I’ll show you mine,
if you show me yours:
A vision for the future of film archive search

Stephen McConnachie
Head of Data, Collections & Information, BFI
Presentation Abstract

A horizon-scanning exercise, describing an ambitious vision for a scalable, dynamic film archive collections information architecture which would enable the community to:

• search across all peer collections, to interrogate holdings based on shared data models and API architecture, linked open data frameworks and shared unique identifiers
• surface a dynamically aggregated collections search and display offer to public users, based on the architecture outlined above
• automate comparison of holdings for specific films, directors, actors, production companies and genres across multiple archives, using Linked Open Data principles and unique identifiers

There are three major developments in the film archive domain, which make possible a radical transformation of collections information sharing and access:

1. Shared film metadata model: EN 15907, with the conceptual framework it embodies, makes it possible to understand our databases in like for like terms, for the first time
2. Collections Management Systems with open APIs: the growth of systems featuring API technologies enables new models of information exchange and querying
3. Unique identifiers for moving image works: the exponential growth of EIDR registrations, and their alternate ID cross-references, enables film collection systems to share information about the same film with confidence, and without labour

Together, these make possible a scalable aggregation of holdings metadata across all film archives, with no requirement for a central data store, or manual aggregation. Instead we can imagine applications which call APIs dynamically, to retrieve holdings using the unique ID as the key and the shared data model as the map.
Some warnings about this presentation...

| Personal   | • This is a vision, not the vision  
|            | • Archives may prefer to not expose their collections |
| Speculative| • This is not an explicit BFI ambition  
|            | • This is not a project plan |
| Theoretical| • This posits an ideal future, without reference to budgets or politics |
| Biased     | • This is the vision of a Head of Data, not a Curator, Conservationist, Collections Manager or Lawyer |
A vision for the future of film archive search

Make the machines:

- search all film archive collections and
- understand the results
- without requiring human work

(type select export worry explain)

Make this infrastructure:

- scalable
- affordable
- decentralised
- automatic
How is this different from European Film Gateway?

**E.F.G.**
- Centralised database / portal
- Actively / manually created by collection owners
- Iterative updates
- Selected / curated

**This**
- Decentralised
- Automatically created by systems
- Dynamic updates
- Self-selecting / un-curated
How is this different from European Film Gateway?

1. Centralised versus decentralised: EFG offers a centralised portal, with collection owners adding records to the central store, but this is a model for aggregating in a decentralised form, local systems joining up.

2. Active / manual versus passive / automatic: EFG is created by collection owners consciously and actively uploading metadata and content, but this is works in the background, automatically created on the fly by systems.

3. Iterative updates versus dynamic updates: EFG updates in iterations when contributors undertake their work, but this updates dynamically as archives create data in their systems.

4. Selected / curated versus self-selecting / un-curated: EFG offers a selection of digital collections, but this is all collections, analogue and digital, not a selection. As a result it is a warts-and-all, no human intervention model...

So how does it work?
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The building blocks

1. Shared data model: EN 15907

   - Work
   - Manifestation Item
   - Comparing like with like
   - Inherited properties

www.filmstandards.org

Film identification - Enhancing interoperability of metadata - Element sets and structures

EN 15907 defines a metadata set for the comprehensive description of cinematographic works including the various incarnations it can assume during its lifecycle
What is EN 15907?

Full Title: Film identification - Enhancing interoperability of metadata - Element sets and structures

EN 15907 defines a metadata set for the comprehensive description of cinematographic works including the various incarnations it can assume during its lifecycle.

EN 15907 is an event-based model, and one of its major benefits is enabling clear, accurate description of where your collection objects sit in the lifecycle of the work: cinema releases, censorship activities, restorations, reissues, etc.

For more information, see filmstandards.org.
How does EN 15907 enable archive search?

It describes a hierarchical model, Work - Manifestation - Item, with an optional Variant: each level contains a defined set of data, describing abstract properties, contextual properties, and concrete properties, with inheritance.

How does that help, when machines speak to machines about film collections?

