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PUBLIC BROADCASTING FOOTAGE IN THE COMMONS

A PRACTITIONERS' STATEMENT

Maarten Brinkerink
Netherlands Institute for Sound and Vision
Postbus 1060
1200 BB
Hilversum
The Netherlands
mbrinkerink@beeldengeluid.nl

Gertjan Kuiper
VPRO
Postbus 11
1200 JC
Hilversum
The Netherlands
g.kuiper@vpro.nl

Jesse de Vos
Netherlands Institute for Sound and Vision
Postbus 1060
1200 BB
Hilversum
The Netherlands
jdvos@beeldengeluid.nl

Abstract: Around the release of the documentary series *The Mind of the Universe* (2017), public broadcaster VPRO and The Netherlands Institute for Sound and Vision collaborated to distribute the raw materials shot for the series to be released under open licenses. This article reflects on those experiences and gives recommendations for the various stages of production for open licensing. It aims to lower the threshold for other public broadcasters that wish to publish materials in the commons.

Keywords: open licenses, creative commons, public broadcasting, wikipedia, education

1 Introduction: Participating in the Great Online Video Conversation

The Mind of the Universe[1] is an international tv series about the rapid evolution of our knowledge. The ten-part television series from Dutch public broadcaster VPRO explores the human destiny and the world of tomorrow through the eyes of great minds from all continents all over the globe. Launched in 2017, *The Mind of the Universe* is also a unique and unprecedented open source project in its scope and intention to provide all raw footage filmed for the series for free to everyone interested in learning and knowledge. The interviews were produced between 2015 and 2017 by Dutch public broadcaster VPRO for a tv series featuring Robbert Dijkgraaf. The project was made possible by NPO and the open access video platform was built by the Netherlands Institute for Sound and Vision, the national audiovisual heritage institute of the Netherlands.

Sound and Vision brought its experience with open access to video collections earlier on to the project. In 2009, Sound and Vision launched the platform **Open Images** on which videos from its archival collection were published openly, in various formats, with relating metadata. From the very start the Wikimedia community picked up on these materials on the platform. To date, more than 4,200 articles on various language versions of Wikipedia have been enriched with videos from this collection. These articles combined receive more than **5 million monthly views**.

From 2010 onwards, Sound and Vision participated in the Stichting Natuurbeelden (Foundation for Nature Footage), which produced a series of unedited videos of Dutch nature. So far, these videos have been used on over 500 pages, which on average generate **over half a million views per month**. These collections differed from the material of The Mind of the Universe in that they have a well-demarcated subject matter, especially in the case of the nature videos, and a more or less objective display of various behaviours, landscapes, locations, historical events, technologies, customs, species, etc. that have a one-on-one relation to existing Wikipedia articles.

In 2010 Peter B. Kaufman, CEO Intelligent Television, published the white paper **Video for Wikipedia and the Open Web**[2] about the open publication of video. By "open publication" Kaufman refers to copyright holders licensing their content to third parties. The various open licenses (notably **Creative Commons (CC)** licenses) determine the conditions under which third parties are allowed to use, modify and distribute said content. Kaufman's white paper offers an analysis of the requirements, risks and rewards of publishing openly, as well as practical ways in which to openly publish video online. He concludes:

> By participating in the great video conversation on the web, cultural and educational institutions have the ability to engage the public; have the public increase the online visibility of the institution's media; educate people; enable fortuitous discovery; and even facilitate business opportunities for clip and image licensing.[3]

Yet, almost a decade later, open publication of video is far from common practice, especially when it concerns newly produced content. This should come as no surprise considering commercial interests. The opportunities for monetisation of openly published materials are often perceived to be significantly less, which isn't necessarily the case as we can learn from the cultural sector. The Rijksmuseum for instance, uses its openly published collections as a means to market itself to new audiences.[4] More importantly though, public broadcasters serve a public cause that is characterised by the broad dissemination of information and knowledge. Open publication offers them clear opportunities to expand their reach and impact. Audiences can be made (co-)producers and are enabled to find creative and unexpected ways of reusing content. This makes one wonder why public broadcasters don't publish their materials under open licenses more often?

