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Restoring audiovisual products sustainably: innovative approaches to work with audiovisual archives

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Abstract

The paper explores evolving definitions and practices surrounding archives and repositories in the digital era. It highlights the challenges of distinguishing between these terms and the political complexities inherent in defining archives. The discussion draws from critical archival theory and its emphasis on appraisal, preservation, and description, and analyses the influence of digital platforms, like YouTube, on archiving practices. It addresses materiality and sustainability, underlining the environmental and financial costs of digital archives, and the uneven global access to audiovisual cultural memory. Two innovative case studies are presented: the reconstruction of Colombian television archives through human and AI-powered metadata extraction, and a Welsh postproduction company's workflow optimisation to reduce energy consumption. Both cases exemplify creative solutions to digital archiving challenges, such as improving context and access, on the one hand, and minimising environmental impact, on the other. The discussion extends to broader issues, including the archiving of video games and social media, copyright, and the risks of private ownership and algorithmic control. The text concludes by advocating for "critical digital archives" that are ethically, materially, and environmentally sustainable, suggesting that ongoing innovation and nuanced debate are essential for the future of digital audiovisual archiving.

Keywords

Audiovisual archives, Digital preservation, Platformization, Cultural memory, Algorithmic curation, Metadata extraction, Data sustainability, Carbon footprint

1 Introduction

A common, everyday perception of an archive is a stack of shelves, filled with dust-collecting documents[1], hidden in basements or under heavy locks and doors, away from view and accessible only by selected few keepers. However, a more contemporary view of the archive is

> a repository of some kind; and while for some people this is seen in formal 'archives of the nation-state' terms, in fact it can variously also be a building, cardboard-box, photograph album, internet website, or discourse of interconnected ideas such as community heritage and shared memory. (Moore et al., 2017, p. 2)

Thus, archives are conceived as repositories of knowledge and history "founded on the assumption that artifacts and documents can be made to tell special stories of social identity … [and] to establish particular trajectories of the past and thereby to create a common past (and a shared future) that is culturally distinct" (Fritzsche, 2005, pp. 16-17), even considered as the "the legitimate place to find authentic/official answers about our histories" (Rowat, 1993, p 198). Although the claim to legitimacy might be associated with the national archives as constituent of the collective memory of the nation-state, it also

[1] In fact, dust has been defined as one of the most common stereotypes that feature in images related to archives (Patterson, 2016, p. 341; Moore et al., 2017, pp. 13-14).

applies to the family photo album as a legitimating system of participation and relevance within a family. An archive contains the valued artefacts that have been selected for preservation because of what is considered their intrinsic worth and are made available to others, mostly researchers and scholars in the case of institutional archives—or family members and genealogy buffs, in the case of family photo albums—, to scrutinise and evaluate to obtain further knowledge about the human culture that produced them.

As such, archives carry with them the power of determination of collective worth, because they are "an ordered repository of documentary records deemed 'nationally significant' … [and] images of a well-intentioned protection of a collective right of inheritance underlies these allusions to the loss of heritage" (Rowat, 1993, p. 202). This is the archontic principle that Derrida and Prenowitz (1995) refer to when discussing the archive. It creates a residence, a place where the storage of worthy examples of human existence resides and where "the documents, which are not always discursive writings, are only kept and classified under the title of the archive by virtue of a privileged *topology*. They inhabit this unusual place, this place of election where law and singularity intersect in *privilege*" (p. 10). Access to the archives, which are kept under control and organised by a given epistemology structured by the archivists, becomes the privilege of the few, the initiated.

Yet, when thinking about today's digital landscape, those concerns appear to be remnants of a past when paper and ink, instead of electrical impulses, made up cultural output. The change from conventional to all-electronic media implies a change in structure and development of the archives (Wright, 2007), including increased expectations for accessibility to the materials (Patterson, 2016). Derrida and Prenowitz's (1995) idea is useful insofar as it allows us to think about the ways in which archives, understood as places of safekeeping and power, are transformed in the digital ecosystem and suggest more complex frameworks of appropriation and re-signification, as well as a new idea of what the appraisal work of the archivist and their motivations are. Open digital platforms serve as repositories that allow not only the incorporation of material by users but also personalization in how users interact with the products, for example, through the use of tags, or user-created metadata (Andreano, 2007), thereby rendering obsolete, at least in part, the archontic principle that can be deduced from Derrida and Prenowitz's (1995) proposal, by promoting a more democratic form of classification. As Roncallo-Dow et al. (2016) have pointed out, a multi-channel platform like YouTube can also be understood as a place that restores a new kind of aura (Benjamin, 1989) to cultural manifestations, giving them a new life that reminds their value as a creative object, but this restoration should be considered in terms of reincorporation into the spheres of collective memory.

Notice that until now the meanings of archive and repository have been presented without a description of whether these terms mean the same, one encapsulates the other, or they are discrete concepts. This has not been done idly, but out of the experience of these terms being used in different areas of the human and social sciences.

Despite this seemingly open perspective, there has been more nuanced contemporary debate around the use and applicability of terms such as archives and repository within archival studies. The following pages examine how these theoretical tensions manifest within contemporary digital audiovisual archiving practices and present two case studies that highlight innovative approaches to tackle some of the challenges in the field.