It means they compare like with like, with clearly defined expectations and parameters. The search machines expect to find Director, Production Company and Copyright Holder in a Work record, and the dates they find there relate to production and copyright events. They expect to find release date or restoration date in a Manifestation; and instead of Director, they expect to find such agents as Distributor, Restoration Producer, and Censorship Authority. In the Item they expect to find acquisition and accession dates, print dates or file creation and checksum dates for digital Items, and agents including Acquisition Source, Conservationist, etc.

...
How does EN 15907 enable archive search?

... It means they can rely on inherited properties, not duplicated properties across all object records.

This builds storage and search index efficiency when scaled across millions of records. Filmographic properties from the Work (e.g., Director, Synopsis, etc.) are inherited by the Manifestations and Items, contextual properties from the Manifestation (e.g., type of lifecycle event such as restoration, cinema release, etc.) are inherited by the Items.

This is efficient and clear, for machines and humans.
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The building blocks

EN 15907: a shared data model for describing moving image works and collections

**Work abstract entity**
- Titles
- Dates (copyright / production)
- Categories (fiction / non-fiction)
- Part - Whole conditions (serial / standalone / component part)
- Content: Synopsis, Genre, Subject
- Agents: Cast, Credits, Rights holders

**Manifestation realisation, release, exhibition or distribution entity**
- Titles
- Dates: release, transmission, distribution, creation
- Type: pre-release, theatrical, non-theatrical, transmission, home-viewing, internet, restoration, not-for-release, etc
- Format general: 35mm film, Digital Cinema, Blu-ray, etc
- Agents: Creator, Broadcaster, Distributor, Publisher
- Rights context: platforms, territories, dates

**Item physical or digital object**
- Titles
- Dates: creation, acquisition, accession, de-accession, loan, transport
- Acquisition: source, method, funding context, conditions of access
- Format specific: 16mm BW Pos, 35mm Lavender Separation, ProRes422 HQ, etc
- Condition report: pristine, not for projection, heavy scratches, etc
- Storage location: home location, current location
- Conservation recommendations: urgent transfer required, relocate to sub-zero, etc

**Work abstract entity**
- Titles
- Dates (copyright / production)
- Categories (fiction / non-fiction)
- Part - Whole conditions (serial / standalone / component part)
- Content: Synopsis, Genre, Subject
- Agents: Cast, Credits, Rights holders

**Variant abstract entity (optional)**
- Titles
- Dates (copyright / production)
- Categories (fiction / non-fiction)
- Part - Whole conditions (serial / standalone / component part)
- Content: Synopsis, Genre, Subject
- Agents: Cast, Credits, Rights holders

**Manifestation realisation, release, exhibition or distribution entity**
- Titles
- Dates: release, transmission, distribution, creation
- Type: pre-release, theatrical, non-theatrical, transmission, home-viewing, internet, restoration, not-for-release, etc
- Format general: 35mm film, Digital Cinema, Blu-ray, etc
- Agents: Creator, Broadcaster, Distributor, Publisher
- Rights context: platforms, territories, dates

**Item physical or digital object**
- Titles
- Dates: creation, acquisition, accession, de-accession, loan, transport
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The search machines can look in the same place for the same type of data: it is predictable and structured, therefore you can build rules and logic to automate search, retrieval and display. It is based on a concept (events in the lifecycle of a work), but it enables very granular, controlled logic for applications.

This shows the hierarchical relationships in 15907 expressed as separate but linked records: and this shows a three level model or a four level model, including the optional Variant.