This paper aims to lower the threshold for open publication by describing the lessons learned by Dutch public broadcaster **VPRO** and their experience with open publication of the series **The Mind of the Universe**. This article discusses the various stages of open publication, from pre-production to the "afterlife" of the openly published materials. It concludes each section with recommendations for public broadcasters who want to publish under open licenses.

2 Pre-production

2.1 Conceptualisation

While conceptualising *The Mind of the Universe*, directors Rob van Hattum and Gijs Swantee sat down with renowned Dutch scientist Prof. Dr. Robbert Dijkgraaf, the director of the Institute for Advanced Study at Princeton University. The idea of making a series with researchers working at the cutting edge of various scientific fields immediately felt like something that should not be done in isolation, but rather in close collaboration and exchange with partners from across the globe. Scientific articles still often exist behind paywalls, making them accessible only to those fortunate enough to study or work at recognised universities. The Open Science movement challenges this status quo and aims to open up scientific discourse with "transparent and accessible knowledge that is shared and developed through collaborative networks. (...) Research data, lab notes and other research processes are freely available under terms that enable reuse, redistribution and reproduction".[5] *The Mind of the Universe* takes these principles and applies them to the distribution of the interviews with scientists from the series. Openly distributing the series across various platforms on the internet enables reuse and redistribution by a broad community, something the makers of *The Mind of the Universe* aspired to from the beginning.
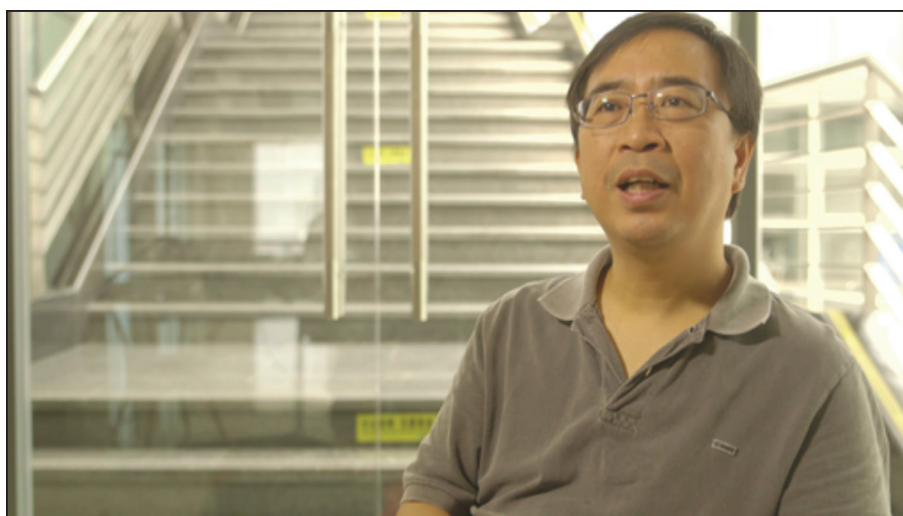

Video 1. Raw material from the interview with Jan Wei Pan for The Mind of the Universe: Chinese quantum physicist Jan Wei Pan on how the Chinese are exploring the quantum world and the launch of the first quantum satellite. VPRO, *The Mind of the Universe*, CC BY-SA.

2.2 Legal Limitations

When the directors took the idea of open publication to the NPO (the coordinating organisation of the Dutch public broadcasters) the initial response was very positive. However, there were some legal challenges to overcome: Dutch media law[6] does not allow for the commercial exploitation of public broadcaster's activities by third parties (section 2.141). A solution was found by approaching open publishing as a way of engaging with new communities around the topics discussed in the series, and by doing so, support the production of future TV programmes. One of the results of dealing with these legal challenges was the fact that the television series that was broadcast on the Dutch TV network would not be available under CC license; within The Netherlands the TV series could only be watched through the official NPO channels. Outside of the Netherlands, however, it is available to view on YouTube.

