

# tech-i



## T&I Award 2021: the story of SR's public service algorithm

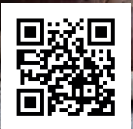
*Plus*

- **5G-RECORDS** – how PSM can benefit
- **Rai's Stefano Ciccotti** on technology priorities
- **Loudness for radio**

*and more...*

# EBU

OPERATING EUROVISION AND EURORADIO



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**Cover story:** The 2021 EBU Technology & Innovation Award was won by Sveriges Radio for its News Values project. Pictured on the cover, clockwise from top left, are Jörgen Bang (product owner), Jessica Axelsson (UX designer), Tobias Sandblad (editorial project manager) and Linnea Långberg (UX designer).

Photo: Mattias Ahlm/Sveriges Radio

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Printed on FSC certified paper by  
Graphius (FSC CO14767)

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## EBU

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# A recipe that works – let's use it!

**Antonio Arcidiacono**, Director of Technology & Innovation, EBU

In time, I believe, we will see that 2021 marked the beginning of a new golden age for collaboration among public service media in Europe. The launch, in January and July, of two related products built *by and for* EBU Members has shown us the sustainable path to innovation and growth.

In the March 2021 issue of *tech-i*, we presented the Eurovision News Monitoring tool that gives journalists across EBU newsrooms – 20 Members and counting – access to a wealth of valuable content. And in this issue (on page 4), you can read about the public-facing phase of this project. Since 1 July, visitors to the websites and news apps of participating Members have been presented with a feed, titled *A European Perspective*, showing selected stories from across the EBU membership, translated into the user's local language.

These twin initiatives work to the advantage of both European citizens and EBU Members. In-depth reporting sourced from trusted newsrooms helps keep local audiences informed about pan-European stories, with content that is selected by local editors to be both relevant and compelling. This acts as a counterbalance to disinformation campaigns that exploit fault lines between communities. At the same time, editors and journalists have access to a resource that saves them valuable time and enriches their own reporting.

This project has generated considerable excitement, not just because of these direct benefits, but also because it demonstrates in a concrete way



that collaboration can fruitfully go beyond producing content together – we can also find success by building together.

## **BUILDING TOGETHER**

A first key lesson: we must control all of the core elements of the products we develop while at the same time controlling the costs. It is clear that EBU Members will need to outsource services to external companies, both the tech giants like Amazon, Google and Microsoft and the traditional media technology vendors. But by building together we can establish a common position that strengthens our ability to

influence those companies and guarantee the interchangeability of suppliers.

A great example of this is EuroVOX, the EBU-developed transcription and translation tool that sits at the heart of these new digital news projects. It doesn't try to replace the translation engines but helps broadcasters to integrate the best supplier for any given use case and switch between suppliers efficiently as required.

This model can be extended to other cloud services or indeed any procurement or outsourcing, including operational. It is highly significant that the EBU is the first media organization to have joined the GAIA-X project (see page 6). This will be a key enabler for our collaborative development model, guaranteeing the security and the interchangeability of cloud-based applications. EBU Members and potentially all media players can benefit from healthy competition between suppliers and a multi-cloud approach.

The other key ingredient in this recipe for success is collaboration, both within and across EBU Members. Our colleagues at Sveriges Radio identified this as a critical element of their News Values project, the winner of this year's EBU Technology & Innovation Award (see pages 10–11). It's about having technology teams working in close collaboration with the content creators and editorial staff; and it means jointly having access to the talent that can support new developments.

As I wrote above, we are just at the start. What we have done for news must also be done for sport, for education, for culture, and more. *Together we can build the tools and products that will ensure our collective growth and success!*

“A first key lesson: we must control all of the core elements of the products we develop while at the same time controlling the costs.”

# Changing the way Europeans find the news

Ten EBU Members have launched a new project to overcome language barriers and share diverse news content from across the continent, writes **Luis Jimenez**, EBU Digital News Lead.

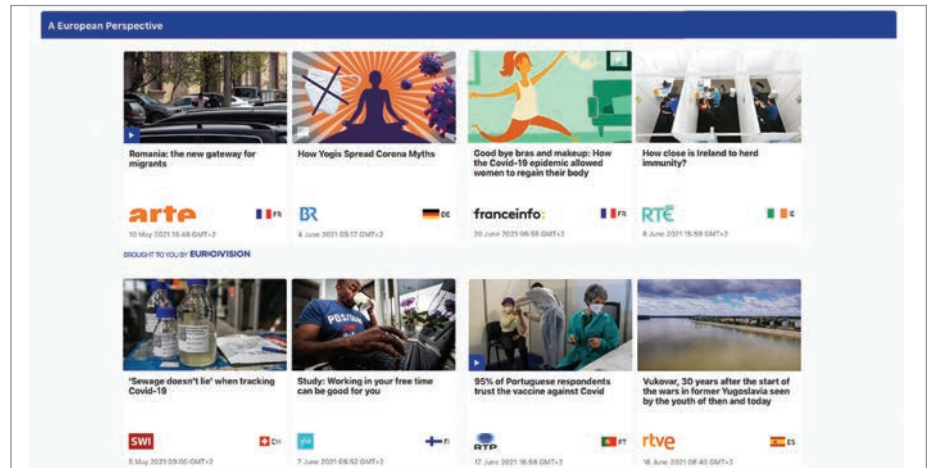
On 1 July 2021, visitors to some of Europe's most popular news websites were presented with *A European Perspective*, a new feed showing selected stories from across the EBU membership, translated into the local user's own language.

This ambitious project draws on the combined strength of public service media newsrooms: great journalism, original reporting, and ethical, trustworthy journalistic processes from the EBU Members that participate in the project. All with one idea in mind: get Europe talking. To make this a reality, editors at our participating Members manage to clear the rights for about 175 reports per week, thus making them available for other project partners, and ultimately their audiences. Users will typically find between 5 and 17 stories per 'recommendation box', and they can access them from the partners' homepages or inside selected news articles. At the time of writing there are around 2,000 stories available for publication in the Digital News Hub that feeds the tool, which is powered by the EBU-developed EuroVOX and PEACH.

## HIGHER PURPOSE

*A European Perspective* is a window to Europe because the stories selected to appear are rooted in diversity. This has been and still is core to the service. From COVID-related issues to environment reports, from lifestyle to economy, the story range being shown to audiences is vast.

Jukka Niva, the Head of Yle News Lab, Yle News and Current Affairs, says audience feedback has been 100% positive. "People seem to well understand the higher purpose of *A European Perspective* and find it valuable. The project also has tremendous and endless possibilities as the



EBU and its Members are trying to break the language barrier in European public service news. With it we can help Europeans to understand the realities of other Europeans better."

The steering group, drawn from participating EBU Members, collaborates closely with the Eurovision News team, led by Justyna Kurczabinska, and the EBU Technology & Innovation Department. Everyone involved in the project has gone the extra mile to ensure that the service service would deliver on expectations and meet all deadlines. The editorial team meets twice per week and exchanges ideas with Sébastien Noir, who leads the T&I software engineering team, every Friday. They also attend the developers' sprint reviews where priorities for the next cycle are discussed. And in between these, together they relay information and ask for advice from the core working group that convenes every three weeks.

## FURTHER IMPROVEMENTS

For Pawel Glimos, a developer on the EBU Digital News Hub, it has

been a challenging and rewarding experience: "After we started exploring the requirements in detail, and the requests from the Members and editorial staff started piling up, I realized just how much there was to be done. There were a few challenging parts, like implementing a versioning system for the articles or ensuring that the system could withstand the load after the launch. Overall, the toughest part was implementing and connecting every element of the media translation/editing pipeline. We had to create many different behaviours spanning the whole project to provide editors with full functionality. Next, we aim to expand the media workflow further – support for audio editing, more straightforward three-step translations, add more statistics so that editors can quickly check what is currently a hot topic for their audiences, and polish the overall experience."

Now immersed in finding the best workflow to editorially process video and audio files, we trust that the possibilities the Digital News Hub offers are endless.

*A European Perspective* has been made possible through a grant from the European Commission's Multimedia Actions programme. It is co-funded by the EBU. If you'd like to join the project you can contact the team via: [erbhlp@eurovision.net](mailto:erbhlp@eurovision.net)



# Being loud about loudness, for the benefit of radio listeners

The EBU working group on audio loudness normalization, PLOUD, has produced new guidelines that specifically target radio use cases, writes group chair **Florian Camerer**.