2 Archives and repositories

As mentioned in the introduction, in everyday discussion the terms 'archive' and 'repository' seem to be used interchangeably. That is also the case for data management (USGS,

2025; University of Oxford, 2025). Archives (in singular but with the 's' appended) is used to shorten "archival repository/repositories" (University of Hull, 2025), implying that they are a specific type of repository (Britannica, 2025; New York State Archives, 2025). Repositories are then considered to be the buildings or general infrastructures that house any type of items containing value (The National Archives, 2004, 2025) at the same time as the organisation that administers said infrastructure (Society of American Archivists, 2025b), making it difficult to disentangle one use of the concept from the other. To complicate matters further, both meanings, the buildings where records are kept and the institutions that keep them, might also be ascribed to the word archives (as only two of the eight meanings for 'archives' given by the Society of American Archivists, 2025a).

This problem with the definition of archives has not gone unnoticed. Caswell (2024) has mentioned that "defining archives is an impossible, hyper-political task that inescapably dooms the author to failure" (p. 2), which implies that any of the provided definitions used here can be discussed, debated and contested from various disciplinary perspectives. Despite presenting these words of caution, Caswell ventures a definition of the archives as "collections of collections of records that have been deemed archival, thereby subjecting them to the archival interventions of description and preservation" (p. 2), admitting that this definition is both historically and intellectually positioned from a Western contemporary perspective. Main aspects she considers stemming from that definition include the act of appraisal—which means "the choice of what to save, in what form and under whose authority" (Schoenebeck & Conway, 2020, p. 1)—, the purposeful intent of preservation, and the interest in providing some form of structured description. The first aspect refers to the work of the archivist, the second highlights the material demands for the maintenance of the records and the third underscores the importance of providing elements that allow for creating relational sense of the records by assigning them to overarching categories.

Even if this definition enters conflict with some perspectives of what an archive is—Caswell (2020) readily admits that her summary runs afoul with humanist perspectives that use archives as a metaphor—, it provides a standpoint from which different collection practices can be contrasted. For instance, there is a post-modern perspective in archival theory that recognises the positionality of the archivist and its impact upon appraisal, expanding considerations of who the archives is for and the migration of much personal archival information to, among others, social media sites (Schoenebeck & Conway, 2020, pp. 3-4).

Gaber (2025) has drawn attention to how the digital age has presented a series of challenges and opportunities for archiving practice. One of the challenges refers to the

> unprecedented expansion of archival practice now within reach of almost anyone with access to a device with an internet connection and the (fairly basic) skills of storing documents online … [but] some archivists seem reluctant to embrace the dispersion and multiplicity of archival practice (mainly through terminological and methodological gatekeeping) or to unconditionally accept its underlying social justice imperative. (p. 12)

Notice that the terminological and methodological gatekeeping Gaber (2025) refers to aligns with the debates about what archives may be and how appraisal takes place when amateur archivists are engaged in the process.

Critical archival theory has been developed as a response to these and other criticism and embraces the need for an analysis of the archival theories and practices to address these injustices, recognising the power differentials that underscore the appraisal process, and issues such as "who becomes archivists and how and why, and of how we define and teach and practice core concepts" (Caswell et al., 2017, p. 3), while at the same time

presenting a defence on how archival theory refutes some of the approaches by the humanities "which has so often ignored the existence and legitimacy of archival studies as an area of rigorous academic inquiry" (p. 1). For instance, modern archival scholarship appears absent from contemporary historic theory (Gaber, 2025) and with "the growth of digital humanities, historians' relationship to records has become more complicated. Historians now not only use but create, contribute to, and theorize collections of digital records, some at a massive scale" (Carbajal & Caswell, 2021. p. 1102). Gaber (2025) and Carbajal and Caswell (2021) draw attention to the need to recognise some of the headway made in archival studies to help historians and other humanities researchers to address misconceptions and foster more productive and meaningful exchanges.

From the perspective of critical archival studies, Carbajal and Caswell (2021) present seven important aspects that should be considered when discussing digital archives: (1) materiality, (2) appraisal, (3) context, (4) use, (5) scale, (6) relationships, and (7) sustainability.

Regarding materiality and sustainability, the physical spaces and infrastructure, whether as buildings to store physical materials or in servers with digital versions, demand elevated construction and upkeep costs, which require innovative and creative approaches to their establishment (Suárez, 2021), as well as accessibility challenges and a need for constant updates on the software and processes to ensure the quality and reproducibility of the digital files. As Suárez mentions, many institutions in Latin America have opted for uploading some content to YouTube or other social media platforms to provide access to materials that would otherwise be unreachable for people within those countries to access. But having archive material on private platforms, regardless of their popularity, ease of access and lack of direct charges to the consumer, comes with other concessions to the platform owners whose private interests supersede cultural maintenance, as observed by Carbajal & Caswell (2021) under the aspect of relationships.

Considering appraisal, the decision-making processes that led to the selection, preservation and storage of some audiovisual products instead of others create the gaps in archiving that need to be critically analysed by those who use it to obtain traces from the pass (Noordegraaf, 2010). Appraisals are as important for what they select as for the things they omit, and these "silences are further obscured by the perceived legitimacy of digital interfaces and the lack of face-to-face interaction between archivist and user" (Carbajal & Caswell, 2021, p. 1108). As shown by Goyeneche-Gómez (2020) in the case of the Standard Oil Company's photographic archive of South America in the late 1940s, private interest was taking over the national institution in creating a new epistemological space that "implied concrete processes of selection and framing to determine what was included and excluded in that universe" (p. 346)[2]. The series of photographs sponsored, organised and distributed were classified according to the interests of a private company, and "the archive sought … to generate an effect of a globalising identity that would remove spatial and cultural distances rooted historically" (p. 359)[3], providing an example of Derrida and Prenowitz's (1995) archontic principle in action. This action by a private institution showed how they were trying to shape knowledge and communication structures, based on the power to determine, as archivists, what would constitute part of the archive, and thus, what would be the representation of a given reality.