Within these limitations it was now possible to release the raw interviews with scientists and researchers as well as the B-roll under a CC license.
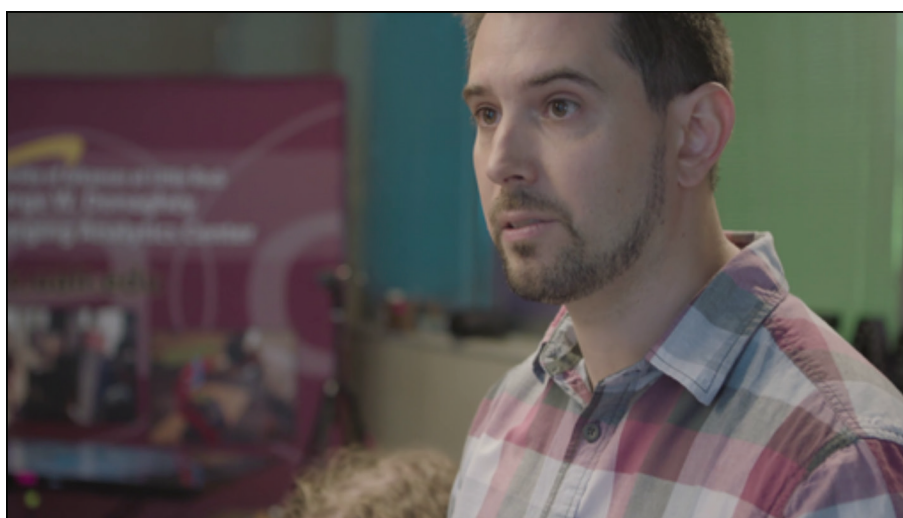
Video 2. Shots from the B-roll of *The Mind of the Universe*: Carolina Cruz and her son playing with the hololens; research of various AR and VR applications at the laboratory. VPRO, *The Mind of the Universe,* CC BY-SA.

2.3 Ethical Considerations

Allowing the public to create their own productions using the footage from the series can potentially lead to inappropriate forms of use. In the case of *The Mind of the Universe* the contents were hardly controversial and therefore unlikely to be used inappropriately. But it is a risk that comes with publishing materials openly, where public broadcasters can feel responsible for the messages that are being conveyed when using 'their' materials. The Netherlands Institute for Sound and Vision made similar considerations when a part of its WWIII archival collection produced by the NSB (National Socialist Movement) came into the Public Domain. The material contained clear references to Nazi ideology and symbolism, and as such inappropriate use would be likely. In the end, Sound and Vision decided to publish the materials in the Public Domain anyway, accepting the fact that the public discourse cannot and should not be controlled. However, Sound and Vision actively engaged with a wider community to discuss the materials and their historical context. Also, the materials were published on platforms that would be able to contextualise these historical records and by doing so support the appropriate use of the footage.

2.4 Funding and Partnerships

The initial ambition for *The Mind of the Universe* was twofold: to cooperate with international broadcasters to create various language versions of the series, and secondly to work together with universities to see the material of the series reused in an educational setting.

The idea was to create a global platform that would allow international broadcasters to download the raw material and upload their own edits of it to the same platform. Even though the responses from international broadcasters were generally positive, there were two reasons why partnerships were not formalised. The first was the broad and abstract subject matter of the series which made it difficult for potential partners to see exactly where it fit in their existing

activities. Secondly, the requirement to publish materials created using raw materials from *The Mind of the Universe* under an open license was new to these broadcasters, causing uncertainty about the legal and practical feasibility.

VPRO reached out to UNESCO to explore the opportunities for collaboration with educational partners in the project. UNESCO saw the value of *The Mind of the Universe*, including the ambition to publish materials under open licenses and the project was granted official patronage. This helped open doors to foundations, educational networks, open universities and the like. However, in the initial stages this did not result in any additional funding. This was exacerbated by the fact that VPRO was still developing their ideas and could not always clearly articulate their questions and the added benefits of open publication. Only in the post-production stage were definite partnerships with universities formed (more on this below).

