The Secret to Automating Multi-Party Asset Workflows

Abstract

Siloed archives are easy to build and inexpensive to maintain, but their commercial value and long-term viability are limited by their isolated nature. Very few end-to-end media workflows stay within a single domain. The vast majority involve multiple parties with data and process hand-offs at each interface point, some of which are automated, but far too many of which require some level of manual intervention. Increased automation and correspondingly decreased manual labor are the keys to long-term profitability, so manual touch-points must be eliminated where possible and relegated to exception handling where not. The key to all of this for media archives and the workflows they support is shared identification. There are many possible identifiers, each of which have their place, but the ideal solution for multi-party, commercial workflows is curated identification such as is provided by the Entertainment Identifier Registry (EIDR). Use of EIDR IDs by media archives and their partners enables process automation, cost reduction, and transaction speed improvements across such diverse applications as acquisition of off-air recordings, intellectual property rights management, search and discovery, and bulk digitization. Curated identification does not provide these services, but it does make them easier to implement, more economical to run, and more reliable to operate. To paraphrase the BASF slogan,[1] "Curated identification does not provide the services you need. Curated identification makes those services better."

The Case for Shared Identification

To paraphrase John Donne, "No media archive is an island entire of itself; every archive is a piece of the continent, a part of the main."[2] Siloed archives serve no purpose. To be useful and to have value, their contents must be accessed – they must be made available for commercial exploitation, public review, or critical study, depending on whether the archive serves the for-profit, non-profit, or academic communities. The media assets themselves are only part of a much more complex picture – one that includes technical metadata, descriptive metadata, key art, critical ratings, and promotional works from trailers to featurettes all produced by and obtained from a wide variety of agencies. These collected assets deliver maximum value to their holding organizations when they are linked together and made available to those who would consume them at the proper time and in the desired way.

If there was only one global archive, it held every asset that ever was or someday might be, every asset was accompanied by complete technical and descriptive metadata, and linked to all supporting assets such as key art and bonus features, then it could use whatever proprietary system it wished for the identification of its holdings and downstream communications in the supply chain. Trends in media consolidation notwithstanding, this is not likely to happen anytime soon, so alternatives must be found that minimize cost and maximize value while allowing organizations to cooperate in complex, interdependent workflows. Generally, this is done through automation. More particularly, this means reducing labor and eliminating manual touch

points throughout the supply chain. Any organization that fails to do so will ultimately suffer from Baumol's cost disease,[3] and no one wants that. This phenomenon was first identified in relation to the performing arts, but applies in any situation where the labor component of a good or service does not diminish over time. This leads to increased costs relative to more efficient alternatives, diminished profits, and reduced market share.

Traditionally, media workflows outside the scope of control of a particular digital asset management (DAM) system are powered by title matching. At each handoff between organizations – and for larger companies, at workflow handoffs within an organization – someone must match how a media asset was identified by one party to how it is identified by the other before the workflow can continue on to its next stage. In a commercial digital media workflow, this typically includes the B-to-B sales offer (or avails), order, commercial delivery, transcoding, creation of the customer offer, retail sales, retail delivery, and all of the supporting reporting and financial transactions behind the scenes. Generally, this is based on the respective titles by which the assets are known by each party or an explosion of point-to-point identifiers.[4] This process has the dual benefits of being both costly and error-prone. A Cognizant Technology Solutions case study that looked at the feature film distribution pipeline between Warner Bros. and Microsoft for the Xbox Live platform found that more than 1,100 labor hours could be saved each year with the introduction of shared asset identification, combining streamlined avails, order, and delivery; reduced QC efforts; and improved reporting and invoicing.[5] These savings are multiplied significantly via a network effect as more suppliers and more retailers use shared identification and as the process expands to encompass home entertainment and television productions, which dwarf feature film volumes.[6]

For media workflows to succeed, the participants must have either a shared identification or a way of accurately translating each other's identifiers. Title matching exists because audiovisual titles are not unique, are often abbreviated or extended to include other data, and vary over time in ways that confound automated analysis. If common identification cannot be achieved, no exchange of information – and therefore no commerce – is possible. As the kids today like to say, "*Wovon man nicht sprechen kann, darüber muss man schweigen.* (Whereof one cannot speak, thereof one must be silent.)",[7],[8] Since title matching cannot be automated effectively, and therefore represents an impediment to further automation and an invitation for Baumol's cost disease, an alternative to manual title matching must be found. The most effective and extensible alternative is globally unique, curated identification.
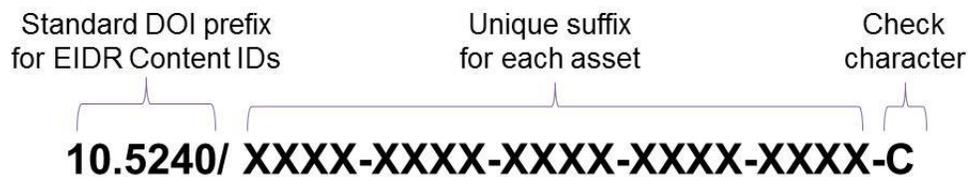

