform that might be lost.

Figure 1 shows the current planned use of the frequencies in the 470-694 MHz band by different European countries. The information has been extracted from the replies to the ITU-R Questionnaire on spectrum requirements for terrestrial television broadcasting in connection with WRC-15 Agenda Item 1.2. For many countries, the use of the 700 MHz band represents around 30% of the frequencies

planned which corresponds to the percentage of spectrum lost if broadcasting services have to release the band; for example, this is the case for Finland, Hungary, Norway, Poland, Russia and Sweden.

However, for some other countries the 700 MHz has been planned for more than 30% of the allotments/assignments (for example, Cyprus, Czech Republic, Denmark, Ireland, Italy, Luxembourg, Malta, Spain, UK) and can be as high as over 50% of the frequencies planned for DTT. Similarly, in some countries this part of the spectrum has been used slightly less than the rest of the spectrum (for example, Austria, Bulgaria, Croatia, Germany).

The diversity of replies to the questionnaire including some replies which had limited information or were difficult to interpret should be noted. In addition, when the replies were collected, several countries had not yet planned the release of the 800 MHz (e.g. Spain). Therefore, in these countries the real use of the 700 MHz might be higher than the indication given in Figure 1.

It is also important to have a more detailed look at how the use of the 700 MHz frequency channels is spread over the different layers/multiplexes in a country. Figure 2 shows the case for Denmark and Sweden, two neighbouring countries, where the 700 MHz band represents 30%

of the total frequencies planned for DTT. The seven layers planned in each country are affected differently by the potential release of the 700 MHz, but almost all are affected. While some layers make no or little use of the band, some other layers heavily rely on that part of the spectrum. In some countries, some layers would be completely lost: this is the case of Portugal and Italy, for example. Portugal is one of the countries that have made less use of the 700 MHz but one complete national SFN is currently operating in Channel 56. In Italy, ten national SFN are planned in the band; this includes three national networks from Mediaset which would be affected 100%.

DECISIONS ON THE RELEASE OF THE 700 MHz

The European Commission issued a mandate to CEPT ''to develop harmonised technical conditions for the 694 -790 MHz ('700 MHz') frequency band in the EU for the provision of wireless broadband and other uses in support of EU spectrum policy objectives''. The CEPT Report 53 provides the preferred technical (including channelling) arrangement and identifies common and minimal (least restrictive) technical conditions for wireless broadband use in the 700 MHz band.

The EC has not issued an EU Decision yet for an harmonised common release of the band across EU countries, but the report provided by Pascal Lamy to the EC and the Draft RSPG Opinion on the

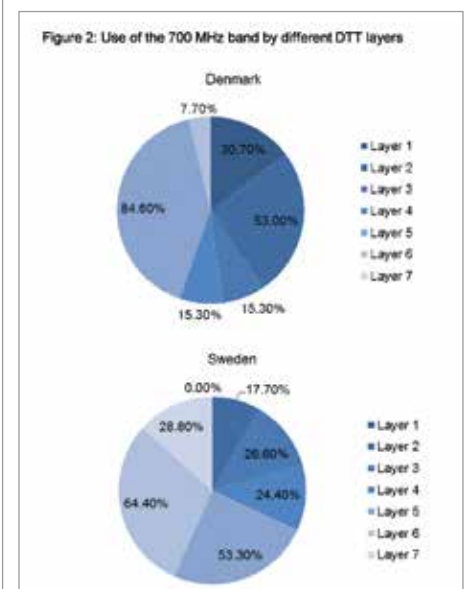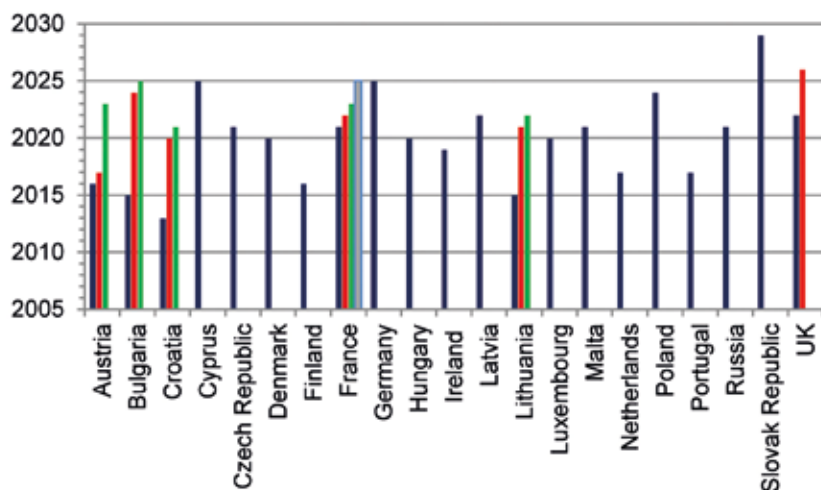Figure 2: Use of the 700 MHz band by different DTT layers

Figure 3: Duration of DTT licenses in different countries

Source: Replies to ITU-R questionnaire on spectrum requirements for terrestrial television broadcasting in connection with WRC-15 agenda item 1.2

future use of the UHF band (470-790 MHz) states that repurposing in the future the 700 MHz band for mobile services throughout the EU by 2020 (+/- 2 years) seems appropriate.