VPRO also reached out to Sound and Vision. For many years it has actively explored opportunities for open video distribution to enhance the reach and utility of its collection.[7] In the pre-production stage the partnership focused mostly on understanding how open publishing would impact the production process and the facilities required to enable future reuse, for example on the Wikimedia projects.

Vital for *The Mind of the Universe* were the scientists of international acclaim who were interviewed. These scientists are unlikely to carve out time in their schedules to be interviewed for a TV series which would be aired only for a small Dutch audience. The fact that the interviews would be published under open licenses, and thus serving a much wider audience was one of the key factors that won them over.

2.5 Pre-Production Recommendations

These experiences lead to the following recommendations:

- Make the consideration of open publication an integral part of the conceptualisation stage of new projects, especially those that have strong informative and educational potential. Ask yourself: how could open publication of (parts of) these materials help us reach our goals?
- Investigate and explore the possibilities for open publication within the legal limitations that are applicable for public broadcasters in the country concerned.
- Discuss potential ethical implications of open publication in a wider community and pro-actively promote the materials in trustworthy communities.
- Make sure you can clearly explain and show the added value of open publication of the specific materials. What potential use-cases do you see for this content after publication? If possible, create pilot material before approaching funders and partners.
- Take inventory of possible reuse scenarios, for instance in education and on Wikimedia projects, and where possible involve those communities early on.

3 Production

3.1 Process

During production planning it is helpful to initially differentiate between what is required for production of the TV show and what specific requirements are needed for the open publication of raw, uncut materials. These requirements, for example, can lead to a different style of conducting interviews: more discipline is required from the interviewer, and there is less room for error when the interviews are published openly in full. Additionally, introduction clips where the interviewee elaborates on who they are, what they do and their background are

essential. These additions will be very helpful for future users of the materials as it offers the full picture, not just edited segments.

The usual process for creators of television series is driven by the creative autonomy of the makers. In that scenario, the choice to use something or not is based mostly on creative preferences, combined of course with financial restraints. When producing for open publication, a great deal of discipline is required from everyone involved, especially in relation to the inclusion of existing creative works within the video production. For example, framing a shot so that a painting on the wall is not prominently featured and using music that's available under an open license or can be freely reused in a work that will be openly distributed are examples of a required attention to detail.

In the case of *The Mind of the Universe*, additional time was needed to make so-called "clean edits" of the interviews. This additional work was not initially budgeted for.

3.2 Contracts and Agreements

There were numerous components of the project that required arrangements with the people involved in their creation to enable open publication:

Footage

Foreign camera crews were asked to transfer all the rights of the recorded material to VPRO. This is common practice for broadcasters working with international crews, but in the case of open publication an absolute requirement.

The interviewees were approached via email. No contracts were signed, but the scientists were informed about the "free distribution" of the material and that "the material could be used by everyone as they see fit".

Music

For editors at VPRO, their normal routine is to edit with music they feel works well and for which a license can be obtained. In the case of *The Mind of the Universe* there were more restrictions, to enable future open publication. VPRO decided to have 24 pieces of music composed and recorded specifically for the series. The individual pieces were delivered as separate tracks that could be played at both 80 and 100 bpm. With these recordings, a database of diverse music was created from which editors could draw.

Translation

The people interviewed for *The Mind of the Universe* were of various nationalities and some were interviewed in their mother tongue. Transcripts of the interviews were created, either by outsourcing this activity to a translator or through deploying state of the art speech-to-text technology.[8] Where necessary, translations had to be made based on the transcripts for editors to be able to do their work. Although these translated transcripts did not have many errors there were some grave mistakes due in part to the use of names and jargon in the interviews, and also occasionally because of the speakers' accents. These translations were then edited to be used in subtitles for the final version of the series that was broadcast, but also for the raw material of the interviews.

3.3 Production Recommendations:

- Whilst planning, try to run through the entire production process from start to finish for the various distribution channels you have in mind. By doing so, resources can be allocated more effectively. E.g. translation can be done just once for all outlets, same goes for annotation, adding metadata, etc.

