

Final Recommendations from the *Audiovisual Media in Europeana* Task Force



REPORT
10 July 2017

Image: Stage manager Paul Römer and camera operator Joes Odufré are filming the opening credits of the AVRO game show 'Weest op Uw hoede', 1955. Provider: Netherlands Institute for Sound and Vision via EUScreen.



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Preamble

This Task Force was proposed in February 2016. The group intends to make audiovisual media a first-class citizen - on both the Europeana portal and in the wider Europeana ecosystem. Our original aim was to formulate recommendations regarding audiovisual content in Europeana in three specific areas:

1. Improving the use
 - a. improving search on time-based media (including an assessment of audiovisual media standards in relation to EDM)
 - b. Multimedia hyperlinking (incl. definition of a pilot / exhibition)
 - c. Crowdsourcing
2. Accessibility
 - a. Support of subtitles and multilinguality emerging media formats (layout on mobile devices)
3. Editorial
 - a. How to embed audiovisual content in Europeana Collections and other Europeana-related sites reusing AV materials assessment of multimedia content (topics)
 - b. editorial use of AV content externally (length, edit)

These final recommendations report back on the work of the Task Force and its consultations with stakeholders. It outlines a set of nine high-level recommendations.

The current report is the result of a face-to-face kick-off meeting at the Netherlands Institute for Sound and Vision, Google Hangout sessions with the Task Force members, a feedback round with reviewers based on the mid-term progress report and a second face-to-face meeting, kindly hosted by Televisió de Catalunya. The pre-final version was discussed at the Europeana Members Council meeting on July 6. There was general consensus about the necessity to invest in the areas outlined in the document. Given strategic priorities the Members Council suggest to prioritise recommendation 4. Unified layout, 5. Shared streaming infrastructure and 6. Citations for research. Regarding the latter, it was suggested to contribute to the Resource Citation Taskforce¹ that was recently launched.

¹ <http://pro.europeana.eu/get-involved/task-forces/resource-citation-object-identity-standardization>

Task Force members

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Johan Oomen	Netherlands Institute for Sound and Vision	Co-chair
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Richard Ranft	British Library	Europeana Sounds
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Rodolphe Bailly	Cité de la Musique-Philharmonie de Paris	Musical Instruments Museums Online
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Consulted during the Recommendations Process

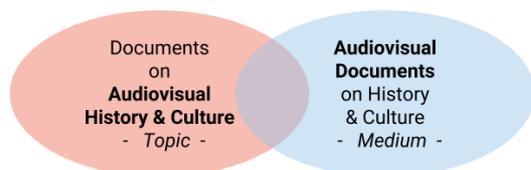
The views of the consulted reviewers have been taken into account during the consultation process, but this document reflects the views of the task force members alone. We want to mention the reviewers in order to thank them for their insight and feedback, but do not wish to express the thought that their views fully align with the vision expressed in these pages.

Werner Bailer	Joanneum Research	EuropeanaTech
Stephan Bartholmei	Deutsche Nationalbibliothek	Members' Council
Maarten Brinkerink	Netherlands Institute for Sound and Vision	Europeana Sounds
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Audiovisual Media on Europeana

The content exposed through Europeana that could fall under the category 'audiovisual media' can be expressed in a Venn diagram with two sets:

1. One covers the **topic** of audiovisual media: documents on the history of broadcasting, film posters, cinema stories, photos of equipment, audio recordings of interviews with producers and audiovisual engineers, 3D images of musical instruments, and the likes.
2. The other is the **medium** of audiovisual media: moving images and sounds. This medium-specific aspect goes well beyond the realms of broadcasting, cinema, home movies, radio, or the music industry.



Audiovisual media have become growingly pervasive throughout our 21st century - and speaks of the entire 20th: its fictions, its realities, its politics, its high culture and its daily lives. Throughout these ages, audiovisual documents have increasingly become a, if not the, major source of both entertainment and information. In the US, streaming video has already surpassed 70 percent of broadband usage.²

In the collections accessible through Europeana, audiovisual media are present. They have been made available via dedicated projects - resulting in expert hubs

such as the European Film Gateway, EUscreen, and Europeana Sounds, all participants in this Task Force - but also via singular partnerships with audiovisual archives, national aggregators and via topical expert hubs such as Europeana Fashion. Its popularity remains uncontested. Reports have consistently quoted a greater interest for AV items from Europeana visitors than for other formats. Its quantity has massively increased with projects such as EUscreenXL, which successfully boosted the amount of broadcast-related and other audiovisual items to over one million, and Europeana Sounds, with comparable numbers.

Meanwhile, its presentation leaves room for improvement. Some of the desired advancements are technical in nature. They relate to the time-based character and complex composition of the medium. None of these are unsolvable, however. We live in a world that is technologically advanced enough to have video as a daily part of our learning, sharing, and communicating environments. Europeana can rely upon existing standards and best practices to improve the experience of these items for its various user groups. This Task Force proposes the road ahead for both technical and non-technical solutions to make audiovisual media a first-class citizen in Europeana's environment

² Peter Kafka, 'Streaming Video Now Accounts for 70 Percent of Broadband Usage', Recode, 7 December 2015, <http://www.recode.net/2015/12/7/11621218/streaming-video-now-accounts-for-70-percent-of-broadband-usage>.

Audiovisual Media's Editorial Context on Europeana

Recommendation 1: Increase the Visibility of Audiovisual Items on Europeana Collections

During the process of establishing Europeana as a platform, one concern has been increasing the amount of audiovisual content. Audio and video materials keep users engaged on a website longer than any other content type out there. They are the content most web users look for. Today, with [The European Library](#) as their largest aggregator, around 55,1% of the materials accessible via Europeana are images. 41,5% of the materials Europeana links to are text-based, leaving audiovisual and other content, such as 3D, at the bottom with only 3,4%.³

On top of this underrepresentation of audiovisual content in the mix, the search algorithm of the portal does not easily surface audiovisual content. When entering a search term in the Europeana portal, usually the first couple of result pages will bring to the fore image and text content before any audiovisual materials are listed. This is true even for video or audio that comes with rich metadata, a thumbnail and a direct link.

Recommendations for Implementation

This Task Force recommends **displaying audiovisual content more prominently**. This way, the diversity of content offered through Europeana could be brought to the user's attention in a better way. This could also mean featuring video and content more prominently, even if it only comes with an

isShownAt link (which is the case for many videos in Europeana).⁴

Visually strengthening the presence of audiovisual materials could be achieved e.g. by creating an audiovisual material strip in the search result template. Furthermore, the 'type of medium' icon could be made more visible by including it in the thumbnail (if present). Listing video and audio content more prominently in the search results list could help users appreciate the richness of materials available in Europeana, as they wouldn't have to make use of filters in order to find other content than images or texts.

Improving user exploration on the Europeana Collections portal was one of the recommendations resulting from the 2016 round of user testing.⁵ **Improving user exploration for time-based works**, specifically, would benefit from a number of developments. With regard to thematic collections, raising the proportion of audiovisual content should be investigated. Items that come with a thumbnail and good metadata quality but without a direct link (as is the case for most audiovisual materials) might still be integrated in a thematic collection.