The following European countries have already officially announced the release of the band:

- Finland: to release the 700 MHz band from broadcasting to mobile services as of **1 January 2017**.
- Sweden: the 700 MHz band will be allocated to mobile broadband services as of **1 April 2017**. As it moves out of the 700 MHz band by 31 March 2017, the DTT platform will also transition to the DVB-T2 and MPEG-4 AVC standards.
- France: the 700 MHz will be fully available for mobile services by **30 June 2019** except in some areas, where operators will be able to use them as soon as April 2016. MPEG2 will be switched off and all transmissions will be in MPEG4.
- UK: In November 2014, Ofcom issued its decision to make the 700 MHz band available for mobile data by the **start of 2022** or sooner if possible.

DISCUSSIONS IN OTHER COUNTRIES

In Germany, the Federal communications regulator BNetzA is preparing a decision on its strategy for mobile broadband services after 2016. Current discussions talk of a transfer of the 700 MHz band to mobile services by 2019. At the same time DVB-T services will move to DVB-T2 standard.

Denmark held a consultation on the future of the 700 MHz on the basis of a cost-benefit analysis but there is no political decision yet.

In Norway, the communications regulator Nkom, and national broadcasters NTV, NRK, RiksTV, published a report dealing with the technical consequences for the digital terrestrial TV network if the 700 MHz band should be allocated in future for mobile telecommunications services. No decision has yet been made as to whether the 700 MHz band will be allocated for mobile services in the country, or not.

In Belgium, a public consultation was held on the potential release of the 700 MHz band. The results are expected to be published later this year.

In the Netherlands, the Dutch government confirmed plans to devote the 700 MHz band to mobile communication. The Netherlands will prepare its policy for the band in 2015 including a public consultation. It is not yet known when the frequencies will be auctioned, but the ministry has previously said it's considering 2019. Then the expiring 3G licences could be auctioned at the same time.

In Switzerland, the regulator Ofcom has already announced the release of the 700 MHz band but with no detailed plans.

European regulators will probably align their time schedules with any official decision from the EC, which, if it is in line with published reports, will be 2020 (+/- 2 years). It should be noted that in many countries the duration of DTT licences will end around 2022 (+/- 2 years) which would make it very difficult for them to release the band before (see Figure 3). In addition, changes of frequencies to the current DTT licences cannot be implemented immediately and they will require a transition period.

COORDINATION WITH NEIGHBOURING COUNTRIES

The amount of frequency assignments and allotments affected by the potential release of the 700 MHz requires intensive coordination between neighbouring countries.

Coordination talks at bilateral or multilateral meetings have already started in two European geographical areas. One area, the so called WEDDIP group includes Belgium, France, Germany, Ireland, Luxembourg, Switzerland, Netherlands and UK. The other area covers several Nordic countries as Finland, Denmark, Norway and Sweden.

The coordination has started with the aim of planning for all countries 6 multiplexes in the sub 700 MHz spectrum.

CONCLUSIONS

The impact of releasing the 700MHz band on current spectrum planning and on viewers is likely to be much granter than it was for the 800MHz band release. The 800MHz band wasn't much used for DTT in Europe, and many countries tied analogue switch over (ASO) with the release of the 800MHz band in an effort to minimise the impact on viewers.

700MHz is different, given that it is heavily used for DTT services: 30%-50% of European DTT services are to be found in this band. Different DTT layers will be affected differently, with some not being affected at all, and others loosing 100% of their coverage.

It takes a long time to coordinate frequency usage across borders, and varies greatly from country to country. Countries that have chosen an aggressive timetable for releasing the 700MHz face having to alter their frequency plans in stages in order to facilitate this release in a coordinated manner. And of course, there is always the risk that DTT platforms would lose capacity as part of the 700MHz band release. Looking at the 800MHz experience, we see that DVB-H layers planned, but not implemented were lost, and some countries (e.g. Spain) lost significant capacity in their DTT networks.

To make all this possible, we need to consider the costly upgrades to transmitters and roof-top receive antennas. Who's going to pay for all this? Given the upheaval to the broadcast industry, and the DTT services upon which viewers rely for their services, it seems counter productive to put time pressure on stakeholders to release the 700MHz band by 2020. Although it may be possible in some countries, a 2022 +/- 2 years seems to be a more realistic schedule for most European countries.