- Work with music produced specifically for the openly publishable production, or with openly licensed music that can be found on platforms such as **Jamendo** and **Tribe of Noise**. Even when a copyright holder gives you permission to use their music in your production, automated copyright detection systems, such as YouTube's content ID system, might still flag the content as copyrighted.
- It is important to verify that contracts with all parties involved state that the rights are transferred to the publishing organisation. In exceptional cases, producers/directors are members of rights organisations (e.g. VEVAM in the Netherlands) that ensures compensation when their productions are distributed via other platforms. These agreements can be at odds with the notion of open publication and should be avoided.

4 Publication

The Mind of the Universe was published over four channels:

1. Terrestrial television: The 10 episodes of *The Mind of the Universe* were aired between May and July 2017. On average these episodes received 400,000 viewers (a 5% market share).
2. Complete episodes were uploaded to **YouTube** for international viewers, resulting in roughly 85,000 views as of August 2019.
3. **The Mind of the Universe: Open Source Science TV:** This platform, co-developed by Sound and Vision, offers access to the raw materials (over 30 hours of footage) and allows this corpus to be searched through and downloaded.
4. Open Images and Wikimedia Commons: The raw footage of the interviews and the B-roll were uploaded to the open video platform **Open Images**. Using the Open Images API and the **GlamWiki Toolset** the videos and their metadata were uploaded to **Wikimedia Commons**. On this media repository editors of Wikipedia find resources to enrich and edit Wiki pages.

Specifically for the platforms mentioned under point 3 and 4, a number of actions were taken to prepare for online, open distribution:

a. Improving Discoverability

Publishing materials for reuse by third parties in an efficient way depends largely on the discoverability of the material for users that are unfamiliar with the contents of the project. VPRO and Sound and Vision went to great lengths to enable users to effectively search through the raw material:

- The videos were segmented: each question and answer together formed a single segment.
- Using open source video annotation software developed by Sound and Vision, VPRO tagged both the full videos and the segments. Initially the idea was to have the community (including Wikimedians) add tags, but during the process VPRO felt it would be a waste to not use the knowledge of the directors and researchers who had done much of the research for the series. Time was allocated to one of the researchers to add tags to the interviews.
- The tags that were added are mostly terms from the **UNESCO thesaurus**. This makes it easier to link to other knowledge sources. Also, custom tags could be added as non-structured text.
- Where possible speech-to-text technology was used to transcribe the interviews. In other cases, the translations were outsourced and added to the interviews as transcriptions.
- Categories were added to the material on Wikimedia Commons.

b. File Formats and Quality

There were several considerations with regards to the quality of material available for download. The material had to be of sufficient quality to be used in an educational setting, should be easily downloadable and broadly supported by various players. However, the content did not have to be of sufficient quality to support professional broadcasting. An HD (1920x1080 px) H264 format was chosen for download on *The Mind of the Universe*'s own

platform. For Wikimedia Commons the Ogg Theora format was chosen to comply with Wikimedia's requirements of non-proprietary formats.

4.1 International Restrictions

It is important to realise that open publication does not necessarily mean free distribution. Distributing materials openly, especially in a broadcasting context comes with its own challenges. The VPRO tried to get *The Mind of the Universe* aired in certain African countries. In these particular countries however, one needs to pay in order to get something broadcasted. Also, international distribution requires working with distributors who are looking to make a profit themselves. Publication on, say, YouTube will be a hindrance to working with such distributors since the content is already widely available to their potential audience.

4.2 Publication Recommendations

• Make searching through the openly published material as easy as possible. Use available tools to transcribe and tag the video segments to provide granular entries into the corpus.
• Publish open source (non-proprietary) file formats for open publication.
• If the ambition is to get material broadcasted in other countries, take into account the requirements of the distribution system (and practices) that are in place there.

4.3 Licenses

Video 3. Explanation of the principles behind the various Creative Commons licenses. Creative Commons, CC BY.