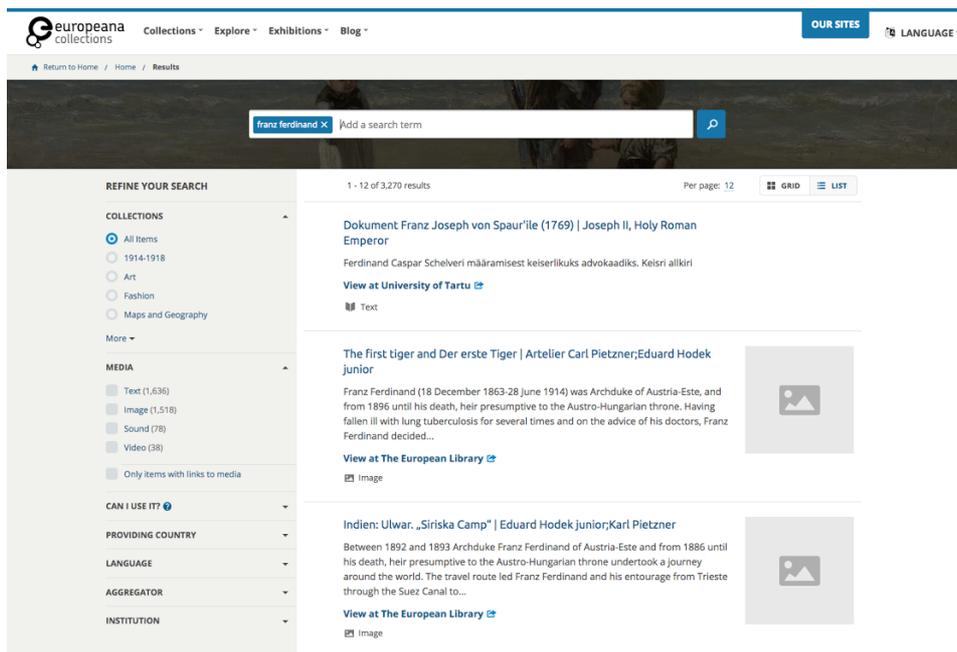
⁴ A search for 'battle of the Somme', for example, currently returns over 75 result pages with images before the film *The Battle of the Somme* is listed. Still, when it was released in 1916 the film was a massive success, watched by about 20 million people in Britain in the first six weeks of exhibition and distributed in eighteen other countries. Since 2005, it has been inscribed in UNESCO's [Memory of the World Register](#).

⁵ User Intelligence, 'Europeana - Integrated Report v1.0' (Europeana Foundation, March 2016).

³ Europeana Statistics Dashboard 09-02-2017

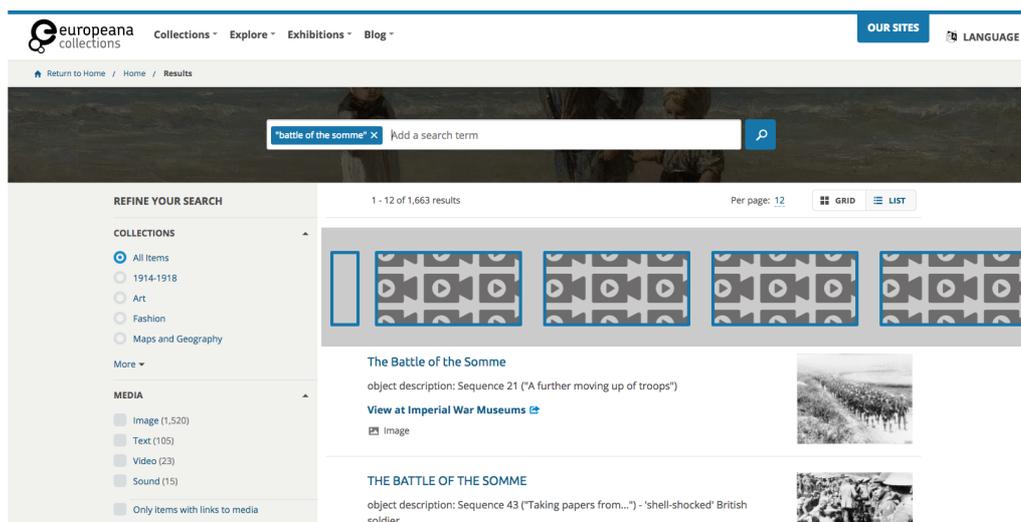
According to the new *Policy for Europeana Thematic Collections*⁶ this is not possible. However, its strict implementation might mean that the gap between numbers of images, texts and AV items highlighted to users will further increase. It could be examined whether moving image materials could be considered Tier 2 already when having several (instead of just one) thumbnails available to scroll through providing more insight into the programme. Embedding audiovisual media only on certain sites (a feature that e.g. Vimeo Pro supports) could be implemented on the Europeana Collections portal. Embeds could serve as a middle ground between having no audiovisual content in a thematic collection and the requirement of having a direct links to content.

Content providers should be involved in the editorial process by being able to specifically mark what use of content can be allowed. There are several specific permissions for collections: either all use is allowed, no use is allowed, use per collection is allowed, or ask every time. The expectations and prerogatives of the content holders and their attitude towards various content re-use options should be further researched. Expert Hubs should take a leading role and enforce the reach to content providers as it remains critical for Right Holders to consider and understand the value of embedded videos in Thematic Collections. In this light, projects developed under curatorial Generic Services calls will undoubtedly provide useful cases that will influence the future development of the Thematic Collections, hence need to be carefully evaluated.



One example is the search for 'Franz Ferdinand', whose assassination triggered the First World War. The result list ranks image and text documents higher than AV content, even if the exact string "Franz Ferdinand" is not even contained in the title or elsewhere in the record, while relevant video content is not to be found before the search results on page 7.

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Mock-up example of strip highlighting audiovisual content on the search results page. Video icon CC BY by Adrien Coquet from the Noun Project.

Recommendation 2: Create Ample Opportunities to Include Audiovisual Content in Curation

With more than 54 million archival objects searchable on Europeana Collections,⁷ Europeana.eu offers access to a unique combination of different content formats such as text, audio, images, animations and video. With such an immense stock in place, curation becomes a crucial factor molding the presentation form - it helps users to better find their way on the portal, to better navigate through time and place, individual histories, etc. It is our understanding, that for the majority of users format plays a secondary role: they engage because of the topic. However, when creating a narrative or an online exhibition, it is important to keep the balance between different formats used in it. Multimedia content, with audiovisual archives being its impactful element, enrich the experience, show the variety of perspectives.

Good current examples of such an editorial approach are the thematic collections: Europeana Music⁸ and Europeana Art.⁹ These are impressive, immense initiatives, successfully attempting to create multimedia storytelling. It is worth noting that Europeana Music derives from the Europeana Sounds project. The vast expertise of its project partners - curators, musicologists, researchers - has made the content selection, and editorial work possible.

⁷ As of February 2017

⁸ See <http://www.europeana.eu/portal/en/collections/music>

⁹ See <http://www.europeana.eu/portal/en/collections/art-history>

Recommendations for implementation

Storytelling and multimedia narratives can and do support historical or artistic storytelling online, therefore when thinking about editorial work on Europeana.eu, even more focus should be put on the topic itself, and not the format.