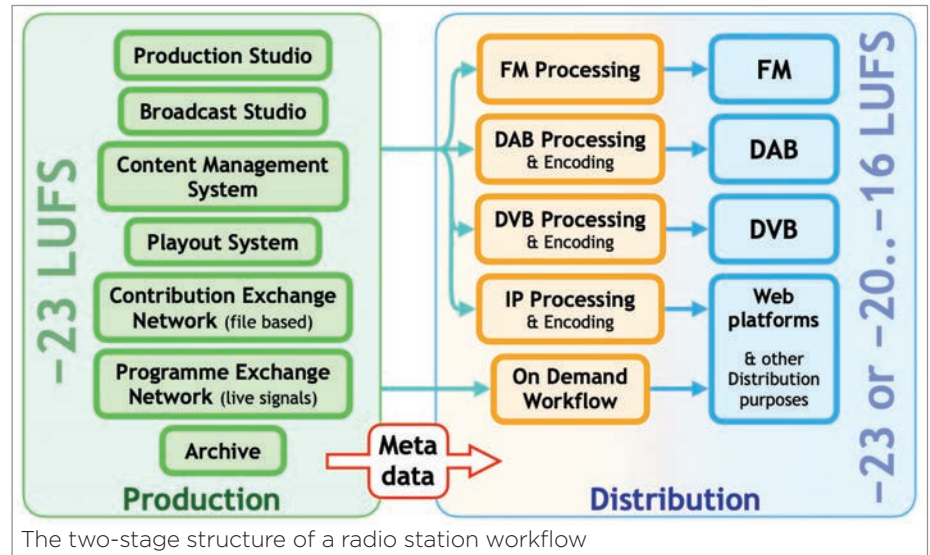
We are loud again! Well, we have never been quiet, frankly. We being the intrepid EBU loudness gang PLOUD, which recently celebrated its 13<sup>th</sup> anniversary. And being loud and active has always been our forte.

This time, the efforts of a core team of loudness fanatics, under the subgroup chairmanship of Wolfgang Rein (SWR) concentrated on loudness in radio. There, the shift away from peak normalization has had a slower start than in television. One of the reasons is the heterogeneous distribution landscape, with analogue FM services still omnipresent in most countries. Also, the ‘loudness war’, with its most severe manifestation in pop and rock music, affected radio more than television. A few PLOUD members working in public radio stations eventually suggested a separate loudness document to emphasize the intricacies of radio workflows and programmes.

## SAME LEVEL

One central mantra must be stated clearly: in essence there is no difference between television and radio (or any other sector, for that matter) when it comes to loudness normalization replacing the peak paradigm. Programmes and often also parts of them (like individual music tracks) are generally produced and/or normalized to the same loudness level of  $-23$  LUFS. Period. Let that sink in for a moment.

Before anyone dismisses this level as way too low for the FM world, consider the crucial link within this ecosystem: alignment, meaning the alignment of the studio level to the nominal deviation of the FM carrier. Without this information, any statement about loudness levels for FM is utterly useless!



Consequently, producing at  $-23$  LUFS does not mean that the level experienced by the audience is necessarily lower than before. If the alignment is adapted accordingly, the consumers get the same average loudness level, but can enjoy a much-improved balance of programmes, elements and dynamic quality. The latter is a major benefit, especially for stations with, for example, classical music or popular music from before the outbreak of the loudness war (pre-1990s).

Generally, the main message of the radio loudness group is the clear distinction between production and distribution. These areas should be treated separately, with a ‘generic’ programme at  $-23$  LUFS being tailored to diverse distribution platforms (like FM, DAB, web streaming, etc.). Tri-media environments (television, radio, online) can now be served with freely interchangeable content as far as loudness levels are concerned, considerably simplifying this exchange.

Concerns specific to radio include: keeping the level relationship between, for example, movements of a symphony when broadcasting the whole composition vs. adapting the level

of individual movements in different contexts; or using the same philosophy for a complete pop/rock/jazz music album to keep the artistically intended level relationship between the tracks (‘album normalization’); different values for the permissible music loudness level in relationship to the voice, depending on the format of the programme (for example, news, morning show, evening concert, radio drama, etc.). These are aesthetic choices that should not be universally cast into a rule or recommendation and are covered in chapter 7 of Tech 3401 (on use cases).

This brings us to the published documents. The set of supplements to the core loudness recommendation R 128 is extended with a third on *Loudness in Radio*, characterized by the same concise set of directives as the mother document. The aforementioned Tech 3401 *Guidelines for Radio Production and Distribution in accordance with R 128* provides more in-depth advice how to manoeuvre through the transition to a loudness-based radio world. The count of PLOUD loudness documents is now at nine, all available via [tech.ebu.ch/loudness](http://tech.ebu.ch/loudness).

# EBU joins GAIA-X to ease cloud adoption for PSM in Europe

As more and more EBU Members aim to take advantage of the cloud, the GAIA-X European initiative, now with the EBU as a member, promises to remove some of the uncertainties and challenges, writes **Lucille Verbaere**.

GAIA-X was born out of the realization, in 2019, that the dominant cloud platforms were all owned by non-EU entities, that moving data and services from one to another was challenging, and that full control over the data stored in these platforms was impossible.

The vision was to foster a cloud ecosystem aligned with European values and laws, such as GDPR, enabling vertical and horizontal chains where data can be easily exchanged but still controlled within trusted data spaces. It should be easy to connect different cloud platforms together and switch from one provider to another. The 270+ members of the GAIA-X Foundation – including the EBU – are thus now working together to develop a reference architecture, secured open interfaces, federated services, and policies that will ensure European companies can access cloud platforms that are secure, interoperable and energy efficient, and that guarantee data privacy and sovereignty.

## MEDIA & THE CLOUD

So, what is the relevance of all this for media? EBU Members are gradually moving to the cloud: France TV has already migrated the group's financial management system and has started to migrate the HR system as well as remote production systems to a mix of private and public clouds. In Switzerland, SRG's online distribution is cloud-based, including live streaming. In Germany, ZDF has started a big cloudification project, encompassing generic IT tools along with broadcast-specific applications such as editing and online services, now fully cloud-based.

Elsewhere in the media sector,



content providers with greatly fluctuating workloads, such as animation and VFX companies, are more and more turning to decentralized cloud solutions that allow them to trade unused resources and decrease their upfront costs.

Although hyperscalers – the big multinational cloud providers – can today offer simple integrated solutions, cloud migration is not straightforward for media companies. Most EBU Members worry about interoperability and vendor lock-in; and they need to shift to cloud-native applications to ensure cost-effectiveness. Data sovereignty and compliance with GDPR are also key concerns slowing down adoption of cloud services from US providers.

## BUSINESS OPPORTUNITIES

With GAIA-X, media companies will be able to adopt multi-cloud solutions that can easily be interconnected, configured and decommissioned and are in line with European values.

Furthermore, the initiative could generate many business opportunities for the media industry. For example, in France the *Alliance Culture Data*, a project led by BnF-Partenariats, has identified seven areas in which the cultural and creative sector could greatly benefit from trustworthy and secure data spaces: operational excellence, commercial performance, product improvement, segmented advertising, customer and market knowledge, R&D, and open data. Many use cases can be developed in each of these areas:

- improved audience insights would allow better content personalization by media companies;
- the remuneration of rights holders could be automated and secured;
- combatting piracy and fake news becomes easier with strong end-to-end authentication guaranteeing from where the content is coming and to whom it is distributed;
- AI algorithms can be accurately trained, thanks to qualified and secured databases, and used for many applications such as translations, people identification in video, etc.

And there is no doubt that many more use cases will emerge once the GAIA-X data infrastructure is in place.

## THE EBU, GAIA-X AND YOU

Now is the time to exchange views, define key use cases and consolidate media-specific requirements. As a new member and the first media company in GAIA-X, the EBU can now promote the creation of a European media data space and make sure the GAIA-X data infrastructure meets media-specific challenges, starting with those related to real-time and big file transfers. We can also target participation in EU-funded projects to develop sector-specific applications and data spaces within the GAIA-X framework.

To join the EBU GAIA-X working group, please contact Lucille Verbaere (verbaere@ebu.ch).

# 5G-RECORDS: making 5G work for the storytellers

By leading the technical work for the EU-funded 5G-RECORDS project, the EBU can ensure that emerging production tools will be well matched to the needs of public service media, writes **Hans Hoffmann**.

Between 2017 and 2019, the 5G-Xcast project did valuable work on exploring how emerging 5G technologies could be used in media contexts. The focus, however, was primarily on *distribution* use cases, so it was inevitable that some of the organizations involved started to consider how 5G could potentially support *media production and content creation*. Thus, the 5G-RECORDS project was born, funded, like 5G-Xcast, by the EU Horizon 2020 programme.

Driving 5G-RECORDS are some key questions: is live production in multi-camera environments possible using 5G? Can we equip a sports stadium for live production using 5G infrastructures? Can we develop higher efficiency in content creation workflows? Can we make it easier for creatives to generate content and tell stories?