From a Patrimony to an Innovation Platform

ALAIN DUFAUX AND **CARYL JONES** (EPFL) WALKS US THROUGH THE AUDIO-VISUAL ARCHIVE OF THE MONTREUX JAZZ FESTIVAL

"*It's* the most important testimonial to the history of music covering Jazz, Blues and Rock."

These are the words that Quincy Jones uttered to the press during the presentation of the preservation project for one of the world's most important audio-visual patrimony of 20th Century music. The collection created throughout the 48 years of the Montreux Jazz Festival by its founder Claude Nobs, brings together the greatest artists of that period. The archive was officially recognized and inscribed in the UNESCO Memory of the World register in 2013. From Ella Fitzgerald, Miles Davis, Phil Collins to David Bowie and Prince, over 5'000 hours of 'live' concerts were recorded in both video (of which 1/3 in HD) and audio (of which 2/3 as multi-tracks), and also visually depicted by thousands of photos.

THE MONTREUX JAZZ DIGITAL PROJECT

The entire media collection is currently being digitized at EPFL as part of the "Montreux Jazz Digital Project", a collaboration between the technical university of Lausanne and "Claude Nobs Foundation" responsible for overseeing the preservation of the archive. The Montreux Jazz Digital Project aims to transform this heritage into a unique archive of "raw material" for researchers to innovate in the field of music technology, acoustics, multimedia, architecture, and digital humanities. A substantial annotation and metadata enrichment program will be devised for schools, musicians and musicologists in particular. Innovative user-interaction tools are being developed by EPFL labs and partners, and will be placed at the archive's disposal to transform it into a living collection easily accessible by the public. The new building "Under One Roof" at EPFL will include an Innovation Pavilion with a "Montreux Jazz Café", a space where the public will be able to discover the recordings of Montreux in an interactive, creative and innovative way.

DIGITIZATION

The digitization tasks started in 2009, and will be completed in 2016. EPFL's Metamedia Center (MMC) is leading the project, while digitization operations are outsourced to a specialized company

CLAUDE NOBS PRESENTING THE TAPES IN THE ARCHIVE BUILDING; THE DIGITAL ARCHIVE AT EPFL, STORED ON THE 2'500 TB AMPLISTOR HARD-DRIVE SYSTEM

whose competences and equipment allow for high-quality conversions and fast execution. Digitized files are generated in an uncompressed primary format to ensure lossless conversion to future file formats. A compressed MXF-contained secondary archive format is also produced for edition and broadcasting needs, together with multiple application-specific sub-formats. The digitized archive is stored on LTO tapes, of which two sets are created and kept in different locations for redundancy purpose. In addition, a hard disk-based storage system provides immediate and flexible access to the assets for EPFL teams working on the archive. With a capacity of several Petabytes (currently 2'500 TB), it is founded on Amplidata's technology, and will ensure parallel streaming of multiple feeds to the future pavilion.

75% of the entire archive is now available in a digital file format. In January 2015, EPFL started acquiring the more recent recordings from the 90s, mostly DAT and HDCAM tapes. As a world premiere, HD video recording started in 1991 at the MJF. Acquisition of those tapes will take place at EPFL with the help of students specially trained by the MMC team. At the rate of 8 concerts per day (2 acquisition chains working in parallel), it will be completed by early 2016. A chain of automatic operations was designed in order to automatically route the digital media files to the storage servers or control/indexing workstations, generate sub-formats, extract metadata, analyze audio for R128-normalized playback, generate application-specific image overlays, and ingest all the related information into the archive database.

VALORIZATION

The Metamedia Center has developed strong competences in several key tasks needed around digitization and valorization (setting up) of an archive: quality control, database design and development, data clean-up, design of an access portal, song indexing operations, media conditioning/edition, storage architecture, IT-related equipment, design of valorization platforms for concert discovery (iPad Application), tapeless ingestion of uncompressed HD video from new concert sessions.

In collaboration with the Metamedia Center, several EPFL research laboratories contribute in valorizing the archive, for example in defect detection/enhancement, or metadata extraction (solo detection, smart thumbnail creation). Simultaneously, the archive has become a wonderful tool to promote EPFL innovation and technology transfer. Projects were defined with labs in the field of acoustics (projection of music in a user-restricted area, construction of models for room acoustics), signal processing (smart playlist generation and recommendation), or architecture (the Montreux Jazz Heritage Lab for immersive discovery of concerts). User-experiences were defined around those projects and proposed to the public in Montreux during the last festival editions.

The challenge for the coming years will be to ensure long-term access and preservation of the archive.[1]

For more information, see:
• http://metamedia.epfl.ch
• www.claudenobsfoundation.com

Shed a tear for television and radio?