With projects on the horizon coming from the *Europeana Generic Services* calls, a better technical integration of the audiovisual media in the thematic collections and exhibitions needs to be a priority. Creating a unified playout experience, allowing embeds of items without direct links when the content owners allow it, would greatly support the inclusion of audiovisual materials among the curated content. A dialogue between the editorial team and the content holders would have to be facilitated, which could be achieved with the support of the Expert Hubs. Aside from acting as an intermediary with regard to the legal issues, thanks to their topical knowledge, the Hubs could also support the content selection process.

The Europeana Generic Services calls may also help creating a model for ways in which different experts from different domains, hubs, aggregating or interested in different media types can work together. The Europeana Network should facilitate those interactions, making collaboration between researchers, curators and technical experts possible. Having a procedure, a model, or at least means of contacting content owner liaisons would make the curation process much more efficient. The cross-domain collaboration coordinated by dedicated Europeana Foundation departments (marketing and communication, editorial) and the Expert Hubs could enable a better-considered and better-balanced presentation of the multimedia content gathered on Europeana. In the future the Hubs could also greatly support the dissemination activities of the Europeana Foundation.

Recommendation 3: Explore Possibilities for External Editorial Use of Audiovisual Content

External collaborations based on mutual support or potential for future income generation may meet the aims of European-level co-operation, expand the use of AV content and offer a new approach to content's presentation. At the same time, they may raise a number of issues and can be resource intensive.

The main challenges to increasing the visibility of audiovisual content outside of Europeana and its re-use in various spheres (be it education or creative industry) are related to its legal status, the accessibility of the content, and most importantly the context and amount of work needed to make the collaboration happen. Copyright issues and difficult access make the dissemination of audio and video and their integration in any external matrix extremely hard to achieve. Yet moving image content is in high demand, and a powerful tool in terms of communicating and knowledge sharing.

The strict regulations of Europeana's *Publishing Framework*, impossible to overcome for most of the audiovisual aggregators, make the editorial use of AV content extremely challenging. Europeana Collections include almost 1.132.000 videos, of which 1.098.000 can not be re-used,¹⁰ significantly narrowing down the set of audiovisual items with potential for any editorial re-use.

In the case of many audiovisual materials available on Europeana.eu, users need to follow a certain amount of steps to access the video (start at Europeana, click-through to the provider website, download at times), which makes both sharing of the item and its re-use basically impossible. Some of the

¹⁰ www.europeana.eu, 09-02-2017

materials currently only have local relevance because of language issues. Extra work is needed in order to make them relevant and accessible to a bigger audience, which often collides with the lack of resources for subtitling, no unified player on Europeana, etc. Also, for these reasons Europeana's communications team currently does not showcase audiovisual content on its social channels.

In its final recommendations the Europeana Task Force for Education¹¹ listed seven keys to unlock the potential for re-use of digital heritage in education. Two of the seven are:

- **Copyright allows for re-use.** It must be legally possible to use the digital heritage in open educational research that can be shared.
- **Easy and reliable access.** the sources can be used beyond where they are found, for example through direct links or embed functions, and links don't change.

Both aspects have been practically analysed under the EUscreenXL project, an attempt, at the time, to set-up a collaboration between EUscreen and EUROCLIO, creator of the on-line education multimedia tool Historiana.eu. The project envisioned a close collaboration between Historiana educators and EUscreen content experts, with technical support from both parties. Audiovisual archival footage has been identified by educators as highly interesting and as meaningfully enriching the final presentation form. However, the project had to be temporarily put on hold. At the time of implementation, the concerns of the EUscreen content holders and high expectations of the educators (briefly listed in the table underneath) were impossible to accommodate.

Recommendations for Implementation

Selection of content, including a special focus on editorial approach, target language, item length, etc., may be challenging, especially in the audiovisual domain, and if not supported by the right set of manly skills and technical tools. There is no showcasing, nor external collaboration without curators acting on both ends, responsible for creating an appropriate narrative for the exact context.

To verify this notion, the Task Force joined forces with the EF social media team to run a small experiment validating the possible showcasing of AV media in various social media channels (see Annex II for numbers).

Furthermore, development of an unified player for audiovisual objects accessible on the Europeana portal could greatly facilitate the use and potential re-use of the footage in a wider editorial and educational context. With embedding as one of the features of the player, items and clips could be showcased in various external settings - as part of teaching resources or curated online presentation forms (exhibitions, etc.). A key issue here is control of content. Once content is translated, subtitled, made shorter or embedded in another project it is subject to concerns and anxieties about reuse and re-editing. Therefore, apart from supporting the content selection, collection holders must be consulted and given a final word before allowing their content to be used. This is a task that by definition could be performed by the Expert Hubs.

¹¹ <http://pro.europeana.eu/blogpost/seven-keys-to-unlocking-digital-heritage-for-use-in-education>

Educators' expectations		EUscreen content holders' concerns	
Technical use of content: direct links/ embedding / downloadable files	VS	Security issues, trust	
Precise choice of content		Resource intensive	
Editing made available: play-in, play-out options		Potential clash with partner's internal IPR regulations on re-use	
Language: translations, citations		Quality and integrity of translations	

Social Media Experiment

Setup

1. 7 Interesting & good-quality Tier 1 & 2 videos, selected by Expert Hubs from different institutions and in different languages, were matched (when possible) with openly licensed videos. Given the difference in quantity & diversity between closed & open content, finding a matching open image turned to be more challenging than expected.
2. The Tier 1 & 2 videos were shared with a screenshot in the player (except *L'Hiver en Holland* that was playable on Europeana and generated a preview), while the Tier 4 videos were promoted with an extract in a GIF format, so that it was seen by the social media platforms as a video and therefore returned the stats for media views.

Results and recommendations:

1. Before the experiment, with no promotion, the videos had hardly any views. The pilot proved that promotion, although labour intensive, is possible and creates impact.
2. The recorded pageviews of other videos on Europeana are low, as at this point, the users are still one click from watching the video. This in combination with social media performance suggests that the likes & shares are not really for the video, but rather for the idea of the video or the static frame (this is probably the case for any type of content).
3. It is understandable that the biggest part of AV content will remain 'closed'. Yet, raising awareness of Europeana as 'good in video' by promoting audiovisual content (not only open licenced) could benefit the closed records as well.
4. To achieve the above, an easier and more visual research of audiovisual content on Europeana website would be helpful, both within Europeana and for the external users.

The experiment has shown us that, although complicated, showcasing audiovisual materials from all four Tiers on social media is possible and can be pushed further. However, what has worked for social media might not meet the expectations of external partners willing to reuse audiovisual media in other ecosystems. As proven by the EUscreen/ Historiana try-out, without the ability to present the audiovisual item in a requested form, there risk of losing majority of collaborations or having to go with very

basic and unappealing presentation forms (i.e. usage of links) is high. Hence when possible and allowed, as discussed in Recommendation 2, it is important to facilitate editorial functionalities such as subscribing, time-based annotation, and other features that make editorial work possible. This might be achieved with a set of new editorial tools in place, hopefully developed under the Generic Service calls and by the Europeana Foundation team itself.

Optimise Integration of Audiovisual Content to Improve its Usage

Recommendation 4: Offer Unified Audiovisual Playback

Video and audio published on Europeana is mostly available in Tier 1 form: the `isShownAt` property contains a URL that points to a web page with contextual information on the provider's or aggregator's website. Videos and audios where the `isShownBy` property points directly to the source URL are displayed on the portal embedding the original player (when possible). YouTube embedding has been activated as a proof of concept - but is not permitted when advertisements are shown.