The EN 15907 data model is probably best achieved as a set of discrete, linked records, each level enforcing its own fields and value lists, and allowed relationships. But the data model is really a conceptual model, and it can be comfortably achieved in a single level, flat database architecture.
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The building blocks

EN 15907: a shared data model for describing moving image works and collections

- Titles
- Dates: copyright, production, release, object creation, object acquisition / accession, de-accession, loan, transport
- Categories: fiction / non-fiction
- Part - Whole conditions: serial / standalone / component part
- Content: Synopsis, Genre, Subject
- Agents: Cast, Credits, Rights holders
- Dates: release, transmission, distribution, creation
- Type: pre-release, theatrical, non-theatrical, transmission, home-viewing, internet, restoration, not-for-release, etc
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Work

Manifestation

Item

properties expressed in one record, with abstract, contextual and object data stored on a single hierarchy level
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The building blocks

The previous diagram shows how many moving image archives store their collection records: the abstract or filmographic units of information combined with the contextual and the object description units of information, in a flat database model.

One of the many drawbacks of this approach is the duplication of filmographic data across all object records (i.e., if you want to know the Director or the Synopsis, you have to store it in every record). This creates inefficiency in data storage and retrieval.

Another drawback is that it is more difficult to achieve a clear display of context: which objects of many are related to the same restoration, or the same cinema release, or the same censorship event. That may be captured in a text field, but it’s not displayed structurally: the Items are not grouped together.
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The building blocks

1. Shared data model: EN 15907
   - Work Manifestation Item
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2. Systems with open APIs
   - Machines speaking to machines
   - Exposing datasets over internet
   - Embedding data model EN 15907
A vision for the future of film archive search
The building blocks

What is an API?

An API is a technology that lets systems interact with other systems, datasets, digital files, social media, networks, websites, fridge freezers, air conditioning systems, smart TVs, toothbrushes...

**Per Wikipedia:** In computer programming, an application programming interface (API) is a set of routines, protocols, and tools for building software applications... An API can assist otherwise distinct applications with sharing data, which can help to integrate and enhance the functionalities of the applications. APIs often come in the form of a library that includes specifications for routines, data structures, object classes, and variables. In other cases, notably SOAP and REST services, an API is simply a specification of remote calls exposed to the API consumers. Source: en.wikipedia.org/wiki/Application_programming_interface
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The building blocks

A Generic API Example

- Search application
  - display output
  - query over network (e.g., Internet, http)
- API
  - convert to output
  - translate to database
- Database
  - process query
  - deliver result
  - deliver output
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A Specific API Example

Adlib API response to the query:
database = works & search = title = ‘red shoes’ and credit name = ‘powell, michael’

The BFI uses Adlib, supplied by Axiell. It has a very easy to use, documented API (api.adlibsoft.com), and you can ask it questions from a Web browser, API client, Excel document, Web site, etc.; and it will give you back the results as raw XML or JSON, or formatted as you like, using HTML, CSS, JavaScript, etc.

The following slide shows the Adlib API response to the above query when submitted to the BFI’s Collections Information Database system.
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The API’s Response (in raw XML)
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The API’s Response (reformatted)
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The API’s Response (on a Web page)

*Note that there are two Red Shoes by Michael Powell in 1948.
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An API – like the Adlib API, which is in use by more than 6 film archives in Europe and USA – plays these key roles:
1. It exposes film archive collections data to querying over the internet (HTTP), without risking any database violation (it is a translator and firewall between the outside world and the database back end)
2. It exposes those datasets to a structured and documented set of search operations (command library) which can embed EN 15907’s principles without having to change the database structure (the API is a translator)
3. It delivers back to the search application machine processable information in XML or JSON, and it can transform that using technologies like XSLT to any form that the display requires

The API doesn’t care what the search application is: it can be a website, an iPad app, an Excel spreadsheet, Access database, Word document, etc. As long as the application has Internet access it can ask the API a question, receive the response, and do what it likes with the response: display it in a Web browser, store it in a file, email it, tweet it, or post it to Facebook.
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The building blocks

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3. Unique IDs: EIDR
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The building blocks

A key identifier in this domain is EIDR, a global ISO 26324:2012 standard ID Registry for the media and entertainment industry. EIDR IDs are to audiovisual assets (movie, TV, radio, and Web) as ISBNs are to books and UPCs/EANs are to consumer products. The use of globally-unique, curated audiovisual asset identifiers is reaching critical mass now, with all the major film, TV and Internet companies using them to achieve economies of scale in digital moving image ecosystems such as video-on-demand, e-commerce, etc.