DAVID WOOD, EBU, EXAMINES AN ASPECT OF SMART PROGRAMME PRODUCTION

"The purpose of a television or radio programme is fundamentally to provide the viewer or listener with an emotional experience"

'Smart Production', the theme of this tech-i, means techniques for making programmes more efficiently. It may mean saving staff or equipment and more sophisticated post production. Technology offers many tools for doing so; file-based workflows, cloud services, commodity equipment, and IP based programme production. We just need to reach out and grab them – though some will prove slippery in our hands. .

But what of the higher level of objectives? Could new technology help them too? The purpose of a television or radio programme is fundamentally to provide the viewer or listener with an emotional experience – to understand himself, to think, to smile, to laugh, to cry. Can the technology of the age of smart production help to do this better? Can we help 'arrange' the programme to produce a greatest emotional response? And if we can, where and when should we do so?

One of the tools of an age of Internet delivery will be greater feedback from viewers and listeners. In principle, because Internet content is delivered specifically to an address rather than being scattered into the ether, Internet records exactly which TV set, tablet, smart phone, watches or listens. This information can be made available – in theory – to the content provider. Listeners or viewers can also comment on content on the shows they are watching or listening to, via social networks or other mechanisms, and these views can harvested. There are different views about the degree to which the user's data should be available, and how anonymous it should be. But many organizations throughout the world are developing software systems to analyze viewing or listening patterns and comments , and devise methods of providing, as a result, 'Recommendations' about content story lines to help content providers, or for helping viewers and listeners to choose their content.

But will this be the only role of 'big data' in shaping the emotional impact of media content – or could it be just the beginning?

There are reports that the owners of a comedy club in Barcelona, Spain, recently installed video cameras into the backs of the audience's seats. Their purpose is to record the facial expressions of the audience, and establish when and where they smile, chuckle, or laugh (facial expression software is common in still cameras today). In this way, the audience members are only charged for the number of times they laugh in a show – it's about 30 euro cents a laugh. By the way, there is a cap at 80 laughs – anything after that is free. In a time of recession, the public there seems to like 'pay-per-laugh', and audiences at the club have risen. The system also provides a direct incentive for the comedy artists to raise the 'standard' of their humor. More comedy club systems like this are said to be planned for France, the Netherlands, and Finland.

Is it really crazy, or would the idea of 'pay per laugh', also suit the pay TV of the future, and become practical? Many smart TVs have cameras built in them, and these could be used with local and cloud software to monitor and analyze the viewer's emotional response to the programme. Could we could go further than just 'pay per laugh', and have 'pay per tear' programmes, or 'pay per scream' TV programmes?

For decades, many have claimed that the methods used in broadcasting for 'tailoring goods to sell' are ultra-primitive, compared to those used for other commercial goods and services - like cars or soap powder. They say we must use more 'science' and less 'wet finger'. Maybe such a 'big data' road is inevitable for broadcasters?

But something may be lost if we do so. The search for the greatest emotional impact may lead down the path of lowest common denominator content – anything to achieve an immediate laugh, a tear, or a scream - rather than leading the viewer or listener to challenging new discoveries and interests that need time to digest before emotional involvement comes. What do you think?

EBU.IO – QC GUI for Quality Control Programme

UNDERGOING ITS FINAL PREPARATIONS FOR A FULL LAUNCH LATER THIS YEAR, THE EBU.IO/QC SOFTWARE IS LOOKING GOOD. **FRANS DE JONG** (EBU), GIVES US THE INSIDE SCOOP.
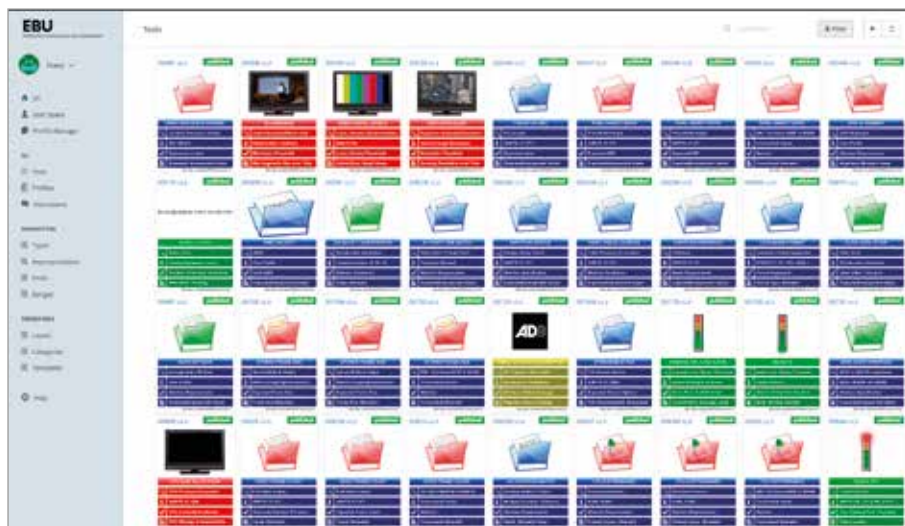
T he EBU.IO/QC software is undergoing its final preparations for a full launch later this year. Since the soft launch at IBC 2104, the interface now offers a more intuitive user experience, is better on mobile devices and is prepared for the next batch of updates that the EBU Strategic Programme on Quality Control (QC) is preparing. Originally a series of Word and Excel templates, the QC interface is now a multifunctional collection of over 200 QC Items (individual QC tests), from which users can select and group to create