Offering a unified AV player on the Europeana Collections platform would greatly enhance the user experience and allow advanced features and services to improve the use and consumption of AV content in Europeana. Features like subtitles, time-aligned metadata and secure playback (all described further in this document) could only be supported in a coherent and generalised way through the use of a unified AV player. The need of such a unified player becomes even stronger if the video streaming service should become part of the DSI Core infrastructure (see Recommendation 5).

Currently, the Europeana Collections platform is only supporting the embedding of third party video players (Youtube, Vimeo, etc.) that support the `oEmbed` API for the in-line playback of video content. Aggregators like EFG have taken a similar approach. For its core collection (ie. the videos accessible via `euscreen.eu`), EUScreen provides a secure unified HTML5 player for its AV content.¹² Europeana partners such as Ina

have developed their own open source playback solutions, such as Ina's `Amalia.js`.¹³ Only very recently, in the framework of the Europeana Sounds project, the Europeana Radio Player¹⁴ has been developed. This player is based on the `Amplitude.js` audio HTML player, but its use is just experimental and it would probably be abandoned in favor of the `Video.js` framework¹⁵, an open HTML5 video player currently under experimentation by the Europeana software team. Documentation of and experiences with the Radio Player need to be taken into consideration.

Europeana is also participating in the International Image Interoperability Framework (IIIF) working group, in which a subgroup has been established in order to discuss specific issues related to AV playback¹⁶. Considering this involvement and also the fact that Europeana is planning to invest in the implementation and support of the IIIF standard in the DSI projects, it's worth to take into account the possible development of an IIIF player that could fully support also video and audio playback.

The British Library started (December 2016) a 2-year, Mellon-funded research project "Enhancing Discovery and Access for Sound Collections" with partners McGill University

CH, 7 October 2015), http://www.slideshare.net/nisv_rd/html-5-a-security-solution-for-euscreenxl.

¹³ See <https://ina-foss.github.io/amalia.js/>

¹⁴ See <https://github.com/europeana/radio-player> and <http://www.europeana.eu/portal/en/radio.html>

¹⁵ See <http://videojs.com/>

¹⁶ See <http://pro.europeana.eu/taskforce/iiif> and <http://ronallo.com/blog/choosing-a-path-forward-for-iiif-audio-and-video/>

¹² Themistoklis Karavellas, 'HTML 5: A Security Solution for EUScreenXL' (EBU Developer Conference, Geneva,

and Digerati. The aim is to create the technical infrastructure that will allow for a rich discovery experience and greater access to audio collections, specifically by working with the International Standard Name Identifier standard (ISNI) and IIF, to make content available with the correct rights both institutionally and where rights permit beyond, across multiple media types and collections, using the highest possible level of automation, interoperability, trust and accuracy. Through the project it will seek to advance the use of persistent identifiers within audio collections to provide a rich, federated discovery experience of content held in multiple institutions, and provide the capability to listen and explore this content through a host institution's own compliant IIF audio-visual player.

Recommendations for Implementation

When thinking about offering a unified player, there is no reason for reinventing the wheel. The first step to take, is looking at existing open source AV players (based on HTML5) that support the features we need (subtitles, time-aligned metadata/annotations), using open standards like WebVTT.¹⁷ A first candidate could be the EUscreen player¹⁸, which is based on the HTML5 framework, supports subtitles, time aligned metadata, secure playout and is available under an open source license. Another natural candidate to take into account is the Video.js framework, which provides also plugins to support

subtitles and eventually time-aligned metadata. Video.js is also used in the Universal Viewer¹⁹, an open IIF player, which supports audiovisual content, even if in a quite basic manner.

The wide community support of the Video.js framework and its rich set of third parties plugins combined with the secure playout feature of the EUscreen player, which offers the possibility to block, on-demand and under specific circumstances, the download of video or its embedding in third party sites, could represent the best solution to offer a uniform and rich experience for the consumption of video on the Europeana Collections portal. It includes strong security measures to support the IPR requirements of many audiovisual content providers.

To reach this objective, we suggest that the partners that developed the EUscreen player, under the coordination of the Europeana product and software teams, release a unified openly licensed audiovisual player for the Europeana Collections website, based on the video.js framework. Requirements could include:

- features already present in the EUscreen player, like subtitles, time-aligned metadata display and secure playout
- features supported under the current Europeana Radio Player, such as user tagging, using Wikidata items as possible input to annotate with, results of can be written to the Europeana Annotations API.

In order to implement some of these features (and others of interest, like adaptive bitrate streaming), it would be necessary to base the development of the player on a shared streaming infrastructure (see chapter below).

¹⁷ See <https://w3c.github.io/webvtt/>

¹⁸ See https://github.com/Noterik/smt_euscreenxlitem for an EUscreen item page with EUscreen player. The client side part of the EUscreen player can be found at: https://github.com/Noterik/smt_euscreenxlelementsapp/tree/master/WebContent/eddie/apps/euscreenxlelements/components/viewer. The server side code for handling the protection for the videos can be found in the [euscreensxlitem](https://github.com/Noterik/smt_euscreenxlitem) page https://github.com/Noterik/smt_euscreenxlitem/blob/master/src/org/springfield/lou/application/types/EuscreenxlitemApplication.java#L347

¹⁹ See <https://github.com/universalviewer>

Recommendation 5: Offer a Shared Streaming Infrastructure

Currently, the Europeana Collections website give access to more than 1.830.000 records related to video and audio recordings. Most of these records don't give access directly to media files, but only to a provider's web page in which the video or audio are played. This kind of content, regardless its value, is unfortunately not usable to curate thematic collections and other virtual exhibitions on the Europeana platform, as explained in the Europeana Publishing Framework.

To be fully re-usable on the Europeana portal, from an editorial point of view, records should point directly to a media file or, in case of AV content, at least point to an embeddable external player. At the moment there are only 27.350 records that point directly to video files and about 61.000 that point directly to audio files. The 27.350 videos are almost totally represented by legacy file formats (Windows media or Quicktime) not playable in any HTML5 player, while the 61.000 audio files are mostly in MPEG-1 layer 3 (MP3) format, which is supported by HTML5 but not actually played directly in the Europeana Collections website.

A unified HTML5 player (as proposed in the previous recommendation) could solve the in-line playout issue for the above-mentioned audio files, but not the playout issue of the video files, which, in order to be played in-line in the Europeana Collections portal, need to be transcoded in a HTML5 supported format. Another important thing to notice is the current distribution of audio and video content per providing institution. The actual top five AV content providers account for the 42% of the total amount of audio and video content in Europeana, while the remaining 58% is coming from a "long tail" of hundreds of different providing institutions, which are often not specifically

audiovisual content holders or that just provide a limited amount of audiovisual content.

It appears to us ultimately important to develop and offer a shared infrastructure for hosting, processing and streaming audiovisual content as an integrated component of the Europeana DSI, considering the above-mentioned factors:

- the myriad of providers that in many cases contribute only few audiovisual records to Europeana,
- the need of transcoding proprietary AV formats to fully exploit the content on thematic collections and in the Europeana at large,
- supporting controlled secure playout and adaptive bitrate streaming,
- supporting subtitles and time-aligned metadata.