EIDR: Entertainment Identifier Registry Association – eidr.org
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How do globally-unique identifiers (e.g., EIDR) promote this vision for the future of film archive search?

Remember the Red Shoes? (Our API search returned two results when we searched for Red Shoes by Michael Powell in 1948.)

Even when you know director, title, and date, the results of film searches can be unexpected: two works titled *Red Shoes*, with Powell as director, dated 1948 (one being the full film, the other being the ballet scenes only).

Titles, dates, and names are not enough to let machines properly speak to each other about film works – although they are a good place to start. For the machines to speak quickly to each other, with confidence about the answers, they need globally unique identifiers.
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The building blocks
De-duplication and uniqueness
De-duplication and uniqueness

The previous example from the BFI’s Adlib system shows the Film Work record where we have a field for an EIDR identifier (10.5240/7A8F-736F-2022-236F-C77E-Q).

*The EIDR record for *The Red Shoes* also contains more than 35 other identifiers, allowing ID cross-reference and direct connections to other organizations including Amazon, Česko-Slovenská filmová databáze, Cinémathèque Québécoise, ISAN, ITV, Netflix, Swedish Film Institute, Sony Pictures, and Warner Bros., many of which provide work-specific Web pages hyperlinked from the EIDR Registry.
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The building blocks

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3. Unique IDs: EIDR
   - Unambiguous identification of works
   - Machine processable identifiers
   - Automation of comparison
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Globally-unique, curated identifiers offer:

1. **Unambiguous identification of works**: no room for confusion because of matching titles, dates, names. The deduplication and uniqueness has been achieved in the EIDR Registry.

2. **Machine processable identifiers**: machines can use the globally unique identifier to establish very quickly and without any debate, that this thing in domain 1 (e.g., the BFI) is the same as that thing in domains 2 to 50 (e.g., all other film archive databases).

3. **Automation of comparison**: the unique identifier allows applications to query APIs and establish very quickly and easily what is held by the organisation for this work. EN 15907 is the conceptual model for that comparison, but the unique ID is the fuel which makes it run quickly and without anomalous results.

So, how might it look, in practical application?

Imagine the search for the Red Shoes if it was able to interrogate every film archive database API in the world, on the fly, silently, in seconds, using the unique identifier; understand the results based on EN 15907, and display that to the film archivist, the researcher, the rightsholder, to Martin Scorsese...
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The building blocks
Deduplication and uniqueness
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The BFI Collections Search result for The Red Shoes. But in addition to symbols indicating the types of content held by the BFI for the Red Shoes, imagine you could see which FIAF member archives in the world held related materials.
Imagine you could then filter by pre-print material, 35mm prints, DCP, DCDM, DPX; by original theatrical release, 1980 reissue; by condition of the elements, by access cost.

Imagine you could navigate directly to an email to the responsible curator or collections access department. Or imagine you could view a proxy online, directly, as archives digitise their collections and store in MAM systems.

Imagine you could undertake the same search not just by work, but by director, art director, scriptwriter; or by subject, genre, country, decade of production, date of printing.

Imagine the results you obtain are organised by work, manifestation, item, guaranteed accurate by unique identifiers, displayed in seconds.
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Make the machines:
search all film archive collections and
understand the results
without requiring human work
(type select export worry explain)

Make this infrastructure:
scalable
affordable
decentralised
automatic
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Let the human beings:
find all versions of all films in all collections
understand the results
proceed with projects

Let the organisations:
drive down access costs, create revenue
justify and defend their collecting activities
improve their collections
keep collecting!
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The outcome would be to unlock the world’s moving image heritage, making our collections transparent to our peers at the click of a mouse, driving down the real terms costs of access and reuse of the collections.
I’ll show you mine, if you show me yours: A vision for the future of film archive search

Stephen McConnachie,
Head of Data
Collections & Information, BFI

stephen.mcconnachie@bfi.org.uk
@mcnatch