QC Templates. QC Templates can export groups of QC Items into commercial products that perform the actual content checks. The EBU QC group is currently working on the final detail of each QC Item's input and output parameters that are needed to make machine-readable Templates. Thanks to high quality work by Roberto Borgotallo (RAI) and Matthias Elser (IRT) the EBU QC data model aligns with the FIMS QA activity, enabling compliant devices to interpret the EBU QC tests.

INTERCONTINENTAL INTEREST
The EBU's QC work has attracted the attention of various bodies across the Atlantic. To help meet their needs, the EBU group is currently adding a new set of QC Items to the collection. The Purple QC Items are a new category used for drafting text-related tests (e.g. captions, subtitling). Another recent activity started in the group is to perform a quick analysis of the potential of the Interoperable Master Format (IMF) for European television broadcasters.

EBU.IO/QC IN BRIEF
Users of the EBU.IO/QC tool can:
1. **Browse the large collection of EBU QC Item definitions:** These not only include a description, but also references to standards, examples and a classification that helps users understand how 'automatable' the Tests are.

2. **Search**: An extensive search allows QC Items to be found by Name or Alias (common terms used to describe a fault or artefact), content type, tags, categories and more!

3. **Create user-specific QC Templates**: See this as a 'shopping list' of QC Tests to perform on material, in the context of a specific use case, such as QC on ingest, archive QC or QCing content that is about to be aired.

4. **Edit new/existing Tests**: Members of the QC group have access to all history of the QC Items and can use the tool to update existing or create new ones. Change tracking and a discussion forum help them do so.
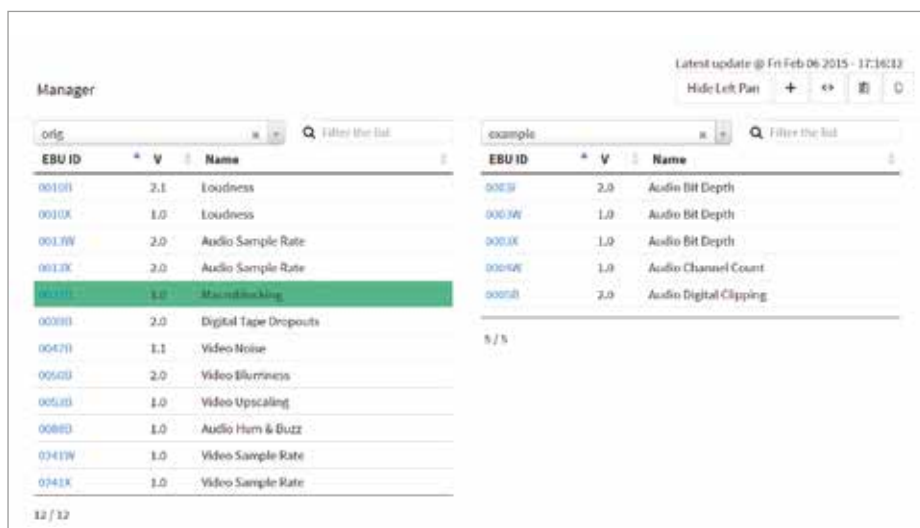
Testing file-based delivery

FROM DPP SPECIFICATION TO AMWA CERTIFICATION. **MARK GLANVILLE** ON HOW THE DPP COMPLIANCE PROGRAMME IS DRIVING INTEROPERABILITY AT BBC.

The UK Digital Production Partnership (DPP) marked "File Delivery Day" on 1 October 2014. Since then UK broadcasters have been ramping up receipt of finished TV programmes as files, rather than on video tape. To facilitate this transition the DPP launched its Compliance Programme. Mark Glanville (BBC Research & Development) shared the programme's experiences of testing files and equipment at the EBU's Production Technology Seminar (PTS) in January 2015.

The DPP Compliance Programme has been helping equipment manufacturers to implement the UK DPP HD (shim) of AMWA AS-11, which specifies the MXF file format for programme delivery in the UK. The Compliance Programme established a lab to test files and equipment for conformance to the specification. Initial interoperability testing had shown that there was some confusion over exactly what AS-11 required, so one of the lab's first tasks was to clarify the specification. This took the form of the "Conformance Rules", which can be found on the AMWA website.