Such an infrastructure could be beneficial for different reasons:

1. It would offer the possibility to institutions that hold just small audiovisual collections and have no specific expertise on audio/video streaming or have no dedicated streaming platform, to seamlessly provide at least Tier 2 digital audiovisual content to Europeana.
2. It would allow the development and tight integration on the server side of important features such as audio and video transcoding from legacy formats, thumbnails and keyframes extraction from video, subtitle support and indexing, adaptive bitrate streaming and secure playout control.

Recommendations for Implementation

In order to explore the possibility to insert the development of a shared streaming infrastructure in the activities of the forthcoming DSI-3, probably the fastest and reasonable way to proceed is to look at the current EUscreen streaming infrastructure²⁰, trying to capitalise all the lessons learned in the course of the EUscreen and EUscreenXL projects.

The EUscreen technical partners, in collaboration with the Europeana product and software teams, should further investigate the requirements of such an infrastructure and set-up a first pilot with a small representative sample of AV content, actually published on Europeana. This pilot should implement and test some basic features, like uploading and transcoding of AV content and secure playout control. After an extensive evaluation of the pilot infrastructure, which should involve in particular the audiovisual aggregators (EFG, Europeana Sounds and EUscreen), the system could eventually be deployed on a larger scale, integrating also additional features, like keyframes extraction and subtitle and time-aligned metadata support and indexing.

A detailed design plan and cost estimation will be produced as an annex by this Task Force, to be evaluated and eventually inserted in the DSI-3 work plan.

²⁰ <https://github.com/noterik?language=java>

Recommendation 6: Include Citations for Research

As the Europeana Cloud project established, fetching and automatically importing bibliographic references into bibliography applications was considered as “very” or “extremely” important by scholarly audiences.²¹ Facilitating the citation of sounds and moving images, whether published, broadcast or unpublished, should be better supported by a source for investigation such as Europeana. The rationale for improving the possibilities of citing audiovisual sources was explored by JISC’s Film & Sound Think Tank and is clearly explained in the summary report by Gerhardt & Kaufman:

“We have been developing, during these centuries, an entire scholarly apparatus for quoting, citing, excerpting, and crediting books, journals, newspapers, and other printed sources, but the equivalent conventions of attribution – footnotes, endnotes, bibliographies – remain challenging for moving images and recorded sound.”²²

One of the Think Tank’s 10 strategic recommendations was the creation of citation guidelines. A number of guidelines have been produced advising on best practises for citation for ‘multimedia’,²³ but none provide sufficient features that cover broadcast, published and unpublished sound and moving images. The JISC Think

Tank recommendation was taken up by EUscreen partner BUFVC in 2013. BUFVC has deployed citation guidelines for audiovisual citation and a citation tool that is available on its website.²⁴

Technologies that support automated citation retrieval are well supported in the academic publishing environment. EasyBib provides on a web tool to help generate citations in Chicago, MLA and other citation standards, including for time-based media e.g. <http://www.easybib.com/mla-format/musical-recording-citation> and CiteThisForMe has a similar online tool, e.g. <http://www.citethisforme.com/guides/harvard/how-to-cite-a-music>. <http://www.easybib.com/mla-format/musical-recording-citation>

Likewise, technologies exist to expose the metadata to academic reference tools such as Zotero, Mendeley, EndNote, for example ContextObjects in Spans (COinS).²⁵ Other academic projects such as Clipper²⁶ further stimulate the enhanced academic possibilities for audiovisual materials, by including annotation options. However what is needed on Europeana to encourage wider adoption of properly formatted citations is an embedded ‘cite this’ widget.

²¹ Stavros Angelis et al., ‘D1.3 User Requirements Analysis and Case Studies Report. Content Strategy Report.’, Europeana Cloud project deliverable (Europeana Cloud, November 2015), http://pro.europeana.eu/files/Europeana_Professional/Projects/Project_list/Europeana_Cloud/Deliverables/D1.3%20D1.6%20User%20Requirements%20Analysis%20and%20Case%20Studies%20Report%20Content%20Strategy%20Report.pdf.

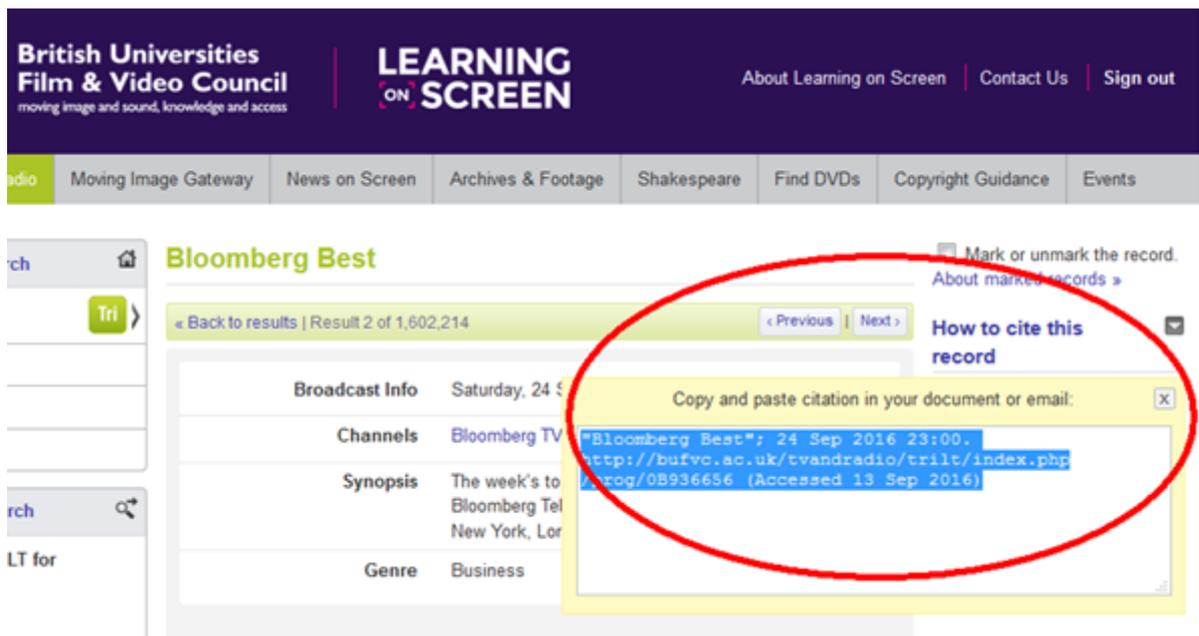
²² Paul Gerhardt and Peter B. Kaufman, ‘Film and Sound in Higher and Further Education: A Progress Report with Ten Strategic Recommendations’ (JISC, June 2011), <http://filmandsoundthinktank.jisc.ac.uk/>.

²³ E.g. How to Cite Video Recordings in APA Style <http://penandthepad.com/cite-video-recordings-apa-style-3032.html>

²⁴ See <http://bufvc.ac.uk/projects-research/avcitation>

²⁵ See <http://coins.info>

²⁶ See <http://blog.clippertube.com/>



Recommendations for Implementation

It might be a relatively trivial task to deploy a 'cite this' button on the Europeana portal, for any media type. For sound and moving image it needs investigating to what extent they can currently be easily integrated. A time-based citation at a more granular level within a media file will only work for direct links, and the citation needs to be persistent if it is to be effective.