[2] Translation by the authors of the original in Spanish: "implicaron procesos concretos de selección y montaje para determinar qué entraba y qué quedaba afuera de ese universe".
[3] Translation by the authors of the original in Spanish: "el archivo buscó… generar un efecto de identidad globalizante que eliminaba distinciones espaciales y culturales históricamente muy arraigadas".

The power bestowed upon the archivist, or even upon the user who uploads previously broadcast content to a social media site, underscores the sense of value that an archive keeps. It also presents a challenge, because "imagining themselves quite literally as 'keepers' of culture, some archivists are still choosing a rarefied and restricted path" (Prelinger, 2007, p. 115) where fears of misuse, appropriation and copyright violation prevent them from opening up access to archives, even when these concerns have been shown to be overzealous (Carbajal & Caswell, 2021, p. 1113). Institutional archives, thus, become spaces of controlled access and continuous suspicion. At the same time digital platforms abound with some of the same material being uploaded with little regard for appropriate copyright clearance or robust metadata that provides context for the products but enabling access to otherwise unreachable materials. Although the idea of user-collected content seems to be more democratic, not all users have the same expertise and skillset to determine the collection mechanism, and even less knowledge and control of the hidden algorithms that are put in place to assign access. Users and algorithms have an impact on both the context of the information presented, by determining the availability and quality of the tags, descriptions and categories that are used to define the metadata of the products, and by signposting access pathways.

Undoubtedly, the digitisation of audiovisual archives, the proliferation of audiovisual products, the expansion of streaming platforms and the ubiquity of user-generated content –without even delving into AI-generated content– provide a scenario where a multiplicity of challenges arise for the development of digital archives, speaking to the scale of the phenomenon. Furthermore, the transnational life of many audiovisual products highlights that these archives cannot be conceived solely from a national perspective but should integrate transnational concerns and characteristics (Van der Deure et al., 2022) echoing the call for a collaboration between the Global North and Global South (Fossati, 2021), and the demands for the custody, consent and care of the materials, in ways that are not exploitative and abusive, but designed upon collaboration and stewardship in the relationship between the institutions and the groups of people represented (Carbajal & Caswell, 2021, p. 1115). This scenario also opens the door for creative dialogues and innovations in processes that help understand archives as creative practices rather than monoliths (Agterberg et al., 2025). The interest here is to answer these calls and provide food for thought in the contemporary debate around what has been deemed the "Archive's Moment" (Caimari, 2021), by showcasing innovative approaches to some of the challenges at hand.

The place that comes to mind as central repository for contemporary records is the internet. But Ernst (2010) objects to understanding the internet as an archive by reflecting on the permutability and constant motion of information. He claims that the internet "is not an archive, but a distributed system of more or less connected collections" (p. 64). Of course, those collections could be specific repositories themselves, yet the whole of the internet is nothing of the sort, despite the seeming possibility of enabling access to all its contents. Ernst also points out the mutability of digital elements remaining part of the files themselves as a distinction to traditional archival documents that were immutable without trace. He mentions that "computer memory is recursive and regenerative" (p. 55), rightly pointing out that the sustainability of digital archives relies heavily on their being able to be regenerated –updated in the technical means of reproduction–, rather than maintained in the shape and form they had, as per books or other paper- or film-based records. This need for regeneration implies that digital archives, much like any other archives of motion such as films and videocassettes, not only need a place of storage, but a constant update in the technical elements that allow for them to be reproduced. Wright (2006) points out, regarding the digitisation of the BBC audiovisual archives, that three aspects need to be covered: storage, access and sustainability which coincide with three of the seven concerns mentioned by Carbajal and Caswell (2021), namely materiality, use and sustainability. Wright (2006) mentions that ensuring that

these three aspects are appropriately covered is central to provide 'trusted repositories' – which align with the definition of the archives given above– and observes that a "critical issue is sustainability of functionality across obsolescence of all the original hardware and software" (p. 7), which also aligns with Ernst's (2010) observation.

The conceptual and terminological tensions presented also shape the way in which evaluation and assessment of quality and effectiveness of digital archives is made. They underscore how internet or cloud-based audiovisual repositories and archives may be assessed.

3 Digital audiovisual archives and their challenges

Despite the illusion that immediate access via the internet might seem to generate, digital audiovisual archives demand physical storage space, mainly in the form of servers where the digital files can be kept. The demand for server space has led to the development of real estate companies dedicated to lease spaces for servers, and a whole new economy of investment in the property market revolves around the construction of server sites with easy access to utilities and connectivity (Greene, 2022). Major platforms, including Facebook (Meta, 2026) and Google (Google, 2026) have their own data centres to store their information and files, spread across the world, which elevates concerns about the physical location of the storage of information, making them prone to geopolitical changes and accidental or intentional attacks on interconnection infrastructures.