For the publication of material, various licenses are available, the most common of which are the **Creative Commons licenses**. Through these licenses, copyright holders can license third parties to use their materials under certain conditions. It is important to keep in mind that only some of the licenses are allowed on the Wikimedia platforms, respectively **CC0**, **CC BY** and **CC BY-SA**. VPRO considered the various licenses and decided on the CC BY-SA license. This requires re-users to give appropriate credit, which is a way of redirecting audiences to the original publication. It also requires productions based on the materials to be published under the same license. This ensures that the open conversation envisioned will not be hindered by third parties using more restrictive licenses.

5 Post-Publication

The traditional broadcasting context (production, marketing and financing), is structured towards the moment of airing. After this, very few resources are allocated to follow-up, e.g. continuing to promote the material during relevant events, or long-term community engagement. In the case of open publication, finishing the product can be seen as (only) the start of an "afterlife" for the materials for which additional resources and time are needed.

5.1 Promoting the Material for Educational Use

Through the partnership with UNESCO, VPRO has built a network of knowledge institutions around the themes discussed in *The Mind of the Universe*. Only a few months after the series aired this has already resulted in collaboration with three universities (Leiden University, TU Delft and Erasmus University Rotterdam) that created **Online Learning Experiences** for an international audience of potentially 5 million students. The universities developed these learning modules as "experiences", not as traditional courses, to help students critically engage with the cutting edge of various scientific topics, also exposing them to some of the ethical dilemmas related to the scientific topics discussed in *The Mind of the Universe*. These learning experiences have been launched at the Open Education Global Conference in 2018.

5.2 Editathons and Reuse of Materials on Wikipedia

One of the big potential benefits of open publication is the use of content on Wikipedia. Open publication complies with the vision of Wikimedia: "a world in which every single human being can freely share in the sum of all knowledge." Wikipedia, the online encyclopedia, maintained by volunteers from all over the world, is the fifth most visited website worldwide. As a source of information it is unrivaled in its breadth, covering almost every thinkable topic.

Segments of videos from *The Mind of the Universe* can now be found in various biographic articles from the participating scientists, across multiple language versions of Wikipedia.
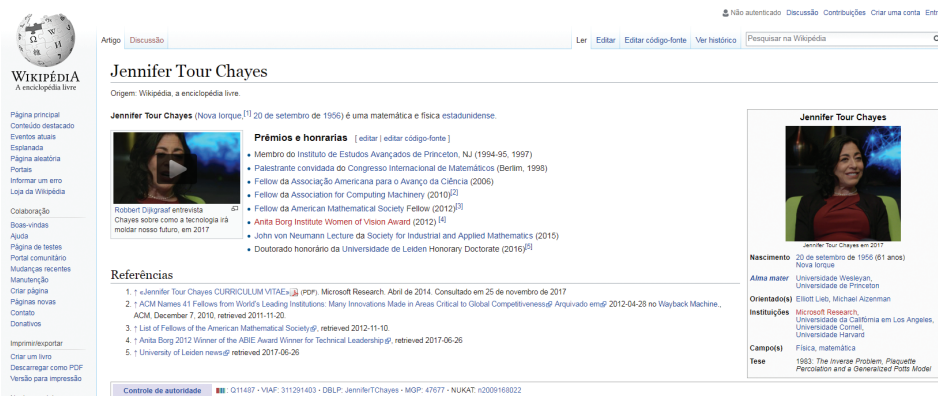
Figure 1. This Portuguese Wikipedia Article on Jennifer Tour Chayes, Affiliate Professor of Mathematics and Physics at the University of Washington, is illustrated with a video from *The Mind of the Universe*.
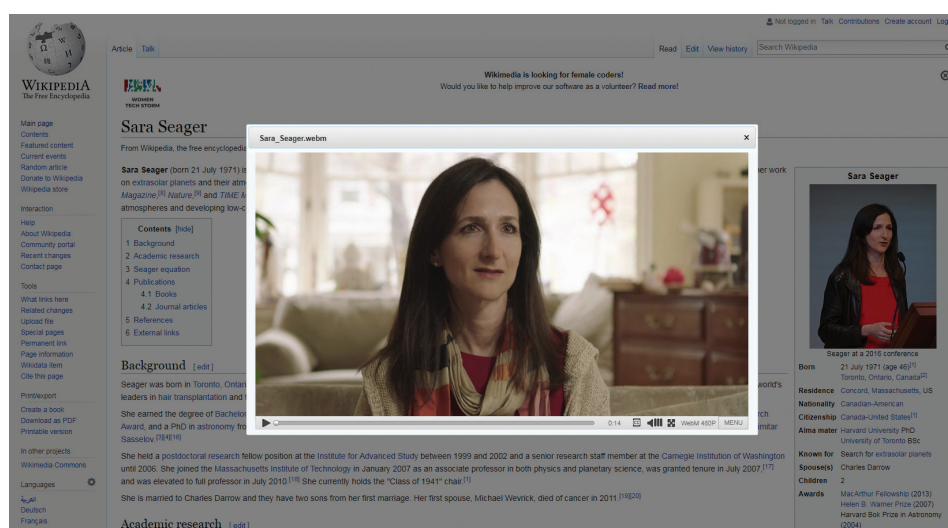