Adding a citation tool will:

- Likely increase use of and referral to Europeana
 - Enhance the credibility of sound and moving images in scholarly works, and use by general public
 - Encourage data providers, since many don't deploy such a tool themselves
 - Make Europeana more useful to this specific community of academic researchers.

Recommendation 7: Implement Content-based Indexing for Audiovisual Materials

Automatic or semi-automatic extraction of metadata (descriptors) from video and audio is a topic explored in several research projects (in the FP7 and H2020 calls). But real production systems that automatically extract features, like person names, objects or landmarks from a video or a still image are not easily deployable due mainly to scalability reasons. Some effective work has been done to extract low level features, like dominant colors and speech to text transcriptions.

The British Library, for example, is planning to incorporate a speech-to-text facility in 2017-18, as part of its digital radio archive plans, after experimenting it in a previous project on its broadcast news.²⁷ BBC's Rewind Project (<http://bbcnewslabs.co.uk/projects/bbc-rewind/>) is using face-recognition software and also Kaldi (an open-source speech-to-text tool) to index and annotate its entire digital TV and radio archive.

In the Europeana DSI project, partner AiT is experimenting low level feature extraction from images, with concrete use cases also presented in the Europeana Creative project, while in Europeana Sounds a module that enables querying by melody or pitch has been prototyped.²⁸ In Europeana Fashion, dominant colors extraction has been performed on more than 400.000 catwalk images, analysing not just the whole picture, but automatically isolating the dress silhouette.

²⁷ See <https://www.bl.uk/projects/opening-up-speech-archives>

²⁸ Alexander Schindler and Harry Van Biessum, 'D2.6 Music Information Retrieval Pilot Delivery Report', Europeana Sounds project deliverable, (4 December 2015), http://pro.europeana.eu/files/Europeana_Professional/Projects/Project_list/Europeana_Sounds/Deliverables/europeanasonsounds-d2.6-music-information-retrieval-pilot-delivery-report-v1.0.pdf.

Recommendations for Implementation

While investing directly in research and development of new technologies on the topic of automatic metadata/features extraction is out of the scope of the actual Europeana DSI framework, experimenting, reusing and applying third party technologies and tools on the Europeana audiovisual corpus could lead to interesting results. There are promising tools coming out from research projects, like LinkedTV²⁹ or Mekanex,³⁰ that could eventually be tested on Europeana AV content. Another interesting development is the surge of available APIs that could be integrated and tested in the Europeana platform, like the Cognitive Services APIs from Microsoft,³¹ which offer a wide set of possibilities of features extraction and indexing from audio, video and images.

In the terminology of Operation Direct, the availability of content-based indexing for audio and video is rapidly moving from Horizon 3 to Horizon 2. Additionally, the technologies are an important mechanism to improve the much-sought after quality improvements for the collections. The Task Force therefore recommends structural assessment for these technologies on the currently available data set.

²⁹ See <https://www.linkedtv.eu>

³⁰ See <http://mekanex.eu/about-2/mekanex-tools/video-annotations-tool>

³¹ See <https://www.microsoft.com/cognitive-services/en-us/apis>

Accessibility of Audiovisual Media

Recommendation 8: Create an Infrastructure around Subtitled Media on Europeana

A tremendous challenge to making audiovisual, time-based materials - be it sounds or moving images - accessible to international audiences, is translating the seen or heard content into a language accessible to the viewer/listener. As video grows to be an increasingly important part of online communications, the importance of clear captions becomes more clear. e.g. on Facebook, where subtitles are a main requirement for online engagement.³²

Closed captioning (CC) and subtitling are both processes of displaying text on a television, video screen, or other visual display to provide additional or interpretive information. Subtitles can be burnt-in, as is the case with several film and video materials made available via EFG and EUScreen. the closed-captioning method whereby viewers can select captions, or language versions, is by far preferable. There are currently no de facto standards for online captions, and various platforms use various methods - oftentimes based on the BBC guidelines for closed captions.³³ The EBU working group has for a long time been working on making subtitles presentable by means of XML.³⁴

Recommendations for implementation

Integrating subtitles via XML would potentially provide integration of the text version as a part of the item metadata, thus making the video material better searchable and findable. Challenges to creating and implementing subtitles on Europeana include questions about using automated captioning, and involving crowd engagement - both topics widely researched in the EUScreenXL project.^{35,36} A notably easy-to-implement technology is the WebVTT standard, which is fully supported in HTML5. The HTML5 element and WebVTT file format can not only add closed captions to videos, but also subtitles, descriptions, chapter markers and other timed metadata, such as preview thumbnails. All major browsers support WebVTT captioning, styling and scripting, although Firefox is missing a closed caption button in its controlbar, and IE 10+ and Edge support TextTracks but not yet the 'onchange event'.³⁷ The largest challenge is the creation of captions and subtitles itself - often not available for heritage materials from broadcast or film collections. We see promising developments here from

³² Patel, Sahil. "85 percent of Facebook video is watched without sound". Digiday, 17 mei 2016. <https://digiday.com/media/silent-world-facebook-video/>.

³³ 'BBC Subtitles Guidelines Version 1.1.3', 3 June 2016, <http://bbc.github.io/subtitle-guidelines/>.

³⁴ 'Subtitles in XML', EBU Technology & Innovation, accessed 4 July 2016, <https://tech.ebu.ch/groups/pdfxp>.

³⁵ Rob Turnock et al., 'Development and Design Brief of User Engagement Pilot Excl Annex', Project deliverable (Utrecht, NL: EUScreenXL project, 23 October 2013), <https://my.alfresco.com/share/euscreen.eu/proxy/alfresco/api/node/content/workspace/SpacesStore/ac736274-b27e-432f-b9e5-63727896fd29/D3.3%20Development%20and%20design%20brief%20of%20user%20engagement%20pilot%20excl%20annex.pdf?a=true>.

³⁶ Arne Stabenau et al., 'Pilot Services', Project deliverable [Confidential] (Utrecht, NL: EUScreenXL project, 10 April 2015).

³⁷ 'HTML5 Report', JW Developer, 18 July 2016, <http://developer.jwplayer.com/articles/html5-report/>.

combining automation (see previous chapter) with crowd-sourced quality control processes, applied for example by the MLLP unit at the University of Valencia and the Participatory Culture Foundation's tried and tested Amara platform.

Implementing the necessary technology and workflows is a sizeable challenge. Yet the outcomes are a tremendous improvement to the accessibility of cross-border materials. The Task Force recommends a proper embedding of captioning and translation activities in the Europeana DSI infrastructure by supporting pilot projects testing out the installation of an end-to-end subtitling process for highlighted collections.

Recommendation 9: Allow Time-based Annotation and Metadata Creation to Make More Relevant Search Queries

Audiovisual content is time-based content. This creates a number of medium-specific challenges. Time-based metadata relate to some of the technical improvements proposed under the topics of citations and semantics, but we offer them a separate spot in this document, as their relevance is broader than a merely technological approach. Annotation as a whole is discussed in a number of related fora, such as EuropeanaTech and Europeana Sounds, where use tagging is involved and AIT is working on Entity and Annotation APIs.