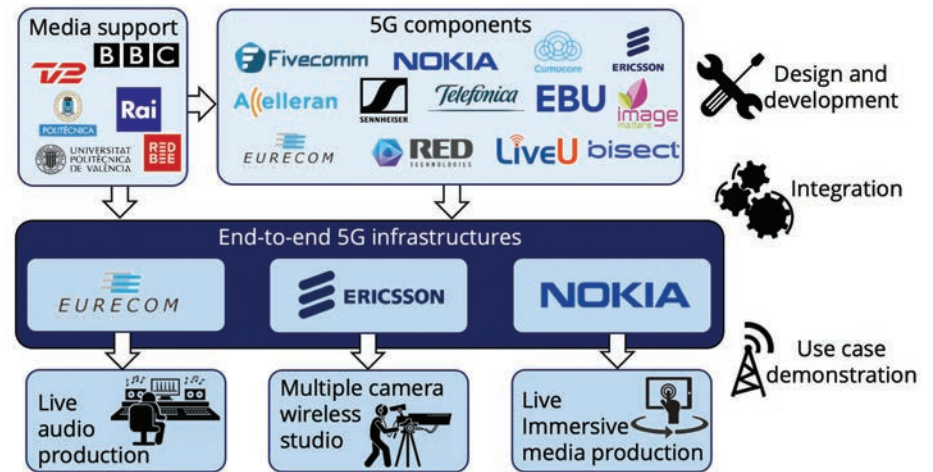
As the answers to these questions would be predominantly of a technical nature, the project consortium decided that the best approach would be to define some fundamental use cases:

- Use case 1: live audio production
- Use case 2: multiple camera wireless studio
- Use case 3: live immersive media

Detailed information about these use cases (and the project as a whole) is available on the website: [www.5g-records.eu](http://www.5g-records.eu)

## PSM INVOLVEMENT

The 5G-RECORDS consortium came together in 2020. As with the 5G-Xcast project, the Polytechnic University of Valencia was instrumental in getting it off the ground. The EBU played a key role to ensure strong broadcaster representation, especially in light of the liquidation of the IRT research centre. Alongside the



An overview of the 5G-RECORDS project

EBU itself, which is responsible for the technical management of the project, three Members are in the consortium: BBC (UK), Rai (Italy) and TV 2 (Denmark).

It is important for the EBU to have a hands-on role in projects like these, taking proactive steps to ensure the needs of public service media will be to the fore as the technology evolves. There are fundamental requirements in terms of workflows, quality and business aspects, as well as a need for standards, to ensure interoperability between equipment from different manufacturers. Without the participation of the EBU and its Members, there is a risk that closed proprietary solutions will dominate. Ultimately, it is about creating value for EBU Members.

## SELF-CONFIGURATION

There are several innovative aspects to this project, not least of which is the work on orchestration, being led by BBC. The goal here is that any piece of production equipment being connected to a suitably provisioned 5G network would be automatically recognized and could self-configure thanks to the orchestration layer. With the use

of templates for different kinds of events, production could start quickly.

Another deeply innovative element of the project relates to the need to bridge the worlds of 5G networks and IP-enabled broadcast facilities. To do this, a media gateway is needed, and the EBU Technology & Innovation team is leading the work on a prototype whose architecture is based on microservices. The work encompasses both hardware and software.

By doing this proof of concept, the aim is to gather knowledge that can be fed into standards. For example, with timing being such an important factor in live media production, how well will PTP (precision time protocol) perform over 5G networks?

With reduced technical resources and R&D capacity at most Members, EBU involvement in projects like this is more important than ever. From the technical project manager Paola Sunna to several other staff members who are actively contributing to 5G-RECORDS, the T&I department is making sure public broadcasters will benefit from innovative new ways to tell stories in the years ahead.



# How EBU Members are doing more with metadata

The EBU Metadata Developer Network held its popular annual workshop in June, once again providing an overview of new tools and approaches to metadata and AI for media, developed by and in partnership with EBU Members.

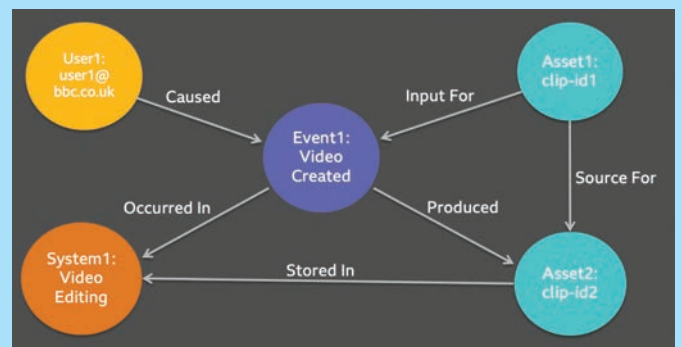
Here we present a selection of the projects that were presented. These presentations and many others are available to view on the website. **Visit: [tech.ebu.ch/mdn2021](https://tech.ebu.ch/mdn2021)**

## MAPPING AND LINKING PRODUCTION DATA

Stuart Jennings, BBC

At the BBC we make a lot of content but have no central means of tracking productions. A story is planned in one system, with video and text content made for it in separate systems. There is no visibility on those links, and no overall view. This means that, for example, we can't track the performance of the content that resulted from a commissioned story or see general patterns in production over time.

Content Origin Graph, or COG, gathers data from production systems and uses a graph database to draw new connections between them, allowing us to answer these types of questions. Data scientists can directly query the database, while an API allows systems to integrate, and a



Data in COG is centred around 'events'

frontend will let decision makers intuitively explore content production from a bird's eye view. This is an exciting new project that will help make the BBC a truly data-driven organization.

## DAM AND MICROSERVICES PROCESSING TO ENRICH CONTENT METADATA

Matthieu Parmentier (France TV)

France TV has invested in the development of an open-source microservices platform (media-cloud.ai) to facilitate the industrialization of AI workflows across several cloud providers. The microservices run in Docker containers and are orchestrated using Kubernetes.

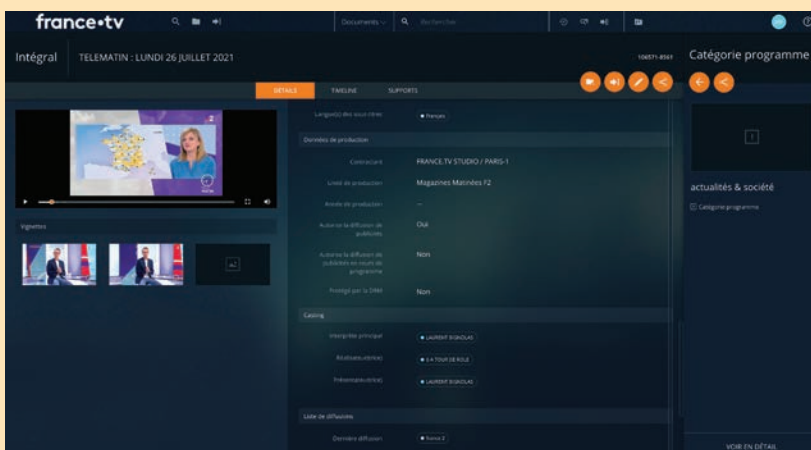
The platform now runs thousands of jobs every day to enrich the descriptive metadata for

many content categories (documentaries, news, TV gameshows, fiction, etc.).

The wise use of AI, where results with a confidence level of 100% are difficult to achieve, needs a bit of strategy to eliminate all the false positives hidden among the real enrichments. This is the role of the DAM (data asset management) platform, where all the

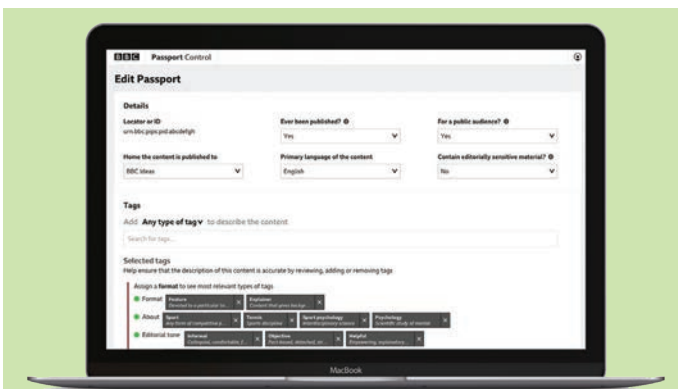
existing metadata, collected during production, are merged, checked and used to initiate the AI jobs responsible for filling the missing parts.

Once enriched, the content metadata is made available to all departments at France TV. Today, AI is used to automatically segment content, generate thumbnails, find credits, and identify contexts for ad breaks.



A screenshot of the France TV DAM (from Perfect Memory) with some metadata filled via AI





Design principles were applied in the creation of the new BBC content passport

## DESIGNING METADATA INTO AN ORGANIZATION'S DNA

Alice Gregory, BBC (with Ting-I Wu and Blaise Galinier)

The future of metadata involves not just machines but also humans and politics, and it can be designed! BBC faces some big metadata challenges that are technical, editorial, organizational and cultural. Having UX and service designers collaborate with engineers has been crucial in making change happen.

Various design disciplines have helped the BBC improve how it generates and works with metadata: from the design of a pan-BBC tagging tool, to mapping out more user-centric workflows.

The aim is to think creatively to get people to care and collaborate along the way.

The process started with research, to understand the pain points for the editorial users. This led to the creation of a vision that people could rally around, the building of a conceptual prototype, and the formation of a network of metadata users and enthusiasts.