The DPP is not alone in the field of file-based delivery. Notably IRT is active in this area and also presented at PTS. While both groups are dealing with MXF files, the nature of the specifications involved is different. The ARD_ZDF profiles developed by IRT are more tightly constrained. If a device can decode one example file, it will very likely be able to decode

any file that complies with the specification. Conversely, the AS-11 UK DPP HD shim allows more variation between files encoded by different devices.

Product testing in the DPP lab is tailored to the capabilities of a product and can involve paper-based exercises, tests with a large set of test files and deep analysis of files produced by devices. When testing products that write files, the complexity of the devices themselves is the main challenge. The lab cannot test every function and workflow for each device. The practical solution was to identify the typical operational use of the device and then carefully document exactly what is tested.

Engagement with the DPP Compliance Programme is an effective way for manufacturers to improve their understanding of the specification and hence improve their products, but the ultimate goal is for consumers to know which equipment they can trust to make files that meet the required standard. This is achieved through the AMWA Certification Authority. Manufacturers whose products pass the DPP lab's testing can apply to the AMWA for a certificate and the right to use the "AMWA Certified AS-11 DPP" logo. The list of certified products is available at www.amwa.tv/certification

For more information, see:
- www.digitalproductionpartnership.co.uk
- www.bbc.co.uk/rd

Embedding International Standard Recording Code (ISRC) in Broadcast WAV files

HAVING EXPLAINED - YET AGAIN - TO A RECORD LABEL THAT AN ISRC COULD NOT BE EMBEDDED INTO A WAV FILE (ONLY TO BE TOLD ANOTHER MASTERING ROOM COULD DO IT), ALCHEMY MASTERING ENGINEER AND MUSIC PRODUCERS GUILD MEMBER, **BARRY GRINT**, SETS OUT TO RESOLVE THE PROBLEM.

Ever since music could be bought on wax cylinders, identification marks have been etched to enable identification of a particular piece during manufacture before the labels and artwork were attached. Even if incorrect labels were used, the markings gave unequivocal evidence of the actual recording. The mastering engineer engraved the catalogue number into the run-out groove of a master lacquer for vinyl record manufacture; CDs could be identified by the data contained in the PQ Subcode.

Then came digital files. The ubiquitous MP3 came with an abundance of metadata fields, as did the AAC file used by iTunes. However, the workhorse file for music production, the WAV, had no provision for the additional data required.

Mastering engineers experienced difficulties in file identification, for example between poorly named mixes of a track. While there could be multiple versions of a title by the same artist with the same duration, it might only be once an amount of work had already been done and the track prepared for audition that the engineer would discover they had the

'explicit' version and not the 'clean' mix, which was the one intended for use. Each mix would have been assigned a unique ISRC identifier by the record label and had this been embedded in the file it could have flagged up this error at the outset.

Broadcasters recognised these limitations early on, which led to the EBU developing a variant of Microsoft 's WAV format, the Broadcast WAV (BWF). This enabled additional information to be stored within an extended file header – an elegant solution in that to software not capable of reading the extra data it is simply a standard WAV file, but to a professional workstation, timecode, level information, reel numbers and an increasing host of other information was now available.

At this point some mastering houses started to embed the ISRC data, arbitrarily choosing any fields made available in their mastering package. While this complied with the request of the record labels, it was practically useless because there was no interoperability between systems.

With the support of the Music Producers Guild (MPG), and in particular Ray Staff at AIR Mastering, it seemed that

the logical place for me to start was by making contact with the EBU to propose that a unique identifier for ISRC be included as one of the features of the BWF standard. I was invited to join the EBU Metadata Group to provide a user's perspective. The team readily recognised the advantage of adding this feature, and in August 2012 Jean-Pierre Evain (EBU) confirmed publication of Tech 3352 - Carriage of Identifiers in BWF.

Figure 1 shows the file header structure (reproduced with consent from the EBU).

With the standard now defined, the next stage was to secure the support of the leading manufacturers of mastering workstations. At Alchemy we use Sequoia by Magix, which made it the logical first choice. Merging quickly followed with their Pyramix system and both companies worked together to ensure interoperability. After a brief delay because of workload, Prism developed the software for SaDIE.

Below are examples of usage reproduced with permission of the EBU.

Box: Example 1: International Standard Recording Code expressed in XML

Example 1 shows how to convey the International Standard Recording Code (ISRC) of the audio in a BWF file.