The semantic possibilities of the web - making information shared online more meaningful to the systems exchanging it by using elements such as RDF that describe the content - have been at the forefront of development interest for Europeana's infrastructure. It is a major topic for the EuropeanaTech community and the topic has been central in the development of EDM. Likewise, it is a major topic for several organisations working on the online availability of audiovisual assets.

EUScreen made its entire collection available as linked data for the first time in 2011.³⁸
The 'Metadata Standards for

Cinematographic Works' (CEN TC 372) have ample provisions for film catalogues to be made semantic web-ready. Broadcasters such as the BBC use a linked data approach for structuring not just its online programme pages, but all its online activities and broadcast organisations and developed the critically acclaimed World Service Prototype.³⁹ EBU, VRT and NRK make ample use of DBpedia's work on converting unstructured data available on Wikipedia into RDF to extract contextual information for their programmes, based on automatic metadata extraction from natural language processing methods, like Named Entity Recognition, speech to text or text to speech.⁴⁰ Additionally, the International Association of Sound and Audiovisual Archives (IASA) has a Task Force dedicated to the topic of semantic publishing. The technology offers ample potential to properly contextualise audiovisual collections published on the web.

³⁹ See <http://www.bbc.co.uk/rd/projects/worldservice-archive-prototype>

⁴⁰ Jean-Pierre Evain, Mike Matton, and Tormod Vaervagen, 'Wikipedia and DBpedia For Media - Managing Audiovisual Resources In Their Semantic Context', in NLP&DBpedia Workshop Proceedings - Preprint (NLP&DBpedia Workshop, Kobe, JP: Springer LNCS, 2016), https://nlpdbpedia2016.files.wordpress.com/2016/09/nlpdbpedia2016_paper_1.pdf.

³⁸ Johan Oomen, 'Television Archives Join Linked Open Data Movement', 29 September 2011, <http://blog.euscreen.eu/archives/2027>.

Recommendations for Implementation

Applications such as the HyperTED⁴¹ demonstrator, developed in the research project LinkedTV, show the potential of multimedia hyperlinking⁴² in order to link video fragments to other collections and items on the web. It is type of interrelation within a collection of objects in all sorts of media that makes the technology such a compelling feat for the Europeana infrastructure.

The Task Force recommends to investigate how the Europeana UI can support this at present, based on a user story in the context of Europeana Collections and identify areas of technical innovations (from Minimal Viable Product to more elaborate use of Multimedia Hyperlinking).

⁴¹ José Luis Redondo García et al., 'HyperTed: Searching and Browsing TED Talks like You Never Imagined' (LinkedUp VICI Challenge at ISWC, Trentino, Italy, 20 October 2014), <http://es.slideshare.net/JosLuisRedondoGarca/hyperted-40494120>.

⁴² <https://videohyperlinking.com/>

Conclusions

In order to make audiovisual collection items first-class citizens on Europeana, work needs to happen on different levels. One is technical: there are currently available tools and technologies that could be better harnessed to improve the visibility and accessibility of audiovisual content displayed via Europeana. There are also solutions under development where Europeana could play a key role to demonstrate its usefulness in a large and

varied data set. Besides the technical level, there are collaborations and human strengths that come into play to improve the visibility of audiovisual collections in the Europeana realm. Audiovisual works and items are primary witnesses of Europe's culture in the 20th Century - the Task Force is looking forward to bringing these recommendations forward to a more concrete level to be implemented in the wider digital service infrastructure.

Recommendations Overview

Increase Visibility for Audiovisual Items in Europeana Collections	
Recommendation 1	Increase Visibility for Audiovisual Items in Europeana Collections
Recommendation 2	Create Ample Opportunities to Include Audiovisual Content in Curation
Recommendation 3	Explore Possibilities for External Editorial Use of Audiovisual Content
Recommendation 4	Offer Unified Audiovisual Playout
Optimise Integration of Audiovisual Content to Improve its Usage	
Recommendation 5	Offer a Shared Streaming Infrastructure
Recommendation 6	Include Citations for Research
Recommendation 7	Implement Content-based Indexing for Audiovisual Materials
Accessibility of Audiovisual Media	
Recommendation 8	Create an Infrastructure around Subtitled Media on Europeana
Recommendation 9	Allow Time-based Annotation and Metadata Creation to Make More Relevant Search Queries

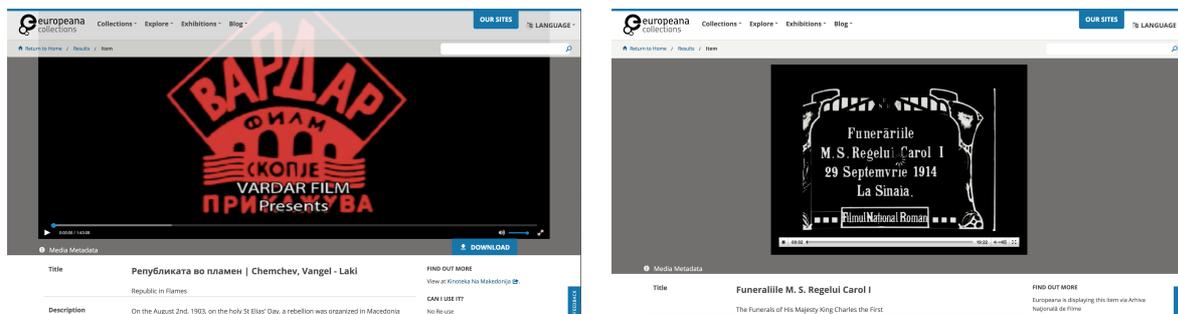
Annex I: Audiovisual playout in Europeana

*Toward a shared infrastructure
based on lessons and technology from the EUscreen project*

1 Why We Need to Think About Sound and Moving Images

Within Europeana there are several content providers offering audiovisual material. Until now there has not been structural support for video items on Europeana, e.g. by offering users a qualitative and uniform video experience or content providers with an hosting and streaming option.

Europeana's technical team supported oEmbed for embedding in the Europeana portal third party players in order to play externally hosted video items. The playout implementations seem to be project-dependent: every collection or content provider uses a different playout solution. This does not create the most optimal experience for the end-user (see example below).



Screenshot: two examples of current embedded collections (from EFG).

The left item video player is not fitting the screen. Both items are embedded from different sources.

While the possibility to embed a video player on Europeana Collections exists, it happens that within the collection of one content provider there are different technical solutions, which leads to different playout experiences on Europeana, making the playout of audiovisual materials on Europeana far from a universal and user-friendly environment.

Meanwhile, many providers have no in-house solution to host their video content and are hesitant to make use of commercial video hosting platforms. The hosted videos in the EUscreen collection will on the short term be transferred to the cloud. For other aggregators and collection owners, Europeana's cloud option could be a welcome offering, when available.

In short, there's a need for Europeana to:

- Provide a **unified playout experience** for video materials that vastly improve the user experience on Europeana Collections
- Provide an infrastructural **solution for data aggregators** willing to bring video items to the Europeana Collections

2 Link to the Europeana Strategy

The AV Media in Europeana Task Force delivers its final report in June 2017. One of the main recommendations in its final report is for Europeana to support a unified player and shared solutions to support video hosting from content partners. Europeana has approached EUscreen to define a strategy leading to a more structural infrastructure for the aggregation and publication of video materials within Europeana. Also in response to (1) the new content strategy (2) the transformation from various platforms in use by aggregators and experts hubs to a single shared platform. This ties into the 2017 Business Plan, which mentions: “With an emphasis on quality over quantity, we will liaise closely with expert hubs and aggregators to proactively identify new collections and partners for publication in Europeana.”