The physical infrastructures to store and exchange information via the internet demand large amounts of energy and sophisticated hardware that generate considerable environmental impacts (Keilbach & van der Deure, 2025, p. 75; Whitehead et al., 2014; Garraghan & Hutchinson, 2025; Miller, 2024, 2025). In a smaller measure, any exchange or transfer of digital files for processing and consumption also incur in energy consumption related to the size of the files, which, in the case of audiovisual files, depends on the resolution quality of the images and the complex modifications that are incorporated as part of any postproduction and editing processes. Thus, the digitisation of high-quality audiovisual products, their processes or restoration, cataloguing and storage, and their access, constitute energy-demanding processes that have an impact on the sustainability of the archives.

Apart from the physical demands and energy consumption related to digital audiovisual archives (Carbajal & Caswell, 2021, p. 1118), and their distribution and access, concerns about copyright also prevent the availability of products in the public domain (p. 1113). Even films from the early years of cinema that have been found, restored and digitised cannot be made immediately available to the public. This is because, in many cases "film archives contain hundreds of thousands of films, which even when restored using public funds, are unavailable to the public because copyright owners could not be located" (Center for the Study of the Public Domain, 2005, p. 2). Continuous change in the extension of copyright for audiovisual (i.e. film and television) products means that they cannot be made directly available to the public and can only be stored in national archives, if these exist, and if the given country has provided legal requirements for their deposit.

In many places in the world, the cost of digitising audiovisual products and then preserving them under ideal conditions implies that very few products are archived by public institutions and there is an overreliance on private collections, with the risks that the latter pose to the collective narrative (Goyeneche-Gómez, 2020). While some countries may digitise and make large quantities of audiovisual materials readily available, other countries struggle to keep up, leading to an uneven availability of audiovisual cultural memories the world over (Fossati, 2021). Based on her own experiences in the differences between

national audiovisual archives, Fossati raises a call for researchers to become activists and address the gap in audiovisual archiving by promoting more exchange between archive-rich and archive-poor countries, but also by engaging in a more diverse form of understanding archive collections, which matches the view presented by Moore et al (2017) in the introduction to this paper.

In order to offer access to audiovisual products they consider of value to the public, institutions and individuals alike have made use of internet video platforms such as YouTube to share material that is otherwise impossible to access. This way, YouTube has become a de facto repository –if not even an archive– where great amounts of audiovisual content have already been digitised for access and consumption.

The failure of YouTube as a 'trusted repository'

Platforms such as YouTube have become fundamental objects of study, particularly due to the robustness of their catalog and the wide variety of content that emerge as sources of analysis (Almos et al., 2025). Rieder et al. (2020) refer to it as the 'platformed media system,' a large and complex amalgam of channels hosted and managed within the company's interfaces and data centers. With more than two billion monthly active users, these platforms represent spaces of audiovisual production, distribution, and archiving that require digital methodological approaches to understand their functioning, scope, and impact on the public sphere (Burgess & Green, 2009; Padilla et al., 2025). Nevertheless, the relationship between the formal and the informal in this type of digital platform generates new dynamics of knowledge production, bringing into question or redefining the archivist's role. Traditional media products co-exist with amateur creators, generating a hybrid media ecosystem in which digital methods allow the mapping of actors, interactions, and narratives (Rieder et al., 2020).

Focusing on traditional media products that are digitized and uploaded by members of the audience from their recordings and collections, YouTube becomes a repository of television products. But is it enough to be considered archives? This issue has been addressed in academic terms since a couple of years after YouTube was established. In a seminal article by Gehl (2009), he claimed that "YouTube is an archive. YouTube is not a peer-to-peer sharing program which links individual computers together in an ad hoc network; there are central servers which hold the video content that users have uploaded. (p. 45). Although he does not engage with the nuanced debates presented in this article about what archives are, from the perspective of archival studies, he describes YouTube as an archive and deems the appraisal work that develops through it as a great advantage. But he also reminds us that YouTube is a private company and that the appraisal by these honorary curators who upload and classify audiovisual information also becomes a collective risk. Gehl states that YouTube's "storage function provides the service which might be deemed democratic, but … its display function allows for entrepreneurs and corporations to effectively exploit the labor of all of those who have uploaded and classified videos in good faith" (p. 56).

This is no minor issue, as it points to the same observations that Goyeneche-Gómez (2020) levied about the private control of representation, and what Mosco (2014) and Hindman (2018) have offered regarding the supposed democratization of the internet: that it becomes an opportunity for the concentration of attention by those who can profit from it. It also touches upon the aspects of context and relationship mentioned by Carbajal and Caswell (2021) by maintaining the exploitation that has been criticized regarding the practices of traditional archives.

Taking Gehl's (2009) description of YouTube as an audiovisual archive McKee (2011) compared its contents, accessibility and descriptive metadata to that of an institutional audiovisual archives, the Australia's National Film and Sound Archive (NFSA). McKee found that both YouTube and the NFSA exhibited strengths and weaknesses. YouTube's strengths were its ease of use and intuitive nature of its search system. The NFSA's strengths lay in the amount and quality of metadata –the information available on the production and broadcast history of the material, for instance– which provides researchers with guidance on where to find the original material if directly unavailable. However, when evaluating the YouTube hyperlinks provided by McKee in his article, Mattock et al. (2019, "Ironically, McKee cites…") found that only 17 of the 55 referenced links remained active six years later and that 20 of them were broken, since they led to content that had been removed from the platform for copyright infringement. For this reason, they conclude that "despite assertions about YouTube as an archive, explanations of its operation raise questions about its role in ensuring access to historical information" ("Conclusions"), and questioning its commitment to preservation, which is a key point for archives.