Identifiers and the Identified

Title matching is the most common form of metadata-based matching in media workflows. It is often augmented with additional data points such as release date, cast, synopsis, etc. Like the titles themselves, these data vary significantly by source and often over time and require fuzzy logic to achieve a positive match. People are very good at fuzzy logic matching, but they are also expensive, slow, and inconsistent. Metadata matching can be automated to a point, but manual review cannot be eliminated as long as workflows rely on metadata to link and identify assets. The ultimate goal, then, should be to match once in an asset's life and then link all future workflows with a shared identifier.

A useful identifier for multi-party media workflows has several key characteristics:

- **It is globally unique** – a particular identifier resolves to a particular thing. That thing could be a single asset or a collection of assets, but whatever it is, it the association between the identifier and the identified never changes.
- **It is permanent** – once assigned, the identifier never goes away. It is always available for use in reference to the identified asset.
- **It is not proprietary** – they may be issued by a controlling organization, but once issued, there is no restriction on their use. Anyone can use them at any time in any workflow.
- **It is large** – the ID space must have sufficient capacity to identify all the different assets that might conceivably appear over time.
- **It is resolvable** – there is a mechanism where the ID can be converted into a description of what it identifies (and ideally the reverse, where you can find the ID via its descriptive metadata). You cannot have a shared identification system without an open and accessible means of sharing the relationship between the identifier and the identified.

If an identifier fails in any one of these dimensions, then any workflows that depend upon it will eventually fail themselves. Implementing a shared identification system is not without cost, so the parties in a supply chain should take great care in the selection of their identification scheme to make sure that will continue to serve their needs far into the future.

EIDR IDs in Brief

Standard DOI prefix for EIDR Content IDs — Unique suffix for each asset — Check character

10.5240/ XXXX-XXXX-XXXX-XXXX-XXXX-C

EIDR IDs are part of the Digital Object Identifier (DOI) namespace. Each EIDR Content ID[9] begins with the prefix 10.5240/ which identifies the particular type of DOI ID and the organization that administers it. That is followed by a 20-character hexadecimal number, generally presented in 5 hyphen-separated groups of 4 digits for human convenience, and an alphanumeric check character. The EIDR number space has sufficient capacity to identify 1,208,925,819,614,630,000,000,000 unique audiovisual works, edits, and encodings, so it will remain viable for decades – if not centuries – to come.[10]

As with all DOIs, EIDR is a "dumb," or opaque, number. Unlike a cataloging system, no intelligence can be derived from the EIDR ID itself other than the fact that it is an EIDR ID.[11] The EIDR ID associated with a work in the abstract (a "title" ID) looks just like the ID for a specific encoding of a particular edit of that work. The only way to know for sure what the ID references is to resolve the ID. EIDR IDs are always "read-for-free," and public resolution services are offered by both DOI and EIDR.[12] In addition, EIDR members offer their own, internal EIDR resolution services integrated into their proprietary workflows.[13]

The EIDR Registry contains a number of different record types, including Movies, TV programs, Radio programs, Shorts, Series, Seasons, Episodes, Web programs, Clips, Compilations, Composites, Supplemental programs, and Manifestations. Most of these are arranged in a hierarchical inheritance tree for each audiovisual work. At the root of the tree (Level 1) is the abstract Title record, which encompasses the referenced work in all its forms. Beneath that are the Edit records (Level 2) that represent the different creative versions or cuts of the work. If one Edit is derived from another, the Edit relationship can be denoted by using child Edits (or Edits of Edits). Beneath the Edits are the Manifestation records (Level 3) that represent the different encodings or fixations of the Edits. Manifestations can get quite detailed, enumerating each video or audio track with all their technical details. Clips, denoting contiguous excerpts of an Edit (one might think of them as Level 2½), are registered as child records of an Edit and can have sub-Clips or Manifestations of their own.