3 Realising the Solution

Below, we highlight a **two-phase** approach to realise a qualitatively improved user experience of video collections on Europeana and a shared infrastructure to host video content in the DSI framework. Within this approach we are using all lessons and technology learned and developed within the EUscreen project, as this gives a solid base for the collection and publication of AV material.

4 Phase 1 Implement and Assess Europeana’s Video Infrastructure

4.1 Set up shared infrastructure and ingest three collections

The baseline is provided by the infrastructure used by EUscreen, that includes both handling as monitoring services. More specifically:

1. Uploading or migration facilities for large AV collections
2. Online transcoding service into the required streaming format (mp4, h264)⁴³
3. Screenshot extraction, also for external streams
4. Monitoring tool on playout and metadata presentation
 - a. approving and rejecting ingested video files.
5. Redundant storage with fallback facilities
6. Updating facilities (replacing media files with newer versions)

It is important that in this phase we work only with three existing bigger collection so the diversity of the ingest process is not so big yet. We try to finalise this first big batch of items and after that see what kind of extra services are needed for smaller and more collections that we also want to play from the shared infrastructure.

4.2 Implement Unified playout for all Europeana video items

In order to qualitatively offer video services to the end-user, it is beneficial to make use of a unified playout technology. We propose to implement the EUscreen playout service, as all its offered services are open source and on Github, while other components can be implemented. The player already provides a unique mechanism to complicate the process of mass-

⁴³ It could be possibility that transcoding service are not a requirement for phase one (it was not for EUscreen), but this again depends on the CP and AV collection that Europeana want to support

downloading HTML5 video materials - which is an important requirement for several of our data providers and would be a sufficient development to port to playout technologies such as *video.js* or Ina's *amalia.js*.

4.3 Evaluation of services toward a wider range of users

Real newcomers in the AV collection of Europeana might have extra demands for the shared infrastructure. It is important to get more comprehensive insight in the needs of these organizations - both in technical terms (are transcoding and screenshot/thumbnail extraction required?) and delivery of the solution on the front-end (what types of embedding can be allowed?). These need to be researched with both a quantitative (global estimates for different types of providers) and qualitative approach (doing interviews on the actual steps/requirements that are needed if Europeana start cooperating with them like this).

Phase 2 Scale-up and Service Extension

In this phase we will implement the positively evaluated services from phase 1 as one technical AV infrastructure integrated in the Europeana Digital Service Infrastructure. The actual course of this development is highly dependent on:

- Positively evaluated services from shared infrastructure by the first three big provider
- Strategic position of Europeana regarding AV material
- Outcomes from the IIIF development

In this second phase more advanced technologies like time-based metadata could be offered. More advanced technology on top of the basic environment are:

- Subtitling services, including search on subtitling
- Time-based comment (WebVTT media fragment service)
- Search on video fragment in a collection and in a single video file

Annex II: Social Media Experiment Numbers

Tier 1/ 2 Video URL and related blurb	Tier 3 / 4 Video URL and related blurb	Publication Date & Channel	Impact Tier 2	Impact Tier 3 & 4
<p>(BBC) Christmas customs http://www.europeana.eu/portal/en/record/09220/EUS_FABC5C990ACF44EF8B4313EA7BF4D33B.html?q=Panorama+23%2F12%2F1957 Report on origins of European customs</p>	<p>Christmas dinner of the second unit Batallion Motorcycle Department in Haarlem http://www.europeana.eu/portal/en/record/2051906/data_euscr eenXL http openbeelden nl media 13757.html?q=christmas</p>	<p>25th December - Twitter & Facebook</p>	<p>Twitter</p> <ul style="list-style-type: none"> • 6 RT • 9 likes • 14 link clicks <p>Facebook</p> <ul style="list-style-type: none"> • 45 reactions, comments & shares • 28 link clicks <p>Record page views on Europeana</p> <ul style="list-style-type: none"> • 25 Dec: 47 • 26 Dec 11 • 27 Dec: 2 • 28-29:3 • TOTAL: 63 	<p>Twitter</p> <ul style="list-style-type: none"> • 2511 • 3 RT • 6 likes • 341 media views <p>Facebook</p> <ul style="list-style-type: none"> • 31 reactions, comments & shares • 18 link clicks <p>Record Page views on Europeana</p> <ul style="list-style-type: none"> • 25 Dec: 8 • 26 Dec 6 • 27 Dec: 7 • 2,6,10,11:1 • TOTAL: 25

Tier 1 / 2 Video URL and related blurb	Tier 3 / 4 Video URL and related blurb	Publication Date & Channel	Impact Tier 2	Impact Tier 3 & 4
<p>(DR) New Year: http://www.europeana.eu/portal/en/record/09221/EUS_50085A16F0F34BE1B8E739AF381DCC2B.html?q=New+Year%27s+swimming+in+Hellerup+port</p> <p>"Vikings": New Year swimming in Hellerup port. An energizing idea for New Year's start.</p>	<p>http://www.europeana.eu/portal/en/record/2051906/data_euscr eenXL http openbeelden nl media 51419.html</p> <p>Zandvoort people take part in new year's dive. With comments by the swimmers on why they participate in the new year's dive.</p>	<p>2nd January - Twitter & Facebook</p>	<p>Twitter: RT 3 10 likes 10 link clicks</p> <p>Facebook: 33 reactions, comments & shares 13 link clicks</p> <p>Record page views on Europeana: 2 Jan:12 3 Jan: 17 4 Jan: 2 5 Jan: 1 TOTAL: 32</p>	<p>Twitter: 2 RT 5 likes 273 media views</p> <p>Facebook: 32 reactions, comments & shares 5 link clicks</p> <p>Record page views on Europeana: 2 Jan: 11 4 Jan: 1 TOTAL: 12</p>

Tier 1 / 2 Video URL and related blurb	Tier 3 / 4 Video URL and related blurb	Publication Date & Channel	Impact Tier 2	Impact Tier 3 & 4
<p>L'Hiver en Holland</p> <p>http://www.europeana.eu/portal/de/record/08614/cat28370.html?q=winter</p>	<p>The winter is here: overview of the ice fun and ice troubles that go along with it and the funny solutions some have for ice troubles.</p> <p>http://www.europeana.eu/portal/en/record/2051906/data_euscr eenXL http openbeelden nl media 50579.html</p>	<p>23 December - Twitter & Facebook</p>	<p>Twitter: 7 RT 4 likes 20 link clicks</p> <p>Facebook: 56 reactions, comments & shares 66 link clicks</p> <p>Record page views on Europeana: 23 Dec: 89 24 Dec: 15 25 Dec: 6 5 January: 2 TOTAL: 112</p>	<p>Twitter: 26 RT 43 likes 1543 media views</p> <p>Facebook: 1277 reactions, comments & shares 198 link clicks</p> <p>Record page views on Europeana: 7 January: 235 8 January: 139 9 January: 142 10 January: 93 11 January: 17 TOTAL: 626</p>



Co-financed by the European Union
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