The abundance of broken links and removed content in YouTube highlights the lack of sustainability of the content, in the sense that it cannot really be trusted with preserving the material it has claimed to hold. If YouTube is superficially successful in providing better access to the material, it does so at the expense of its stability, which, as pointed out by Ernst (2010) and Wright (2006) is expected of a trusted repository or archives.

Apart from preservation, one of the central aspects of archives is appraisal: the curatorial function of distributing, organizing, and storing content in categories. YouTube's curatorial forms become de facto political practices. This is because the decision to select a category in which a video is classified and tagged will determine the ability of YouTube's search algorithms to assign relevance. For this reason,

> digital archives like YouTube are in need of authority to evaluate and display uploaded items within their "new" context. Algorithms and uploaders cooperate in rearranging and reassembling items, thus reactivating mediated memory of past events in terms of the present. (Smit et al., 2017, p. 294)

Therefore, the curatorial decision-making process of users who upload videos becomes the path for searching products within this collective repository. They take on the role of the archivist, but their cataloguing system is governed by the algorithms that are not under their control. The lack of transparency of this process leaves open questions about the appropriateness of the appraisal they carry out.

Another aspect that becomes problematic when thinking of YouTube as archive is the possibility that all the content stored there could be used by the parent company, Alphabet, to scrape the information and train its own generative AI tools. The audiovisual archive that has been shared via this repository might be thus exploited commercially, without any benefit for the copyright holders or people represented and the reconfiguration of representation is at the hands of a private interests, as was the case presented by Goyeneche-Gómez (2020). This is a clear example of the exploitation and abuse that archives have been accused of generating, when a "transfer of custody [of the materials] assumed a transfer of ownership" (Carbajal & Caswell, 2021, p. 1115).

YouTube, then, fails on multiple grounds to be recognised as archives, and does not satisfy Wright's (2006) criteria for a 'trusted repository'. The location of the files that make up its contents is unknown, the overall system in how the algorithm privileges the information added by the users is obscure, and the stability of the content is fragile. However, there is a question that remains open regarding the content that is available and the ease of access to the material, which might be useful to develop actual audiovisual archives.

This is a point that could be addressed to take advantage of the positive role of YouTube as a repository led by the audience.

Finally, a further problematic aspect thus unaddressed for the case of YouTube is its sustainability in terms of the environmental impact of its service.

The carbon footprint of digital file transfers

Large digital downloads have been mentioned as potentially creating an unexpected source of carbon emissions, mainly because the end user has little to no knowledge of how the transfer process and bandwidth usage translates into energy consumption when accessing online files (Reddy et al., 2025). Audiovisual products, particularly in high resolution formats, are large digital files which generate considerable energy consumption along the different stages of their life cycles (Ameur et al., 2025). Since the actual environmental impact of energy consumption varies depending on the carbon footprint of a given nation's electricity grid, it is difficult to establish a one-size-fits-all recommendation in regards to digital consumption (Istrate et al., 2024). Furthermore, even when the analyses move away from the energy consumption of streaming transfers and digital exchanges, the more material evidence of the large carbon footprint might rest with the devices used and quickly discarded through which digital transfer processes are carried out, from portable computers to handheld screens and mobile phones (Maxwell & Miller, 2012).

From the standpoint of archival studies these issues present a pressing problem. On the one hand, there is a demand to digitise great amounts of analogue material in danger of disappearance at great expense "and on the other, there are the potential financial and environmental costs of long-term digital preservation" (Carbajal & Caswell, 2021, p. 1117).

The takeaway from the studies on the impact of large digital file transfers, which are key for the audiovisual sector and central to the contemporary consumption habits via content streaming and particularly for YouTube, is that innovation around sustainability of all digital process should be promoted to find applicable solutions that reduce the overall environmental impact. These solutions need to be at once related to the local needs and demands and embedded in the practices in ways that also become commercially sensible.

4 Two innovative approaches to tackle digital archiving challenges

The two issues highlighted regarding the potential and pitfalls of YouTube and the need for a new approach to diminishing the impact of digital file transfers are discussed here with specific case studies. The former is addressed from the perspective of the lack of a digital audiovisual archives for Colombian television series from the 1980s, using the example of the sitcom *Dejémonos de Vainas* (Coestrellas, 1984-1998). It presents new avenues through which AI might be applied to recover and reconstruct the television grid of the 1980s and provide metadata for the sitcom. The latter is addressed by the research, development and innovation project led by Dragon Postproduction, a company that offers audiovisual postproduction in Wales, and which focuses on digital restoration projects. Their experience trying to diminish energy consumption, and thus carbon footprint, during the iterations required for restoration projects provides an example of commercially viable strategies to diminish environmental impacts.

From manual reconstruction to AI powered metadata creation

The Colombian TV sitcom series *Dejémonos de Vainas* produced by Coestrellas in Colombia between 1984 and 1998 has left an indelible cultural impact in the country. With over 600 episodes, the total number of which is still unknown, it is one of the longest running TV series in the country. Due to the mixed private-public structure that defined the Colombian TV system in the 1980s and 1990s (Gutiérrez-González and Uribe-Jongbloed, 2024), there was never a central archive of the audiovisual products, leaving most archiving to the respective production companies. Some of the most renowned works of the time may have been lost because those production companies ceased to exist and their archives were destroyed, looted or left to decay. The change in the governmental television governance structure also implied that broadcasting details of the period have also disappeared.