In addition to the standard hierarchical inheritance tree structure, EIDR also supports a number of different non-hierarchical relationships, such as the isPromotionOf relationship that links a trailer to the work it promotes and the isSupplementalTo relationship that links a making-of featurette to its associated feature. EIDR also supports different grouping relationships. The Compilation is used to identify collections of independent works ranging from the oeuvre of an auteur director (a Compilation of Title records) to the contents of a Blu-ray disc or other distribution bundle (a Compilation of Edit records) while the Composite is used for a work that is made up of pieces of other works, combined to create something new, such as the traditional television clip show.[14]

The ability to modify an existing EIDR record is strictly controlled by individual access control lists (ACL) associated with each record, but there are no such restrictions on record creation. If a particular item or relationship is not already in the EIDR Registry, any EIDR member can create it.

EIDR IDs do not exist in a vacuum, so the EIDR Registry maintains a cross-reference service for other third party identifiers such as IMDb, Flixster/Rotten Tomatoes, ISAN, and house identifiers from a variety of motion picture and television studios. Not only can you resolve to an EIDR ID (and its associated metadata record) from one of these alternative identifiers, but you can also come in with one ID and go out with another. For example, one of EIDR's studio members uses the EIDR Registry to translate IMDb IDs (which they already have) into Flixster IDs so they can access the Rotten Tomatoes Tomatometer scores for critical and consumer review ratings.

Taken as a whole, the EIDR Registry can deliver IDs for any form of any type of audiovisual work. Once a particular object has been identified, all parties in the media ecosystem leverage that same ID for unambiguous identification and automation without further manual intervention.

To help ensure that EIDR IDs are uniquely associated to a particular asset, the EIDR Registry employs an automated fuzzy matching system to evaluate each new registration and every material edit to an existing record. The automated system returns one of four responses:
- The subject record is sufficiently similar to an existing record to be a duplicate, and the existing ID is returned.

- The subject record is sufficiently unique to warrant a new ID so one is issued.
- The automated system cannot make an absolute determination, so the transaction is referred for human review.[15] The record is then matched to an existing ID, issued a new ID, or rejected for non-compliance.
- The record is rejected because if fails to meet the data requirements of the EIDR Registry.

In the rare event that a duplicate ID is issued, the duplicate is deprecated and aliased to the surviving record. The aliased ID can still be resolved and now points to the single surviving record, so any workflows that use the ID will continue to function correctly, but all future reference in the Registry to that asset will be made using the survivor ID.[16]

Use Cases for Globally Unique, Curated Identification[17]

Acquisition of Off-Air Recordings

Commercial catch-up TV and VOD services and most television and radio archives record off-air television and radio recordings and add them to their holdings as viewable assets or reference material. This represents a high volume of content, both in terms of total hours of programming and in individual catalog items, so every economy of scale must be applied to make this acquisition activity practical. The initial capture can be performed using automatable, scalable, and mature off-air capture platforms, such as Cambridge Imaging Systems' Orbital,[18] but the captured descriptive metadata tends to be both low density and low quality. Properly identifying and cataloguing the items requires using the captured data as imperfect keys into more complete data sources. Matching with sparse almost always requires human intervention, and is not scalable.

Embedding unique identifiers for program content and the channels through which they are presented (such as EIDR Content and Video Service[19] IDs) gets around this problem. A reliable unique ID extracted from the broadcast stream allows linking of EPG data to multiple applications, including recommendations and second screen; allows automated creation of broadcast logs; and provides access to third party metadata sources for both commercial and archival purposes. Just using a unique identifier allows multiple systems both within and external to the broadcaster to connect more efficiently; using a unique identifier, such as EIDR, that supports links to other system connects the archive to a wide range of external data sources and applications.

This process also adds value to the recordings themselves, making them more available to the original broadcaster or other licensees for reuse and resale across the broadcast sector – search and discovery are simpler and more reliable with a unique ID that provides reliable basic metadata,

Intellectual Property Rights Management

ID registries do not store intellectual property rights information or make assertions regarding rights or ownership. Their sole focus is accurate identification, with support for discovery and de-duplication as necessary companions to achieve that aim. Any system in which rights holders can assert their rights in different works and then provide a mechanism where those rights assertions can be aligned with materials held by third parties must first begin with reliable

identification, de-duplication, and discovery. Rights certainly depend on factors external to the work itself, e.g. media or distribution channel, territory, and dates, but also on the particular version of a work, covering different music, voice talent for dubbing, edits that add or remove footage controlled by third parties, and so on. A curated ID registry covers all of these internal aspects, allowing the external legal and commercial rights to be connected to exactly the right version of the work.