Figure 2. The interview with Sara Seager, taken from *The Mind of the Universe* features in the Wikipedia Article on the astronomer.

So-called "editathons" over the past years have proven to be a way of engaging with the Wikimedia community at a physical location to improve existing Wikipedia articles around a certain topic, create new articles or add pictures, video, audio and illustrations to existing articles. For example, within the project Europeana Fashion twelve editathons were organised, resulting in over 50 new, and 200 expanded articles.[9] Several attempts were made at organising an editathon around the themes and materials of *The Mind of the Universe* in the Netherlands. Despite these efforts, not enough interest was generated. We see several reasons for this:

- The subject matter of the series: the scientists whose work was presented in the series are performing research at the cutting edge of their fields. There is a level of abstraction that comes with this that makes it hard to translate into a comprehensible encyclopedic article for a wide audience. It proved challenging to find participants for the editathons who were both interested in and capable of making that translation.
- The nature of the videos: videos with interviews are relatively rare on Wikimedia Commons, we therefore had no "best practices" for the use of interviews in the online encyclopedia to fall back on. In practice we have

seen the interviews used only as illustrations in the articles of the scientists themselves, not in articles on the topics that are being discussed *in* the interviews.

- The type of content: Wikipedia has a **No Original Research policy** in place. The encyclopedia is a tertiary source that references secondary sources to substantiate the facts that it states. The subject matter discussed in the video's is cutting edge and, in some places, speculative, not mentioning sources or publications. This, combined with the fact that video and audio materials are rarely used as references on the encyclopedia, made for a rather narrow application of these materials on Wikipedia.

Some organisations have taken an extra step in reaching out to the Wikimedia community by employing a **Wikipedian in Residence**. These experienced editors of the Wikimedia platforms can help upload content, start community projects and promote the topics of interest to the host organisation.

5.3 Post-Publication Recommendations

- Budget for long-term follow-up. Additional time and resources are required for editorial activities, adding metadata, building and maintaining a functioning platform for the distribution of the materials and social media activities. For national broadcasters, promoting their publications internationally might require different approaches and knowledge.
- Actively encourage reuse through community engagement, promote the materials on various platforms, be available for questions, team up with educational platforms, etc.
- If reuse on the Wikimedia projects is among your goals, try to involve people from those projects early on to understand their values, level of expertise and needs.

6 Evaluating Open Publication

The choice to publish materials openly using CC licenses can be seen as a choice on principal. Why *wouldn't* materials created with public financing and with a public cause in mind be published openly? Still, evaluating the impact of open publication is important. Can we determine how many people are reached with the material? What new things were created? How is the original material enriched and contextualised?

6.1 Tracking Reuse

One of the major challenges of publishing materials openly is tracking their reuse. Important work is being done by projects such as **CADEAH** and **MediaDNA**, using video fingerprinting to track video on various places on the internet. These efforts as of yet don't offer off the shelf solutions for this problem, but in the future this could provide important information.

A more accessible approach until then is simply to track the number of downloads from the platforms mentioned above. Additionally, one can ask about the purpose for the download through a form. However, in the case of *The Mind of the Universe* these forms are often left empty, or the given reason for download is "for personal use" without further specification.