FIGURE 1: IDENTIFIER TYPE AS DEFINED IN EBUCORE (TECH 3293)
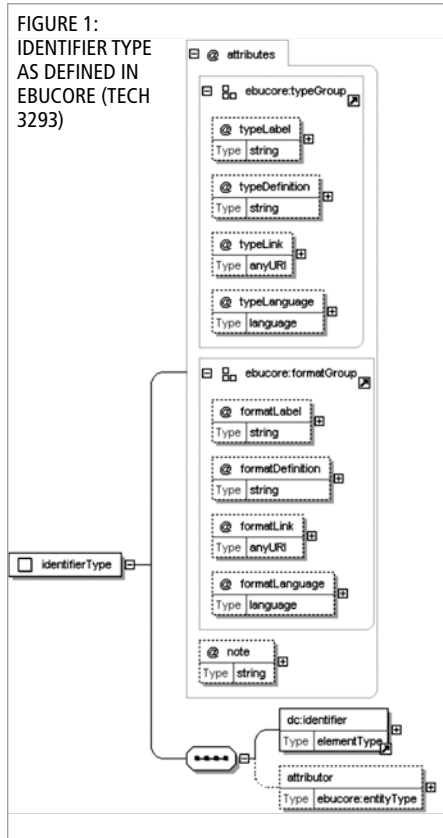
EXAMPLE 1: INTERNATIONAL STANDARD RECORDING CODE EXPRESSED IN XML

THE FOLLOWING FRAGMENT SHOWS HOW TO CONVEY THE INTERNATIONAL STANDARD RECORDING CODE (ISRC) OF THE AUDIO IN A BWF FILE.

```
<ebucore:ebuCoreMainxmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:ebucore="urn:ebu:metadata-schema:ebuCore_2012">
    <ebucore:coreMetadata>
        <ebucore:identifiertypeLabel="GUID" typeDefinition="Globally
        Unique Identifier" formatLabel="ISRC" formatDefinition="
        International Standard Recording Code" formatLink="http: //www.
        ebu.ch/metadata/cs/ebu_IdentifierTypeCodeCS.xml#3.7">
            <dc:identifier>ISRC:NOX001212345</dc:identifier>
        </ebucore:identifier>
        <!-- More optional EBUCore: titles, descriptions, contributors,
        rights - ->
    </ebucore:coreMetadata>
</ebucore:ebuCoreMain>
```

These few lines of XML represent an instance of the EBUCore'sidentifierType schema applied to

ISRC. It contains the necessary declaration of the namespaces associated with the dc: and ebucore: prefixes. An instance of the identifier element where:

- The typeLabel is set as a GUID, or Globally Unique Identifier as defined in typeDefinition (optional), which distinctly differentiates works and versions of a work. The typeLink is not used as EBU doesn't have a classification scheme for identifierTypeTypes.
- The formatLabel is set to ISRC, or International Standard Recording Code as defined in formatDefinition (optional), which defines the structure of the identifier. The formatLink provides a URI to the EBU classification scheme and the termID associated with the ISRC (optional).
- It is recommended to express the required value of the identifier in the form of a URN starting with the ISRC: prefix followed bythe formally registered ISRC value.

It is important to note that this metadata structure can be used to carry one or more identifiers and in a format other than ISRC.

Simultaneously to this development work, Ray Staff and I gave an MPG-led presentation to representatives of the BPI and AIM. I made a further presentation to the Board of AIM, and both the BPI and AIM recommended that their members adopt ISRC in BWF as the standard format for production.

With the software available and the record labels wanting to adopt the format it became clear that mastering engineers' clients would soon require them to deliver ISRC-BWF Masters, and so they would need to be made aware of the format. Merging, Magix and Prism jointly sponsored an event for UK mastering engineers to explain the changes in workflow and give advice on software updates. Guidance notes will be issued by the BPI and AIM to their members and the switch to ISRC-BWF for production will begin.

Software DAWS that are currently known to support ISRC-BWF are: Prism / SaDIE, Magix / Sequoia, Merging / Pyramix, Steinberg / WaveLab, and Sonic Studio.

It is important to appreciate what ISRC-BWF is and what it is not. ISRC-BWF is an identifier only; it adheres to the specification of ISRC as defined by the IFPI. The audio information is not

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EXAMPLE 2: A MIX STEM IDENTIFIER EXPRESSED IN XML

THE FOLLOWING SHOWS HOW THE SAME TECHNIQUE CAN BE USED TO CARRY A CUSTOM IDENTIFIER (IN THIS CASE, A POSSIBLE IMPLEMENTATION OF A MIX STEM IDENTIFIER).

```
<ebucore:ebuCoreMainxmlns:dc=" http://purl.org/dc/elements/1.1/"
xmlns:ebucore="urn:ebu:metadata-schema:ebuCore_2012">
    <ebucore:coreMetadata>
        <ebucore:identifiertypeLabel="MIXID" typeDefinition="mix stem
        identifier" formatLabel="URN" formatDefinition="A custom urn
        compliant identifier to identifiy a mix stem" >
            <dc:identifier> MIXID:NOX001212345 </dc:identifier>
        </ebucore:identifier>
        <!-- More optional EBUCore: titles, descriptions, contributors,
        rights - ->
    </ebucore:coreMetadata>
</ebucore:ebuCoreMain>
```

interfered with in any manner. You do not require two masters. The ISRC-BWF file will be treated as an ordinary WAV by software unable to read the data. This is not a form of DRM.