The Copyright Hub is a UK-based initiative to create the technological infrastructure to support just such a rights tracking system.[20] Identification via curated IDs is critical to the pilots currently under development, since this will allow the creation of the machine workflows necessary for the process to scale. The assurances of curated identification build confidence in the process and facilitate negotiation of the delicate rights relationships. The Rights Data Interchange Project is a similar EU-based effort.[21]

Similar rights management challenges exist with orphan works and the diligent search initiatives that are being developed to allow interested parties to legally and safely exploit them, including OHIM and FORWARD in Europe[22],[23] and OWLS in the UK.[24] Such schemes encourage the use of permanent, external, unique identifiers. The effort necessary on the part of an organization to achieve diligent search certification can be amortized across multiple services if the entries in the orphan works databases are identified by a globally unique ID. The machine automation facilitated by proper identification would also make it easier for the orphan work services to correlate their data with third parties, such as retransmission rights collectives, to better identify the owners of assumed orphan works (and to more certainly assert that particular works are, in fact, orphans).

As another example, different versions of films can have different sets of rights, especially for music. Using EIDR, each rights-specific version can have its own ID, simplifying reporting and clearance.

Search and Discovery

According to UNESCO, "Archives exist for the preservation and continuation of the cultural heritage … [their collected assets] require saving, gathering, preserving and/or conserving and they also need to be accessible to encourage the spread of knowledge." Accessibility is a primary function of archives, but not every archive can meet every need. A unified mechanism for search and discovery across audiovisual archives allows individual archives to act as nodes in a larger archive network, providing transparent client access to the aggregate catalog and allowing the gaps in one archive's coverage to be filled by another. Typically, this would be a work that is not held locally. In other cases, an archive may have a copy of a work, but not a copy of the particular version or in the particular format that the client needs.

The metadata archives hold can be as valuable as the assets themselves. For example, commercial broadcast archives often only have minimal metadata for older content, even if they have the content itself. Using a shared curated ID, commercial archives and national archives can cooperate on curatorial projects, such as improving an archive's metadata based on broadcast records, and commercial projects, such as getting improved metadata to support monetization of content that is currently out of circulation.

The multiplied value of the network effect comes into play here, but only if archives integrate curated content IDs into their technical infrastructure. They could then more easily provide their clients with the ability to discover, curate, transfer, loan, and provide access to digital content. Such a system could also be extended to search and discovery for physical assets, though transfers and loans would still require old-fashioned 20th century transport technologies.

Broadcast Preemption and Audience Measurement[25]

Traditional broadcast programming is only occasionally pre-empted by another program – and then generally only in the case of important breaking news. Pre-emption and cancellation are a regular occurrence in live events broadcasting. Live events can also run long – and occasionally short – leading broadcasters to either switch to their next program early (leaving the audience for the next program to "join in progress") or to air alternative programming to fill the time slot. (Live post event analysis programs are particularly handy since their durations can be adjusted to re-align the broadcast schedule.)

There is another broadcast preemption issue, unique to sports broadcasting, that confounds program schedules, and that is the mid-game switch, or what ESPN calls a "whip-around." In this case, a scheduled game is not as exciting as anticipated, so, to avoid losing current viewers, the broadcaster switches to a more interesting game.

Content identifiers identify the program, not the events being depicted. If for some odd reason, *NFL Monday Night Football* presented celebrity curling with play-by-play by Chris Berman instead of football, the program would still be *Monday Night Football*. In the case of a program pre-emption or whip-around, there are two separate programs, where one replaces the other within the first program's scheduled time slot.

All of this causes consumer confusion, since program guide information published in advance will not match the programs actually being presented on air, and audience measurement issues, since ratings are generally reported according to the scheduled programs. (This is not an issue for music rights, retransmission royalties, and other financial reconciliations, since those take place far enough after the airing that certified broadcast logs can clear up any confusion.)

The ultimate technological solution is to embed suitable content and channel identifiers in the broadcast stream, so guide providers, audience measurement firms, and others will know exactly which program is being aired on which channel at which time, and can adjust for any deviations from the published schedules.[26]

Local pre-emptions and blackouts are a slightly different matter, since they are generally established in advance, though the lead-time may still be quite short, since it is generally dependent on the rate of ticket sales for the depicted event. They mostly apply to sports broadcasting, but may also affect concerts or other live events for which attendees pay an admission fee. In the US, the FCC's non-duplication rule can also come into play, where a local broadcaster has exclusive rights to a program also carried by a distant station being presented in the local area on a cable or satellite system.[27] In any case, these blackouts (and the programming content that replaces them) are addressed using a combination of Video Service and Content IDs, as noted earlier.