Face detection is one of the tools that help identify new chapters

## AUTOMATING PROGRAMME SEGMENTATION WITH AI

Jasper Degryse, VRT (with Marijn Daniels)

Having to scroll through an episode of a talk show to find the exact moment your favourite guest or subject appears can be frustrating, right? On VRT NU, the video-on-demand platform at VRT, we provide shortcuts to the start of each chapter an episode is composed of; and until now, that was achieved by making our editors do the dirty work of scrolling through the episode.

In the chaptering project, we use artificial intelligence to extract metadata from our videos: shot transitions are detected, faces are detected and clustered, subtitles are embedded resulting in extracted topics, etc. Changes in these metadata features throughout the episode are valuable indicators for the start of a new chapter. Once extracted, these features are then fed to the in-house-developed chaptering algorithm, resulting in predictions of when a chapter start occurs. Finally, these predictions are presented as suggestions to the editing team, who in turn verify the results and correct if necessary.

## A PRACTICAL APPROACH TO NEWSROOM METADATA

Kurt Mathiasen, TV 2 Denmark

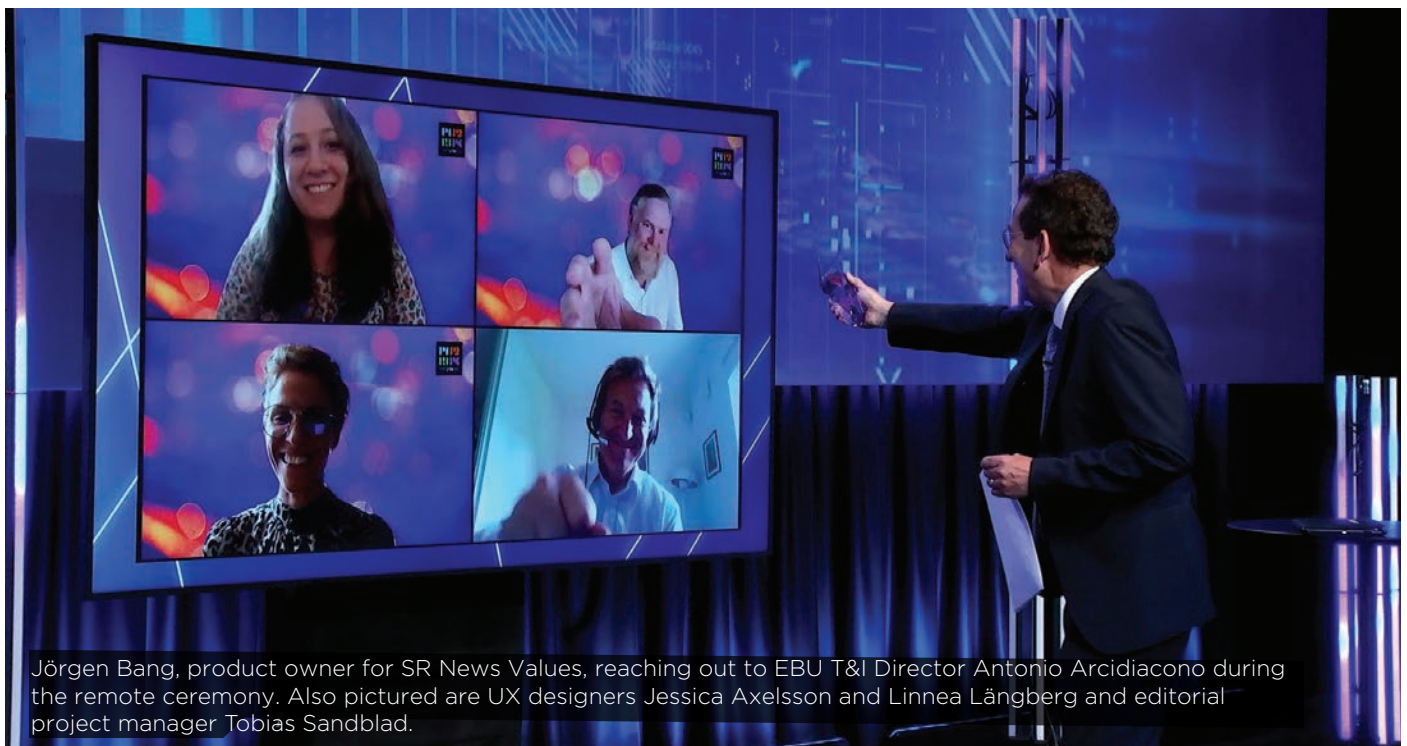
Multiplatform newsrooms (spread across multiple locations) offer the ultimate use case for leveraging metadata: collaboration – who is working on what – and reusing parts of what a colleague has already researched. Most systems have good search capabilities, so the main issue is how to enter the metadata into the production flow.

In a small commercial broadcast organization, the focus is on revenue, especially from the 'new' platforms (VOD), and producing more content. We receive much news-oriented media from agencies, social media and freelancers and we want to reuse the metadata already associated with that content. Metadata standards are thus key, for example the IPTC Media Topics vocabulary.

Production systems provide simple fields and APIs for entering metadata, but internal resources to implement user-friendly tools for standardized metadata are a challenge.

'Copy/paste' is still widely used – it is simple and users feel comfortable with it. Many metadata services provide impressive UIs (user interfaces) to demonstrate their capabilities, but often a simple 'copy' (metadata) button is missing. Our message for manufacturers and service providers is: don't forget the simple functionalities that can be easily implemented in a modern (HTML5-based) UI. Copy/paste and drag/drop from iframes (and other pages) are still tools that are much appreciated by the users.

# An algorithm to promote unique public service journalism



Jörgen Bang, product owner for SR News Values, reaching out to EBU T&I Director Antonio Arcidiacono during the remote ceremony. Also pictured are UX designers Jessica Axelsson and Linnea Långberg and editorial project manager Tobias Sandblad.

Sveriges Radio won the 2021 EBU Technology & Innovation Award for “News Values, the Public Service Algorithm”. **Olle Zachrisson**, Head of Digital News Strategy at SR, explains how the system both promotes particularly strong SR journalism and streamlines newsroom workflows.

SR is Sweden’s national public broadcaster and leading audio company, with over 2,200 staff stationed in 50 locations around the country. Representing the whole population and covering under-reported areas and issues are central strategic ambitions as expressed in our vision: “More voices and more powerful stories for greater understanding.”

Giving prominence to journalism of great public service value is at the heart of a cross-functional project to create a news algorithm from scratch. The algorithm is powered by News Values – a system by which editors rate all audio news stories produced by SR each day. The pre-publication rating feeds the algorithm that in turn helps us automate and personalize the news experience for a wide and diverse audience.

## EVALUATING NEWS

Every day, SR newsrooms publish around 350 news clips in apps

and on the website. The diversity is considerable, with news from 26 local channels from north to south, a large national newsroom, sports, science, culture and language services. For traditional radio, the various newsrooms make their editorial assessments for their own broadcasts, independently of each other.

However, digitally the most relevant news items from all newsrooms are gathered in the same news feed. A good example is *Top News*, our main news playlist in the app Sveriges Radio Play, which constantly updates the audience with the most important national, local and international news. To provide this service we need a common standard for news evaluation: which of all the news items are most important at any given moment?

News Values is the system where SR editors now evaluate news items as they have always done, albeit expressing it in a

new way. In our digital publishing tool, each item is rated in three dimensions:

1) How high is its general news value? Is it an extraordinary news event like a devastating forest fire or suspected terrorist act? Is it a standard news piece, which is certainly important but not of such obvious impact that it affects everyone?

2) How long is the life span? Is it a news item that is relevant for a long time, such as a revealing investigation? Or is the life span short, like a traffic accident or a sports result?

3) Does the news contain significant SR values? Here we have identified a set of distinctive public service qualities: are we out reporting on location? Are unique voices from affected people included in the story? Are we providing our own analysis of a difficult topic?

## VALUES & TECHNOLOGY

The third dimension is what really



distinguishes SR's system from similar solutions in other media houses, and the reason we call it our "public service algorithm". Employees from all over the company have put great effort into identifying and formulating the core values that characterize strong SR publications. The link to the company's mission is clear.

The fact that SR has integrated journalistic values of this type into a technical system is something that has attracted a great deal of attention in the international media industry. In the motivation for the EBU Technology & Innovation Award, Judy Parnall, Chair of the EBU Technical Committee, called the system "a perfect example of technical ingenuity being combined with public service values, helping Sveriges Radio to better fulfil its mission."

SR is far from being the only European public service company that aims to offer its digital users a more personalized news feed. At the same time, every PSM organization wants to ensure that its news output is credible, factual and comprehensive, in line with the journalistic mission. For example, BBC News Labs has created Cupid, a prototype for editorial curation of a personalized news feed, where SR is cited as an

important source of inspiration.