6.2 Monitoring Reuse on Wikimedia

Since all media used on Wikimedia projects is hosted on Wikimedia Commons, the central media repository, monitoring reuse on the Wikimedia projects is much simpler. Tools have been developed to monitor use and reach of materials within these projects:

- **Baglama 2**: This tool monitors the number of views articles on Wikipedia get in which items from a certain category have been used. The articles on which videos from *The Mind of the Universe* were used receive well over 60,000 monthly views on average in 2018 and 2019.
- **Glamorous 2**: This tool generates use statistics across various Wikimedia projects of items in a certain category. In August 2019, 42 articles across various language versions of Wikipedia make use of material from *The Mind of the Universe*.

6.3 Contextualisation

The above-mentioned metrics schemes are quantitative approaches to the evaluation of the impact of content. A more qualitative look at specific cases of reuse could also take place. Here we are interested in how the original material has been used in the context of other forms of information. Again, the use-case of Wikipedia is an obvious one, as well as the educational programmes in which materials can be used. But what about new television productions in which value is added to the original material by providing new, or different kinds of information? Which new, perhaps unexpected audiences have been reached with the content? Such added value can only be measured by a qualitative assessment on a case-by-case basis.

6.4 Evaluation Recommendations

- Track the reuse of materials, not only in quantitative terms, but also highlight individual reuse scenarios to better understand the way in which audiences engage with the materials published.
- Tracking and evaluating needs to be repeated over time to learn about the ways in which the internet's so called "long tail" functions for openly published video materials online.

7 Recommendations and Conclusions

Open publication can seem a somewhat daunting prospect to broadcasters at first. The laws that apply to public broadcasters might place restrictions on what is allowed. Publishing under open licenses takes away potential income from sales of the material to third parties. One might also feel at risk of publishing something that isn't really theirs and making themselves a liability. There might even be ethical considerations: the sense that public broadcasters carry a responsibility for how their materials are being used.

VPRO however felt that as a public broadcaster, especially where educational purposes are served, making materials as widely available as possible is part of their mission. This is where their mission overlaps with educators, cultural institutions and also the Wikimedia movement. In the case of *The Mind of the Universe*, the open publication so far has led to use of the material on Wikipedia. Despite not (yet) being used to the extent that we perhaps had hoped for (for reasons described above), these articles give thousands of people each month access to the material in the context of encyclopedic articles. Open publication also led to the creation of an online learning experience which will

potentially serve millions of students around the world. Instead of laying on the shelves somewhere catching dust, the videos from *The Mind of the Universe* have been given a second life in the commons.

Our lessons learned for organisations seeking to experiment with open video publishing that come out of this experience are as follows:

1. To enable open publication and maximise impact, seek collaboration with partner institutions in the pre-production stage. This will pay off in the later stages.
2. During production, be disciplined in the choices you make for contracts, music and other content, to avoid hindrances for open publication at a later stage.
3. Be innovative in using available technologies such as video annotation and speech recognition, to enable future users to search through the material and find what is relevant to them.
4. Finally, budget for long-term promotion and community engagement around the material.

Through open publication, public broadcasters can team up with a wider movement and increase their impact. The afterlife of video in the commons connects broadcasters to unexpected audiences and can lead to surprising uses of material.

Notes

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8. VPRO used Voicebase.
9. Also resulting in **a manual with best practices for the organisation of editathons**.

Biographies

Maarten Brinkerink is a Dutch digital heritage professional and amateur creator. He works at the Netherlands Institute for Sound and Vision. It is his professional and personal goal to contribute to an open Internet that makes meaningful content available to everyone.

GertJan Kuiper has been working in the field of media and new technology since the late 80s. He works at the digital department of Dutch public broadcaster VPRO, seeking for creative opportunities to break down the borders between the traditional audiovisual media.

Jesse de Vos is a project lead at the Netherlands Institute for Sound and Vision. His projects cover a broad range of topics: from the preservation of new media to collaboration with Wikimedia projects, from Linked Data to the application of AI in the archive.