Bulk Digitization

Many organizations are moving to file-based digital encodings of their library holdings currently stored on analog and digital tape and photographic film. This offers many advantages, including avoiding wear on physical assets and the ability to deliver content to more people in more places and more ways than ever possible with physical assets and analog media. Before these advantages can be realized, the assets must be digitized. This poses its own challenges when an archive is digitizing its own holdings, but there is an extra layer of manual effort and opportunity for error when third parties are involved.

For example, for the British Film Institute's Unlocking Film Heritage project, the BFI is digitizing 5,000 films from its own collection and acquiring digital versions for an additional 5,000 films from partner archives and commercial rights holders across the UK. For the acquired assets, the supplying partner must find the title in the BFI catalog, correctly associate it with the asset they are digitizing, and deliver the final digital copy along with any metadata enhancements to the BFI for ingest into the BFI's digital catalog. This involves multiple manual touch points, each of which adds to the partner's cost and increases the systemic chance for error. Taking an actual case, there are six moving image adaptations of the play *Hindle Wakes* in the BFI catalog, each with essentially the same description, since they are all based on the same underlying material. During the selection workflow, one of the versions was matched to the wrong BFI catalog entry for both the digital asset and the incoming descriptive metadata, requiring significant time to correct the error. Because of the potential for this sort of mismatch, the BFI must perform manual quality checks on each incoming asset to make sure it has been identified and ingested correctly, increasing the BFI's internal costs for every asset acquired in addition to the cost of correcting any errors that are uncovered.

If the programs and their associated metadata were identified with EIDR IDs, most of the manual touch-points could be removed from this process, making it faster, more accurate, and less costly for all parties involved.

In addition, there are cases where the BFI does not have a record for the incoming work. The current process calls for the supplying partner to provide descriptive metadata using a template. The BFI then manually extracts the necessary descriptive metadata to create their catalog record. If the work came in with an EIDR ID, the BFI could take advantage of the alternate IDs associated with many of the EIDR records to automate the acquisition of descriptive metadata from third parties such as IMDb but also including Netflix, Flixster/Rotten Tomatoes, and Internet Video Archive. Internal IDs unique to a work's producer or distributors stored as EIDR alternate identifiers, such as those from 20th Century Fox, ITV, Sony Pictures, or Warner Bros., can be used to obtain descriptive metadata directly from the work's creator.

Summary

The most powerful digital asset management system, sitting at the heart of the most encompassing archive will always be limited by the ability of third parties to discover and exploit what the archive holds. In the media ecosystem, the perennial limiting factor to automation, with its concomitant reductions in time-to-market and transactional costs, are the manual touch-points necessary to identify and link assets described in different ways by the

various systems and players in multi-party workflows. Time-honored methods of manual and semi-automated title matching will eventually price suppliers out of the market. The ideal solution is to match once and then share a common, globally unique identifier throughout the media ecosystem, removing ambiguity from the process and eliminating the need for manual title matching. This is exactly the service provided by curated identifiers such as DOI (Digital Object Identifier) and the EIDR (Entertainment Identifier Registry) system. EIDR IDs can be used by all parties in the global media supply chain to uniquely and permanently identify all of their different media assets in all their derived versions and representations, leading to real and measurable advantages to the participating organizations whether for-profit or non-profit.

Endnotes

[1] Deutsch, Claudio H. "A Campaign for BASF," *The New York Times*, October 26, 2004. Accessed December 9, 2015. http://www.nytimes.com/2004/10/26/business/media/a-campaign-for-basf.html.

[2] Donne, John. "17th devotion, Meditation XVII." Devotions Upon Emergent Occasions, and several steps in my Sicknes, 1624. The Works of John Donne. Ed. Henry Alford, ed. London: John W. Parker, 1839. 574-5.

[3] Baumol, William; William Bowen. Performing Arts, The Economic Dilemma: a study of problems common to theater, opera, music, and dance. New York: Twentieth Century Fund, 1966.

[4] Point-to-point identifiers expand geometrically with the number of parties involved in the exchange, leading to diseconomies of scale as media ecosystems grow.