### **MORE TIME FOR CONTENT**

So how can setting news values save time for stressed digital editors? When rated, each item gets a numeric score that then decides its place in the running order in news playlists and on sverigesradio.se. This editorial algorithm is now automating the total output from all of SR's 33 newsrooms. This means that, instead of having to manually edit the news mix every time something new has occurred, editors can devote more time to enhancing the journalistic content.

The general news values and the freshness of the item carry the most weight in the algorithm. But a news clip that contains the special SR values – for example a unique testimony – is given a more prominent position and so is displayed to more listeners. It also helps our editors in the national newsroom to quickly discover the most important news from all of SR's local stations.

### **COLLABORATION**

The long internal project has been marked by the closest collaboration between tech and editorial in the history of SR. Two project managers, one from

each side, led the effort shoulder to shoulder, which created an exceptionally strong backing for the system in the whole company.

"Technically, what we have done is relatively straightforward really," says Jörgen Bang, Product Owner. "Half jokingly, we say that the algorithm itself is understandable if you've studied basic maths in high school. But the central thing is that it changes how we work with news digitally and the jury seems to have understood that."

The system of news values stimulates a discussion about how we do our journalism. It inspires positive change. Our evaluation of the project has shown something we are particularly proud of: that the new system encourages reporters to get out of the office more often, which makes for more vivid audio storytelling on the reality of people's lives. It also offers future opportunities for more sophisticated personalization, such as individually customized news playlists and newsletters.

### **HUMANS FIRST**

For some, both outside and inside media companies, the word "algorithm" carries negative connotations, especially in relation to free speech and independent journalism. The term is associated with commercially driven tech products that run without human intervention to maximize clicks and profit.

That is why we stress that even though algorithms and advanced programming are important tools in digital journalism, the basis is always the human editor's journalistic judgment.

We will never hand over our news presentation to a completely autonomous system nor personalize to such a degree that our listeners get completely different views of current affairs. SR has a mission to convey the most important news to everyone, and we are firm believers that smart tech can help us do our job better.



Ollé Zachrisson, Head of Digital News Strategy at SR

# Adapt, invent, evolve – news tools for a pandemic



**Morwen Williams**, Director of UK Operations at BBC News, describes how three groundbreaking tools were developed quickly as the first lockdown began, a project that was a runner-up for the 2021 EBU T&I Award.

When COVID-19 hit and lockdown followed, it was incredibly difficult for BBC News to continue newsgathering and broadcasting as normal. So, our News Operations teams set about developing systems to help us carry on for our audiences. The three virtual tools we developed transformed our newsgathering for our teams, making workflows easier – and delivered better programming for our audiences.

## TOUCAN

While the world turned to Zoom, it didn't deliver the right frame rate for television news interviews and had to be converted. This slowed down the entire process, making deadlines even more stressful. In just three weeks, some of our engineers invented a new system to avoid all this and deliver a better picture: Toucan was born. Our news crews navigate to the platform browser, book a session and click to generate a link. They send that link to the contributor who only needs to open it in a Chrome web browser. The crew clicks record, and each camera is recorded in a separate file on a BBC server, already in a BBC News standard format, which saves time.



## PREREC

Similarly, discussion programmes and remote television edits meant audio was over the internet and often substandard with glitching or dropout. Our Programme OB team was no longer on the road and developed PreRec, to bring discussions back together in quality and for tracking packages remotely. It's used in television and radio across the BBC – and was heralded by one reporter as “possibly the most important bit of software BBC News has developed” for television audio track.

PreRec allows a reporter to file their audio track remotely while watching the edit over Zoom and have it dropped into

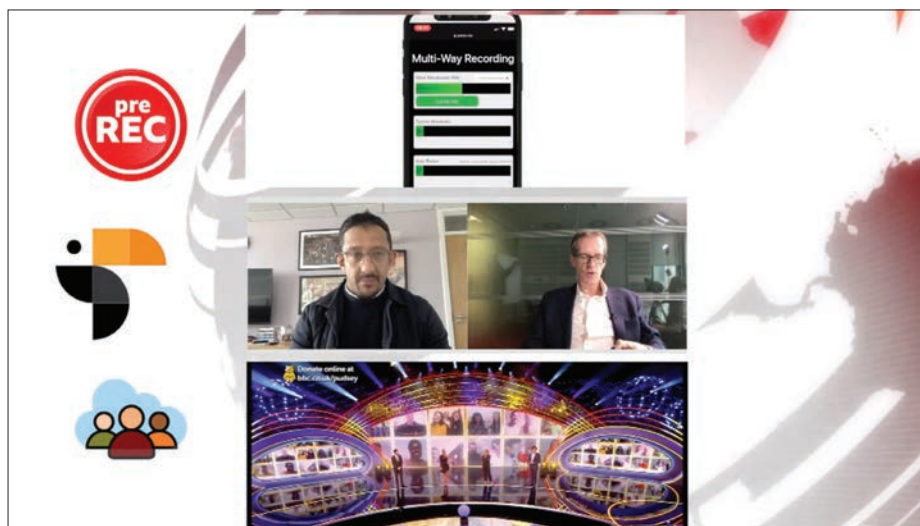
the piece in perfect quality afterwards. It makes radio discussion programmes as good as if guests were in the studio together. The unique feature of PreRec is that, at exactly the same time as the live conversation is happening, it constantly saves and uploads a quality recording to a secure server for each contributor. The producer simply needs to send a link to each contributor; they click the link on any platform or device and everyone is connected together in a secure, online session.

PreRec has been used nationally and internationally and it will be used for remote production long after the pandemic has passed.

## VIRTUAL AUDIENCE

Finally, it's all about the audiences – but they couldn't come to any of our buildings. So we enabled them to join us from their kitchens, lounges and sofas, to bring reactions back into our productions. Originally developed for a discussion programme, Virtual Audience was quickly adapted by many television and radio programmes looking to restore that vital ingredient. It harnesses Zoom but feeds audience reaction into the ears of the presenters, so they're not broadcasting into a vacuum as in the early days of the lockdown. The solution has featured in the media for its creativity and simple ingenuity.

At BBC News UK Ops we are proud of our incredible engineers who deliver the news 24/7 on the road and in the studios. But when they can't do that, they adapt, invent and evolve – and with these three products they kept BBC News and the wider BBC in business and on air during the pandemic.





# Rai Virtual LIS: an avatar for sign language applications



A runner-up in 2021 EBU T&I Award, the Rai Virtual LIS platform is an excellent example of PSM using technology to help fulfil the public service remit. **Mauro Rossini, Carmen Marino** and **Andrea del Principe** explain how the platform works.

The Rai Virtual LIS platform enables the production of content in Italian sign language (LIS) using avatars to create new opportunities and services for deaf people in contexts where human LIS interpreters are not provided.

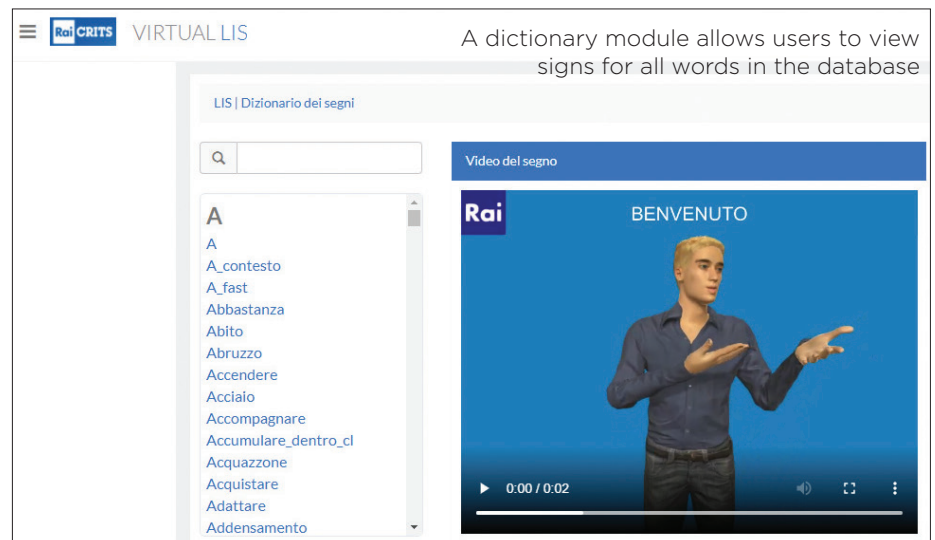
The platform is based on a real-time graphics engine while avatars and animations are developed by using the latest 3D computer graphics technologies. The results achieved by the platform in terms of fluidity and intelligibility have been positively evaluated by many experts and deaf signers.

The use of avatars in this way makes it possible to foresee a whole range of new services for deaf people: sign language descriptions of monuments, artworks, architectural contexts, cultural and tourist information; the translation into sign language, through a virtual actor, of educational content, lectures, training courses and books; the provision of information for travellers in railway stations and airports; and on-demand translation services for content that, owing to the specificity of the topics and lexical complexity, may be difficult to understand.