To reconstruct the television programming and collate the information from the TV shows, researchers developed an approach with a variety of information sources. One source were the results of the tenders that assigned private companies with allocated slots in the programming. A second source was the weekly schedules published in TV magazines of the time—which often contained descriptions of some of the shows—. And a third source was the daily schedules published in a national newspaper. This process, when applied to a specific television show, such as *Dejémonos de Vainas* proved demanding, but was able to generate a spreadsheet that partially reconstructs the broadcasting times, show descriptions and availability of the episodes in both YouTube and the Colombian public service streamer RTVC Play (Uribe-Jongbloed & Roncallo-Dow, 2021; Uribe-Jongbloed et al., 2023).

A new revision carried out in October 2025 showed that the YouTube channel called *Dejémonos de Vainas* offers about 600 episodes of the series, whereas RTVCPlay offers 135. That YouTube channel offered only 190 episodes in 2020, when RTVC Play had 95 (Uribe-Jongbloed & Roncallo-Dow, 2021). In the five years between both measurements, the YouTube channel has tripled the number of episodes available, while the RTVC Play has only added 40. In 2025 the episode titles in the YouTube repository include the year of broadcast, although this is only present in two thirds of them, and mostly referring to post 1987 episodes.

The YouTube repository for *Dejémonos de Vainas* is wider, but offers little information regarding time of broadcast, and there is no real structure to the order of the episodes. Furthermore, as described above, the material could easily disappear because of copyright violation or simply by the removal by the user who has uploaded the content to their channel. The RTVCPlay offer is better, it includes a summary of each episode, and the order of the episodes follows a certain historical line, starting from the oldest and going to the most recent. The interface and ease of access continue to be the advantage of YouTube, whose display of the episodes makes them easier to select and almost seamless to play, whereas RTVCPlay offers a lineal carrousel that requires a number of actions to access the material and there is no way to directly have all the offer at hand.

Two recent actions have been undertaken to help develop further the database of information for *Dejémonos de Vainas*. The first one centred on using the AI Claude (Anthropic) to extract information from digital captures of a TV magazine schedule and the daily table from a newspaper and generating a spreadsheet database of the full grid, including schedules, channels and names of the shows, complimented with external information about production companies (Uribe-Jongbloed & Gutiérrez-Gonzalez, forthcoming). This process yielded a reliable reconstruction of a day schedule, but the multiple steps, manual revision and prompt engineering necessary highlighted that further work was required if this

was the process to develop for reconstructing the whole programming schedule for the period.

Another complimentary step currently in development for *Dejémonos de Vainas* is a pilot of semantic mining using Multimodal Generative AI (Gemini 1.5 Pro) (Gutiérrez-González, forthcoming). Gemini's multimodal capabilities to directly ingest and analyse video and audio streams. The AI acted as an "augmented archivist," successfully generating a three-level metadata taxonomy: 1) Structural Segmentation: Identifying narrative rhythms and scene boundaries without human intervention; 2) Cultural Object Recognition: Detecting specific markers of 1980s material culture (e.g., "Renault 4 vehicles," "dial-up landline phones") that provide historical context; and 3) Linguistic and Sentiment Analysis: Transcribing regional dialects and slang while mapping the emotional valence of scenes. Although the pilot also presented the shortcomings of the AI in terms of generating hallucinations when certain culturally bound components or figures of speech were not recognised, it showed its potential to extract fruitful metadata from the show.

These two innovative research pilots provide an interesting pathway for reconstructing and enhancing current TV archives, taking advantage of the available tools and repositories, recognising the untrustworthiness of YouTube as an archive.

Improving efficiency in restoration workflows

Dragon Postproduction noticed that there was a constant problem in their workflow. Every stage in the digitisation and restoration pipeline demanded the production on a large digital file that needed to be exported in high resolution quality (see Figure 1). This implied a great demand in their equipment for undertaking the rendering processes, while also pausing the intervention into the product. Because the rendering process takes a long time and makes high electricity and server capacity demands, the workflow required for the process of rendering to be pushed until the end of the working day and take advantage of the night, when there are no staff on site and the computing demands are at their lowest. However, if many projects needed to be rendered at the same time, processing times could take longer and delay further stages in the process. Thus, repeated high-resolution rendering created bottlenecks and intensified energy costs.