So why not include multiple metadata fields in the same way as MP3 and AAC? One of the key campaigns of the MPG is Credit Where Credit is Due (CWCD). All of us in this industry secure work by reputation. It is important that composers, performers, producers and all of the engineers are properly credited for their contribution. In ISRC-BWF, the ISRC can be used as a pointer to a database which can be updated at any time. Were data fields available to credit every performer in an orchestra, for example, together with technical contributors, the file would become bloated with metadata. Also, once the file has been released it would be impossible to correct any metadata errors.

Why not just put the ISRC as part of the Filename? Many software packages remove, rename, or truncate filenames.

The future looks better: with ISRC-BWF as the standard, the amount of rekeying of data will be reduced dramatically. Digital distributors will be able to adapt their encoding software to automatically transfer the ISRC information, reducing the possibility of error.

Broadcast play-out software will be able to read the ISRC information to automate usage reporting.

Software such as Gracenote will be able to reference the ISRC to improve accuracy at single track level.

However, probably the most exciting potential is to use the embedded ISRC as a method of accessing pertinent information from databases. Publishers may have a database with royalty information, rights societies' information on ownership, and they will receive more accurate usage data. From an MPG perspective, the most exciting element is the possibility of a credits database so that anyone listening to a song can click on a link to discover who all of the contributors are.

But there are still some hurdles to overcome. The chart below, compiled a while ago as part of a report, shows that a significant amount of data embedded within a file was not preserved by various software packages.

It is now imperative that software developers respect and preserve the integrity of files passing through their software.

This article has been republished with permission from Resolution Magazine

Simon Tuff, BBC

IN EACH ISSUE OF TECH-I WE ASK A MEMBER OF THE EBU TECHNOLOGY COMMUNITY TO STEP INTO THE SPOTLIGHT. THIS TIME IT'S BBC'S SIMON TUFF 'S TURN.

WHAT ARE YOUR CURRENT RESPONSIBILITIES AT THE BBC?
My responsibilities split 3 ways. About 70% of my time is looking after the technology services and projects for the BBC's Radio & Music group which includes our 11 national radio networks and Music TV production. 20% of my time is working to shape & deliver the next generation of audio technology and standards which includes being a member of the DPP's technical committee and co-chair of the FAME audio sub group. For the final 10% I focus on making the BBC's technology more sustainable.

WHAT DO YOU CONSIDER AS YOUR FINEST ACHIEVEMENT SO FAR IN YOUR CAREER?
Over 26 years at the BBC I've had the privilege of being involved in many great undertakings but I love the ones with innovation and collaboration most. Building the Netmix "grunt controller" (or dialogue control) for Wimbledon in 2011 was one, followed by a Christmas presentation of three immersive versions of Carols from King's. These included a restored version of the BBC's experimental stereo recording from 1958 which Fraunhofer helped us map to surround sound. I'd say these are ones of which I'm particularly proud.

WHY DO YOU LIKE BEST ABOUT WORKING FOR PUBLIC SERVICE MEDIA?
Virtually everyone you talk to has a view about the BBC and, good or bad, they tend to hold it passionately. I love that. I also love the fact that we provide the services the nation turns to when it really matters: anything from the coverage of the big royal occasions to information on school closures caused by heavy snow.

WHAT, FOR YOU, ARE THE MOST IMPORTANT CHALLENGES FACING EBU MEMBERS TODAY?
Staying relevant and at the forefront of audience's lives is a huge challenge, especially if keeping terrestrial transmission as a central part of our offering. IP technology is great and it's maturing but it's also complex, not free at the point of use, has limited capacity away from urban centres and is power hungry (broadly using 2-3 times as much power as more conventional platforms per audience hour). Keeping spectrum and making it really work by blending it with the inter-web, in order to deliver the best experiences efficiently, is a substantial challenge.

TELL US ABOUT SOME OF YOUR INTERESTS AWAY FROM THE WORKPLACE.
I've recently discovered "untappd" and so I'm enjoying the social network of beer officionardos and sharing tasting notes. My current favourite is a traditional UK IPA called Landlord brewed by Timothy Taylors. I love hill walking and February sees me make my annual pilgrimage to North Wales to climb Mount Snowdon in the snow. That's magical. I'm also a Formula One fan and after William's return to form last year I'm hoping for something impressive from MacLaren in 2015 but I'm not holding my breath…

BroadThinking 2015

18-19 March
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Network Technology Seminar

23-24 June 2015,
EBU