## NEW MODULES

In the past year the Rai Virtual LIS platform has been enriched with two software modules: Teaching and Weather Forecast.

**Teaching** is a web application that allows students to learn sign language and generate new content in sign language through the virtual actors. The application is divided into two sections: the “Dictionary” section makes it possible to view all the LIS signs available in the database, animated by the avatar, while the “Translation”



The provision of tourist information is a potential application of the Rai Virtual LIS platform



section is dedicated to the generation of new content in sign language by displaying the Italian text and the corresponding sequence of LIS signs. Currently about 1,000 signs have been digitized, and the corpus of signs can be expanded incrementally.

The **Weather Forecast** application downloads weather forecasts from the Rai national Teletext service every day and performs an automatic translation into sign language. The output of the system is a video in Italian sign language. The translation is based on a deterministic algorithm invented and patented by the Rai Centre for Research, Technological Innovation and Experimentation (CRITS).

## SOCIAL BENEFITS

The Rai Virtual LIS platform aims

A dictionary module allows users to view signs for all words in the database



to extend the use of Italian sign language for better social inclusion of deaf people in cultural and didactic contexts, to provide free tools for experimenting with new forms of communication, and to facilitate relationships among children, including those with communication difficulties.

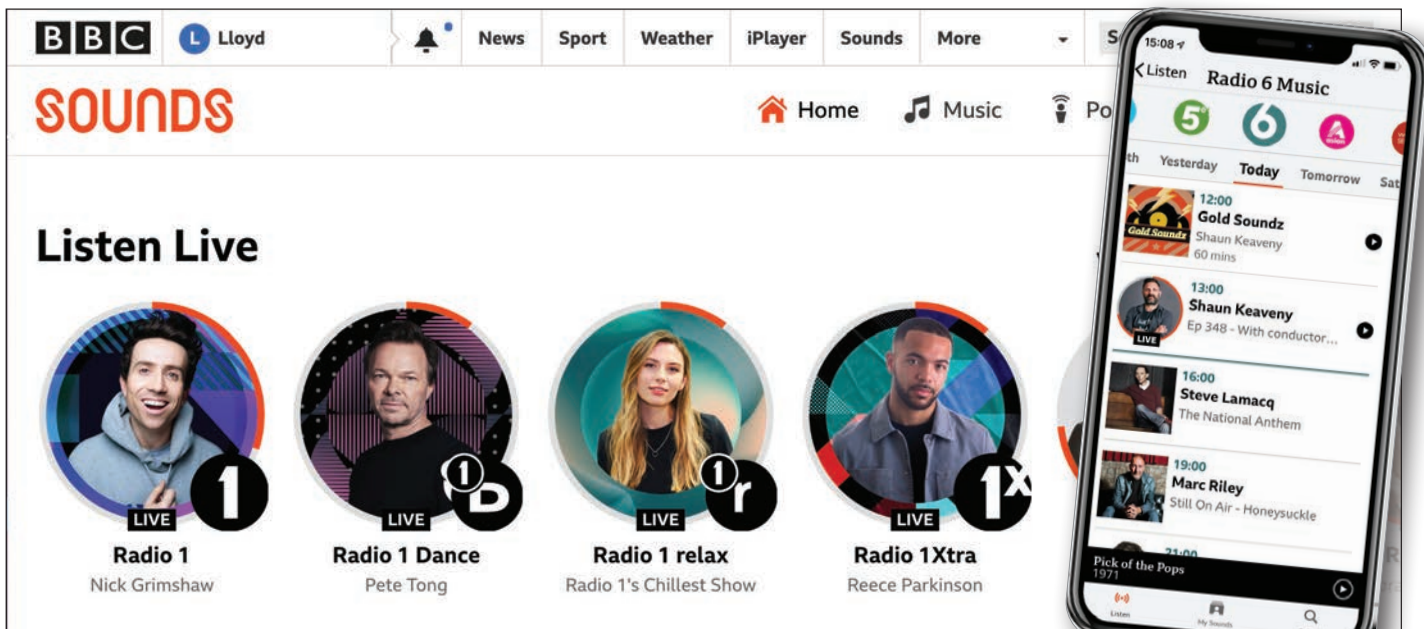
The platform is currently based on Italian sign language but it can be extended to include other sign languages in order to create an international sign language platform.

Consistent with its public service mandate, Rai is considering making the Virtual LIS platform available free of charge to deaf communities, associations, museums, schools, universities, public and private institutions wishing to provide non-profit content and services in sign language for deaf people.

# BBC's new home for radio, music and podcasts



BBC's integrated audio platform was another of the finalists in 2021 EBU Technology & Innovation Award. **Lloyd Shepherd** provides the background to the project.



BBC Sounds was launched in late 2018 as the new home for radio, music and podcasts at the BBC, giving listeners a personal, relevant experience and offering them more control and flexibility. Available on web and mobile (iOS and Android), it was conceptualized as the audio equivalent of iPlayer – a single home for all BBC's audio content. It replaced an older product, iPlayer Radio, which had grown organically over a number of years. iPlayer Radio was turned off in late 2019.

From the start, Sounds was envisaged as an integrated platform for listening to and discovering BBC audio content. Since the initial launch on web and mobile platforms, we have also launched a TV app as well as an Alexa skill (for devices that use Amazon's voice-controlled assistant). Further integrations are in the pipeline.

## UNIFIED EXPERIENCE

Two things tie all these platforms together:

- a single backend system, called Radio and Music Services (RMS), which pulls in content from BBC's scheduling and

content backend and presents it back to the Sounds clients in the form of feeds;

- a single user ID, run by BBC Account.

What this means, in effect, is that the Sounds experience is unified across all clients, and users can shift their listening from one platform to another seamlessly. They can, for instance, start listening to a BBC radio show on their Alexa device, and then continue listening to the same show on their phone when they leave the house. At the same time, because key business logic is contained within RMS, much of the product is built 'in the API', meaning that changes can be rolled out across clients in a coordinated fashion.

## CONTINUOUS IMPROVEMENT

Since launch, the Sounds product teams have focused on three main areas. First, easing user 'pain points' such that the core product is more competitive in the market, and user satisfaction increases. In the past year our App Store reviews have climbed steadily, and in market research Sounds is now second only to Spotify for user satisfaction in audio apps.

Working on frictionless discovery has been a second key area. The BBC produces more than 50 hours of new audio every hour of the day, and almost all of this is available on Sounds. This presents a massive discovery challenge for the user. BBC's approach has been to focus on 'personalized curation' – mixing together our in-house data capabilities in recommendations and audience segmentation with a world-class curation team steeped in BBC's traditions of public service and delightful discovery. We put this work under the heading 'relevance' – and it is an ongoing and detailed programme of work.

Finally, we've been focused on making Sounds available everywhere a user might want to consume it. The experience of iPlayer has shown how important carriage deals are to the success of public service media platforms. We have teams in both product and business development pursuing a range of deals to bring the Sounds experience to new platforms – while at all times preserving the unity of experience for the individual user.



# Towards a greater understanding of the carbon impacts of streaming

Following a year in which video streaming received a lot of media attention owing to concerns that it was a significant driver of climate change, new research from the Carbon Trust is helping to measure the impact, writes **William Pickett** (Carnstone Partners).

In June, the Carbon Trust released a white paper entitled *The Carbon Impacts of Video Streaming*. There have been widely varying estimates of the carbon emissions associated with video streaming. The Carbon Trust worked closely with the DIMPACT\* team and participants to produce the paper. They used primary data from participants, reviewed the DIMPACT approach, and incorporated the latest academic research to provide the most up-to-date estimate of the impact per hour of viewing on-demand streaming.

## CARBON EMISSIONS

The paper estimated that average carbon emissions across Europe for streaming to be 55g of CO<sub>2</sub>e (carbon dioxide equivalent) per hour. This includes all components involved in the delivery and viewing of video content, right down to the end-user device, but excludes the production of content. While this amount of greenhouse gas cannot be neglected when the total viewing hours of streaming are aggregated across an entire viewer base, the unit carbon emissions of streaming one hour of on-demand content are relatively modest. One hour of streaming is comparable to basic everyday activities such as boiling a kettle three times, or driving a car 250 metres.

The results also suggest that the in-home devices and peripherals are where a majority of the energy consumption occurs. DIMPACT participants are now seeking to understand how they can work with device manufacturers to address this hotspot.

There are of course come with some caveats with the results. The first is that the emissions of



video streaming are heavily impacted by the locations where the content is viewed. Some countries depend far more on fossil fuels for electricity generation than others and thus the same electricity consumption will ultimately emit more carbon. The second is that each company will have a different understanding of their audience's viewing behaviours, such as the breakdown of device types and peripherals being used to view content. More viewing on smaller devices such as laptops and smartphones will reduce energy consumption, when compared to large television sets.