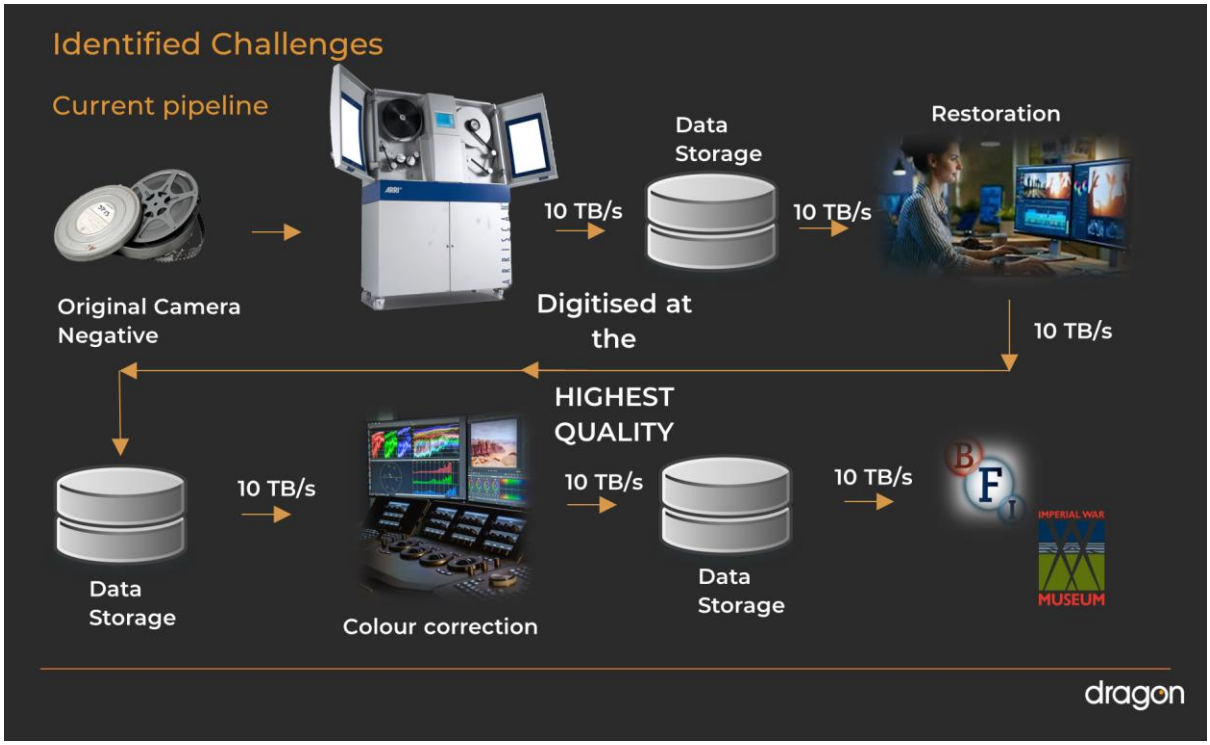

Figure 1: Restoration pipeline (Courtesy: Dragon Postproduction)

Their research and development innovation revolved around the possibility of maintaining the main file in one single accessible location from the various stages, keeping a single workspace where all the different parts of the process could be carried out at the same time without the need to render the project repeatedly. The goal was to reduce the number of rendering iterations at the same time as working on one single file that included a level of compression that still enabled high enough quality for the image to undertake useful restoration work. Furthermore, if certain processes could be simplified directly by AI tools aimed at recognising and repairing or adjusting the digitised material, more time would be dedicated to the more nuanced intricacies of the restoration project.

The pilot for the innovation project is ongoing and a partnership with a software company has enabled the production of two beta releases for the compression mechanism. The expected result would enable Dragon Postproduction to reduce the amount of times a project is rendered, reducing the energy consumption and environmental impact of repetitive rendering processes, while also freeing up time of their staff by having the team working simultaneously on one single compressed project and rendering at the end, instead of having to wait for one of the stages of the restoration to finish before the next one can start (see Figure 2).

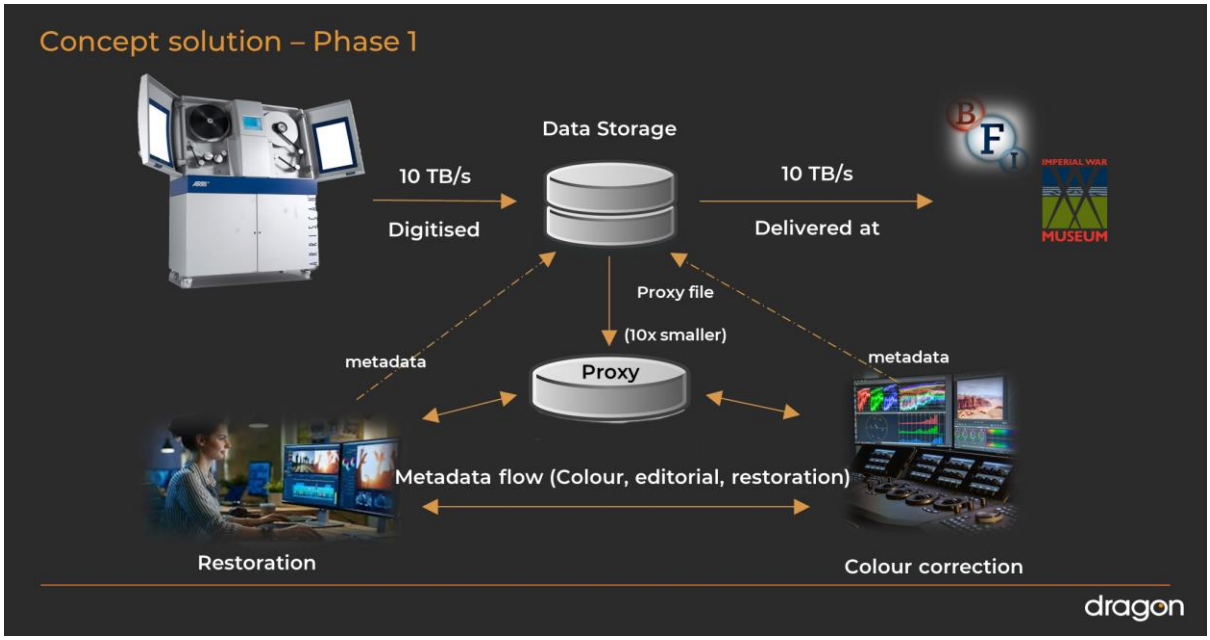

Figure 2: Compressed central file pipeline. (Courtesy: Dragon Postproduction)

As this case highlights, the potential reduction of environmental impact in the workload is also predicated upon the workflow advantage that is generated by the software innovation. This process could also provide a template for other strategies to improve workflow requirements in other post-production companies.