[5] Cognizant Technology Solutions, "Warner Bros. & Microsoft: EIDR Integration Pilot." January 2013. Entertainment Identifier Registry Association.

[6] The collective value of a network follows the pattern established by Metcalf's Law, with the network's value increasing at a greater rate than the simple sum of its individual members, somewhere between $n \log(n)$ and n^2. (See: Briscoe, Bob, Andrew Odlyzko, and Benjamin Tilly, "Metcalfe's Law is Wrong," Accessed November 9, 2014. http://spectrum.ieee.org/computing/networks/metcalfes-law-is-wrong.)

[7] Wittgenstein, Ludwig. Tractatus Logico-Philosophicus. New York: Harcourt, Brace & Company, Inc., 1922. Proposition 7.

[8] Drewry, Raymond, et al. "Content Identification for Audiovisual Archives," International Association of Sound and Audiovisual Archives Journal. No. 45, October 2015.

[9] The EIDR organization manages several different DOI prefixes. The most prominent is the Content ID, which is used to identify audiovisual assets. EIDR also provides Party IDs (to identify production companies, distribution companies, broadcasters, etc.), User IDs (children of a Party ID and users of the EIDR Registry system), and Video Service IDs (to identify media distribution channels – from traditional linear broadcast channels to non-linear VOD delivery services). When it is not otherwise qualified, it is assumed that "EIDR ID" and simply "EIDR" refer to an EIDR Content ID.

[10] With 1 Septillion, 208 Sextillion, 925 Quintillion, 819 Quadrillion, 614 Trillion, 630 Billion different values, that works out to roughly 160,000 EIDR IDs for every grain of sand in the world, were EIDR a sand identification system.

[11] As determined by the 10.5240 prefix.

[12] Free public resolution services are offered at https://dx.doi.org/ and https://ui.eidr.org/, respectively or via the URLs https://ui.eidr.org/view/content?id=[EIDR-ID] and https://doi.org/[EIDR-ID].

[13] EIDR Members span the media and entertainment ecosystem including producers, distributors, broadcasters, post-houses, archives, and data aggregators in the Americas, Europe, and Asia. (See: Entertainment Identifier Registry Association. "Members." Accessed November 16, 2014. http://eidr.org/membership.)

[14] Kroon, ref 9. above.

[15] This manual labor expense is paid once and then amortized across all future uses of the assigned EIDR ID.

[16] Occasionally an EIDR record is deleted (usually because a test record was inadvertently registered in production). In keeping with the DOI requirement that all IDs be permanently resolvable, the ID itself is not deleted. Instead, it is aliased to the EIDR Tombstone record that acts as a resolution placeholder for deleted IDs. Since the deleted record did not reference a legitimate media asset, it should not appear in any production workflows. If it does, it will still resolve correctly – in this case returning the Tombstone record.

[17] Kroon, ref 7. above.

[18] Cambridge Imaging Systems, "Orbital Enterprise Video Recording." Accessed September 24, 2015. http://www.cambridgeimaging.com/orbital_enterprise_video_recording.

[19] In addition to unique identifiers for audiovisual content, the EIDR organization also maintains a registry of unique identifiers for video delivery channels, including traditional linear channels (terrestrial broadcast, satellite, and cable television), non-linear services (such as VOD, catch-up TV, etc.), and newer Internet-based delivery channels.

[20] Copyright Hub, "Welcome to the Copyright Hub." Accessed September 24, 2015. http://www.copyrighthub.co.uk.

[21] Europe Analytica. "RDI: Rights Data Integration." Accessed December 8, 2015. http://www.rdi-project.org,

[22] EU Observatory, "Orphan Works Database." Accessed September 24, 2015. https://oami.europa.eu/ohimportal/en/web/observatory/orphan-works-database.

[23] Forward, "Framework for a EU-wide Audiovisual Orphan Works Registry." Accessed September 24, 2014. http://project-forward.eu.

[24] Intellectual Property Office (IPO) and Department for Business, Innovation & Skills, "Copyright: UK orphan works licensing scheme." Last modified July 4, 2014. https://www.gov.uk/government/consultations/copyright-uk-orphan-works-licensing-scheme.

[25] Kroon, ref 9. above.

[26] Coalition for Innovative Media Measurement, "TAXI – Trackable Asset Cross-Platform Identification," cimm-us.org/initiatives-2/taxi. Accessed January 24, 2015.

[27] Kroon, Richard W. "program non-duplication," A/V A to Z. Jefferson, NC: McFarland & Company, Inc., 2010, pp. 528-529.