## DATA VS. ENERGY

A key area for further development is to examine more closely how we estimate streaming's share of the energy consumption of the internet's infrastructure. The established method currently uses data volume as a way to allocate

energy between the different services using the internet. However, this may be overly simplistic in modelling the dynamics of internet networks. Increasing the video quality from standard definition to high definition may double the data volume, but is unlikely to have an immediate commensurate impact on the energy consumption of the networks. This was observed in the pandemic, where many telecom operators noticed a significant increase in data consumption without any increase in energy consumption. More work is needed to gain more certainty in how changes to streaming service offerings will ultimately have a real-world carbon impacts.

The findings are aligned with the results of models run by other DIMPACT participants. One of DIMPACT's founding participants, the BBC, posted a blog article ([tinyurl.com/bbc-co2](https://tinyurl.com/bbc-co2)) that outlines how their own modelling shows good alignment with the findings. They also explain some differences in their results, based on using different data sources and assumptions. This shows that there are still some live questions and variation of modelling between organizations. DIMPACT acts as a platform to discuss these questions and variations.

*\*DIMPACT is a UK-based collaborative initiative that has developed a tool to assess the carbon impacts of digital media and entertainment products. A growing number of media organizations participate in DIMPACT, and the consortium has an ambition to gain a robust understanding of, and ultimately reduce, the carbon impacts of their digital products.*

# Why IP networks and data management are the top priorities

Trends in both content and the technology used to deliver and consume it point to some key focus areas for public broadcasters in the coming years, writes Rai's Chief Technology Officer **Stefano Ciccotti**.

To shape a strategic view of media technology innovation, we must consider our likely future challenges in content production and distribution. All the trends that had been emerging in recent years have, in fact, strengthened because of the COVID-19 crisis.

First, it's now clear that moving audiovisual content to OTT is not merely about making linear channels available over IP. In fact, the share of linear consumption has been continuously shrinking, whereas the VOD share has increased (24% linear vs 76% VOD, according to the latest *State of Streaming Report* from Conviva).

## CONTENT TRENDS

Furthermore, it's important to note the correlation and mutual influence between the development of content and the evolution of platforms. Especially with regard to long-form content, we have recently seen outstanding growth of consumption on big screens (via smart TVs and games consoles), globally reaching 73% of overall viewing time on a multitude of platforms and ecosystems, both horizontal and vertical. If big screens are fit for the so-called 'long forms', on the other side smartphones have proved themselves to be suited to the delivery of extremely short content. For example,

China has seen the emergence of a new genre known as 'vertical dramas', television series designed for mobile only. They are shot vertically, and episodes range from one to four minutes. Their success is set to drive the roll-out of 5G networks.

I also believe that traditional content providers should push forward the edge of innovation by distributing their services in still unexplored, emerging

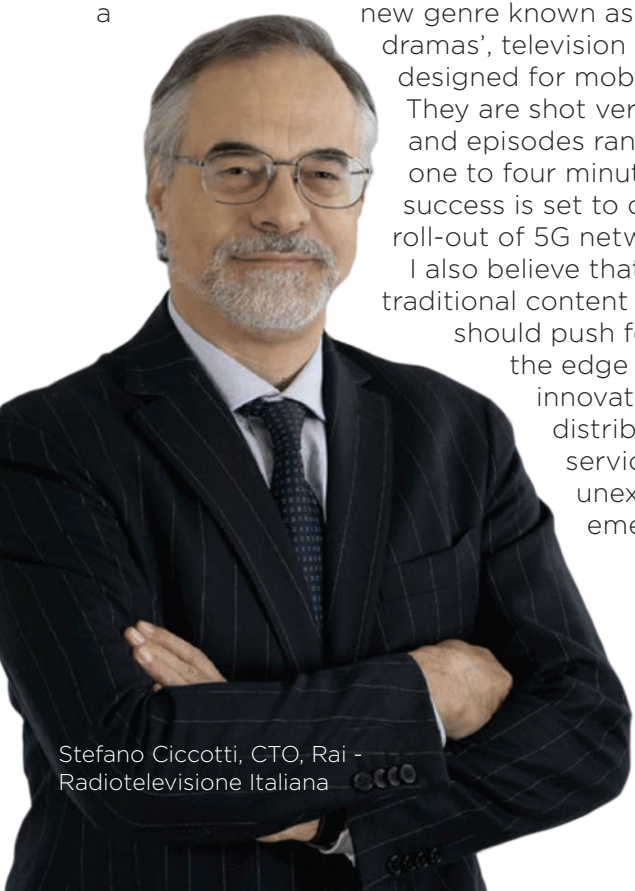
environments, such as connected cars and augmented, virtual and mixed reality (AR/VR/MR) ecosystems. Connected cars, that will average a *daily* internet traffic of 25 GB (as against 25 GB/month for mobiles), already provide the opportunity to offer mobility-tailored content (traffic info, weather forecasts, podcasts). However, in the future – when autonomous driving becomes a reality – the driver will be able to enjoy audiovisual shows as if in the living room. Alongside this, VR/AR/MR, that proved to be powerful tools for staying in touch during the lockdown, will enable the evolution of new formats, especially educational and entertainment ones.

## TWO CHALLENGES

This proliferation of platforms and content leads to two main challenges: the need for future-proof IP delivery networks and the centrality of data management.

The overall growth of long-form and high audiovisual quality content over smart TVs, combined with the increasing pressure on mobile traffic for short-form content, have been already putting an almost unaffordable burden on existing IP networks, especially in terms of performance. The rise of services and platforms that may either cooperate (e.g., connected cars) or compete (e.g., gaming) with audiovisual content providers, will demand not just higher throughput for end-user devices, but also extremely low latency and smarter management of peak-hour traffic. This can be achieved by moving the computing functions as near as possible to the end user: the edge cloud-computing approach. This strategy requires tight interaction between all players along the value chain, with special regard to ISPs and technology providers.

Last but not least, in such a fragmented scenario, data management will play a central role in guiding users to the best experience. The demise of third-party cookies (with modern browsers severely limiting data-gathering possibilities) and the conflictual relationships between Chinese and American big tech companies and the European institutions are driving traditional content providers to look for alliances aimed at developing AI tools for business intelligence purposes and for fairer recommendation systems. As public broadcasters, we feel the responsibility to prevent 'echo chamber' or 'filter bubble' effects, especially when it comes to information services.



Stefano Ciccotti, CTO, Rai - Radiotelevisione Italiana





# Bringing the media and telecom industries together

Founded just two years ago, 5G-MAG has quickly become an important player in the emerging 5G-based ecosystem for media production and distribution, writes **Jordi J. Giménez**, the association's Head of Technology.

Connectivity is becoming a fundamental element of society, with 5G as one of its most prominent drivers. For some 5G is no more than a new generation of smartphones, for others it is part of the expansion of the internet to be available in any location and on any device. For us in 5G-MAG, the opportunity is to be at the forefront of innovation in solutions for media contribution, production and distribution, backed by standards with a global footprint.

The 5G Media Action Group, created in 2019, is a cross-industry association bringing together stakeholders from the global media and ICT industries. 5G-MAG is *the* place to discuss the future requirements and needs of the media industry around 5G connectivity and new use cases enabled by cutting-edge technologies, as well as understanding what such standards can do for media.

The association's work is driven by its members, with a structure that enables addressing commercial, technical and regulatory aspects. 5G-MAG members are able to propose work of significant interest in the form of work items, the current ones being: LTE-based 5G Broadcast; media distribution over 5G broadband networks; and non-public networks (NPNs) for media production.

## DEVELOPING SOLUTIONS

The explosion of over-the-top (OTT) platforms and an increasingly competitive media landscape drive the opportunity to find new methods to deliver content universally and at scale. 5G-MAG members are exploring the use of 5G Broadcast to



Jordi J. Giménez

deliver free-to-air linear television and radio using traditional broadcast infrastructure but with a technology that can reach smartphones, tablets, connected cars or even home entertainment devices.

Another core topic is about media distribution through 5G broadband networks, leveraging their improved technical capabilities and features for media streaming, edge computing, QoS (quality of service) management or scalability with multicast/broadcast modes. Features that would enable the delivery of free-to-air content in mobile networks or fulfilling universal coverage requirements are also in the scope.

On the other side of the media coin, media production and contribution are not only

increasingly moving towards IP but are embracing the internet, in particular for remote and distributed production. 5G-MAG members are actively exploring the role of NPNs (non-public networks) to offer connectivity for localized use cases and applications. Whether as portable setups or integrated with existing 5G networks, NPNs may offer advantages in terms of ensuring QoS, enabling low-latency applications, or security in connecting and managing production equipment as well as network features.

## REFERENCE TOOLS

5G-MAG has recently agreed to support the promotion and fostering of 5G Media technologies by launching a programme to develop 5G Media reference tools. The association has kickstarted this programme in order to establish a developer community and to create common open-source reference tools to support implementation and interoperability of 5G Media technologies. It is expected that these tools may be used in validation, verification, demonstrations, trials and possibly even in commercial services.