5 Discussion: what about other audiovisual archives?

The two case studies presented above highlighted innovative approaches to address specific gaps related to the restoration of information and reduction of environmental impact of digital file transfers. These approaches address only two of the aspects mentioned by Carbajal & Caswell (2021), namely context in the former case and sustainability in the latter. Although expanding the remits of archives to include as much digital culture as possible seems like a worthy endeavour to balance the historical bias on voices and participation in the collection of human achievements, it also brings about further questions concerned with excessive digital footprints, the trustworthiness of repositories and their overarching costs.

On the one hand, the dissemination and ubiquity of video gaming and social media posting implies a growing need for server space, digital transfers, and the consequent energy consumption. On the other hand, they also provide information that might be siloed, appropriated, or accessed later by others without consent or knowledge by its creators. As seen in the Colombian case, despite the inadequacy of YouTube as an archive, it is useful as a source to develop better archiving solutions that are cost-efficient and take advantage of the availability of information while it is still accessible, providing a complement to meagre institutional archives.

Both cases presented referred as well to the ways in which AI powered tools incorporated in research or commercial activities may reduce costs and time in processes involved in restoration and metadata extraction practices. These solutions using AI in specific ways follow Arrojo's (2025) reflection that "innovation is not just the result of technological

advances but a creative process involving people and their ability to imagine and execute new ideas from these technological developments" (p. 191). Yet, as Arrojo has also pointed out, advances in AI also "also raise questions about originality, authorship, and the future of human talent in film creation" (p. 192). Generative AI can and has been used to extrapolate styles and techniques for the production of content, without acknowledgement of the underlying works that allowed for those pieces to be created, bringing forward a timely discussion about copyright, public domain and authorial control of creative work. Such was the case of the uproar that the AI-generated "Ghibli Studio" images caused (Goonetillake, 2025). Moreover, AI powered activities have been pinpointed as spearheading a spike in energy consumption and materials requirement with devastating environmental impacts, which means the use of AI tools should be treated as precious resource to be applied efficiently and only when necessary (Miller & Pedro-Carañana, 2025).

These are but two of the challenges in the digitally mediatised world we live in, where digital audiovisual content is produced and shared at a large scale, the interest in archiving current and previous creations remains a work in progress, and questions arise about how can other audiovisual experiences and everyday activities be stored and preserved to provide the future with sufficient quality evidence to allow analysis and comprehension of human creativity and interaction. Video games engagement and social media interactions are two of the spaces where audiovisual content is developed and shared, and where collective experiences and memories are produced. But how can we archive gameplay to both collect the digital elements and the human interaction and experience? For video game preservation it is possible to think about the software and hardware material aspects of the video game, but what about the collective experiences of playing, sharing, and exchanging information and excitement be preserved and presented for future research (Dym et al., 2023)?

And how far should we go in storing and archiving social media exchanges and creations to give a fair and balanced representation of the present for future scholars to analyse? Since most social media exchanges occur within the confounds of private platforms, access can be easily restricted and the main interests of commercial actors take centre stage, providing an incomplete picture of the interactions (Hegarty, 2025), an issue that archival studies has been discussing both in terms of custody and use (Carbajal & Caswell, 2021). Again, like any other archives, the information accessed never truly represents the amount of information that exists out there, and in this particular case, the commercial interests of the platform dynamics substitute the curators that select and store the pieces that are considered relevant for an archive. How can we provide 'trusted repositories'(Wright, 2006), while also ensuring that the procedures by researchers maintain a sense of sustainability in terms of stability of the contents as well as energy demands? As mentioned by Ernst (2010), the archive is predicated upon the existence without change, whereas the digital material needs to change—for instance, by modifying the software that allows its reproduction—. But is it possible for the archive to remain stable, despite being in motion and mutable, to achieve the trust required?

From the environmental sustainability side, for instance, the difficulty in disentangling the specific carbon footprint of ICT to estimate current and predict future impacts demands more transparent and standardised reporting of energy consumptions (Garraghan & Hutchinson, 2025, p. 261). From a cultural perspective, archives need to be understood as spaces where differing voices are demanding to be incorporated and as "a politically powerful point of reference and has taken its place in the public agenda" (Cainari, 2021, p. 101). As presented by Carbajal and Caswell (2021) there are two paths ahead in digital archival practice

> The first path represents the continuation of the status quo of digital archival practice, leading to materially, ethically, and environmentally unsustainable projects that contribute to the ongoing maldistribution of cultural and financial resources. This is not the future we wish to see. Instead, given the seven considerations outlined previously and recent discourses on critical archival studies, we aim for a different path ahead—one that we call "critical digital archives". (p. 1119)

The two examples presented here show how individual and directed responses might help address and overcome some of the problems spotted in the process of archiving audiovisual products and engage with the aspects of concern to archival practice described by critical digital archives. Many more challenges remain to be tackled and require innovative approaches to problem solving, as well as a soul-searching and culturally nuanced debate about the limits of archiving and the sustainability of digital audiovisual products.

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