The target is an end-to-end open platform enabling the implementation of applications (e.g., media players), service layers and network functions to deliver future television and radio services, as well as new formats, to any connected device including smartphones, tablets, connected cars or smart TVs. Participation is not limited to 5G-MAG members – on the contrary, we hope to attract researchers and independent developers into the community. Join us! **Visit: [5g-mag.com](https://www.5g-mag.com)**

# 2020: a record year for digital media

What impact did the pandemic have on digital media consumption? A new report from the EBU's Media Intelligence Service highlights the main trends, writes **Léa Besson**.

2020 was the year of many changes in European citizens' media consumption. The COVID-19 crisis led to an acceleration in the use of digital media, as illustrated in a new EBU report on *Digital Media Consumption Trends*.

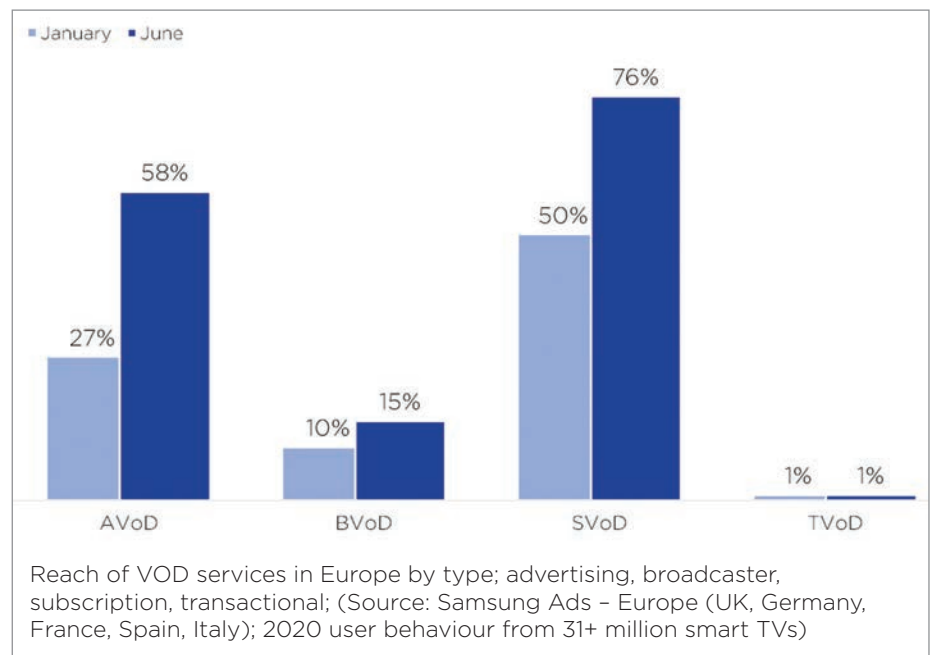
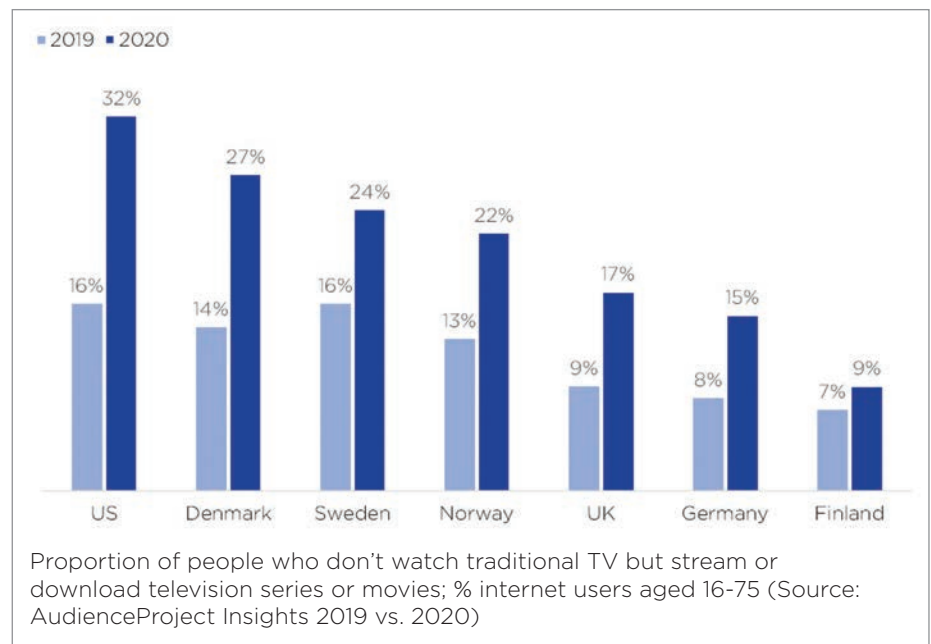
SVOD (subscription-based video on demand) is driving the increase in time spent on non-linear video. The growth was especially strong in 2020. While the pandemic boosted non-linear viewing, in parallel more and more people stated they no longer watch traditional television. The trend is firmly entrenched in the Nordic markets with more than 20% of people stating they are 'pure streamers'.

With respect to the reach of VOD services on smart TVs, SVOD is not the only platform to be boosted by the pandemic: the reach of AVOD (advertising-based video on demand) almost doubled between the beginning and the middle of 2020, to 58%.

## MUSIC STREAMING

Turning to listening trends, music streaming was one of the clear winners of 2020, showing a dramatic increase in time spent between 2017 and 2020, especially among young people. In Europe, Spotify is the outright leader in the music streaming market.

On the spoken content side, podcasts are trendy but usage remain rather low for now. The podcast market is also fiercely competitive, as global platforms such as Spotify and Apple Podcasts seek a piece of the action. Nevertheless, some PSM podcast providers are resisting this competition, as shown in Denmark. DR Lyd, the public media platform, is the leading audio platform there for podcasts in terms of reach among the 12+ group.



## SOCIAL MEDIA

Social media continues to be important in European lives and is the leading media by 'time spent' for internet users aged 16-24. Messaging platforms and Facebook reach all age groups in equal measure. However, while the reach of Instagram and TikTok is soaring, Facebook continues its free fall, especially among young people.

As 2021 began, it seemed

some of the increases had started to fade. By the end of this year, and depending on the evolution of the pandemic, we might be able to analyse better how this boom in media consumption will evolve.

**EBU Members can download the *Digital Media Consumption Trends* report by visiting [ebu.ch/publications](http://ebu.ch/publications) and selecting *Research*.**



# Recognizing young talent

Terhi Nikkilä



**Irene Nikkarinen, a data scientist with Finland's Yle, was the winner of the inaugural EBU Young Engineers and Researchers Award, announced during the 2021 Technical Assembly in June.**

With the company for less than a year, she was nominated for her work on adapting and training an open-source metadata tool that is improving the findability of Yle content on its online platforms and apps. Following her studies at the University of Helsinki and the University of Cambridge, she worked for a short time at a commercial company. The opportunity to serve all Finns with the results of her work was an important criterion in her decision to join the public service media company.

## IN THE SPOTLIGHT

### Stephan Heimbecher

DIRECTORATE TECHNOLOGY  
AND PRODUCTION, CONSULTANT, SWR

#### WHAT ARE YOUR CURRENT RESPONSIBILITIES?

I kicked off my professional career thirty years ago at the IRT in Munich and earlier this year I returned to my roots in public service media by taking up a role with ARD/SWR. My focus there is currently fully on my new role as chair of the EBU Strategic Programme on Production and I am really enjoying working with all those wonderful people on shaping the future of public media.

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

Well, I don't mean to sound arrogant in saying that quite a few things come to mind, as I am fortunate to have had an eventful career in broadcast innovation with a number of highlights. Facilitating the world's first live UHD broadcast over HEVC in 2014 probably stands out the most.

#### WHAT ARE YOUR PREDICTIONS FOR MEDIA TECHNOLOGY IN THE FUTURE?

I have been saying for years that

the only reliable prediction these days is that there is no reliable prediction. However, this much I can say without gazing into the crystal ball: technology is a driver for new digital products which in turn drive new formats for media distribution and consumption. User behaviour has already been turned upside down and that trend will continue in many ways.

#### WHAT, FOR YOU, ARE THE BIGGEST CHALLENGES FOR EBU MEMBERS TODAY?

The generations that grew up with traditional broadcast (i.e., linear programming, etc.) are now outnumbered. Younger generations are longing for a different kind of media experience, which is enabled by today's technology. New players from across the pond have appeared on the scene. Keep up with the unpredictable (see above), be flexible, be brave, try something new. Look ahead, not back! Stay relevant!

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

My daily bike rides release stress



Stephan Heimbecher

and foster my creativity. My regular worldwide (non-business) trips open my mind and form me. I am also a big music fan, especially of Elton John (and actually ran his fan club for almost three decades). And I am still committed to AIDS charity work as the founder of Red Ribbon Germany (which I had to stop for personal reasons a few years back).

# EBU BUSINESS CONCEPTS MODEL<sup>®</sup>

## THE VOCABULARY FOR PUBLIC SERVICE MEDIA ANALYSIS

