

**AUDIOVISUAL and CHILL:**

An Evaluation of Video Digital Libraries  
and Catalogues

by

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## **Abstract**

### Research Problem

This research investigates how well video digital libraries and catalogues used in academic libraries meet user expectations. This is in the context of increasing use and demand for online audiovisual content by the wider community, as well as growing use of audiovisual materials for teaching, learning, and research at academic institutions. It also aims to give an understanding of how well libraries are meeting the challenges of delivering audiovisual materials to users in an on-demand world.

### Methodology

Twelve platforms—developed between 1996 and 2015—are evaluated against 23 user-centred criteria, divided into four core areas: retrieval functionality, user interface, collection qualities, and user support.

### Results

The study found that not one of the platforms evaluated met all the evaluation criteria, and identified three key areas in the usability of the video digital libraries and catalogues: search and retrieval, technology, and structure, scope, and strategy.

### Implications

From this we gain an understanding of performance and usability of video digital libraries and catalogues currently in use by academic libraries. We also learn about the difficulties those working with audiovisual materials are facing, and also of the solutions that are being proposed. Findings of this study could help influence decision making, development of future platforms, and influence policies for delivering audiovisual materials to users.

## **Subjects**

1. Digital libraries – 2. Video digital libraries – 3. User-centred evaluation – 4. Audiovisual materials – 5. Academic libraries – 6. Library media collections – 7. Usability.

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## 1. Introduction

This research investigates how well video digital libraries and catalogues used in academic libraries meet user expectations. Twelve platforms—developed between 1996 and 2015—are evaluated against 23 user-centred<sup>1</sup> criteria, divided into four core areas: retrieval functionality, user interface, collection qualities, and user support. Analysis is undertaken in the context of increasing use and demand for online audiovisual content by the wider community, as well as growing use of audiovisual materials for teaching, learning, and research at academic institutions. The analysis presented in this study aims to give an understanding of how well libraries are meeting the challenges of delivering audiovisual materials to users in an on-demand world.

This study covers key issues from the literature relevant to audiovisual materials, with a focus on academic libraries. This includes a background to purpose and use of audiovisual materials, as well as an overview of historic and contemporary issues effecting their description and access. It looks at problems with, and progress being made on OPACs, next-generation discovery layers, and digital libraries. Additionally, it reviews progress being made in other fields, particularly computer science, where there is a wealth of research looking at automated processing of audiovisual objects using various content-based information retrieval techniques. Finally, an overview of digital library evaluation and design from a user-centred perspective frames the following study.

From this we gain an understanding of the difficulties those working with audiovisual materials are facing, and also of the solutions that are being proposed. Findings of this study could help influence decision making, development of future platforms, and influence policies for delivering audiovisual materials to users.

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<sup>1</sup> The Americanised spelling of *user-centered* is most often used in the literature, however the British *user-centred* will be used in this document except in quotation, where the original is preserved.

## 2. Context

We live in a society surrounded by images. Still, moving, projected, mobile. If they aren't being pitched at us, we are presenting them to ourselves—and at an ever increasing rate. They are readily available; increasing in quantity (and decreasing in quality?) Images are in, text is out.

Or so it would seem.

Technology—in particular the Internet—has been pivotal in redefining the image in the 21st century, and this is especially true for moving images. The launch of YouTube in 2005 was a milestone for the delivery of video direct to users, and from a user to the world. Similarly the proliferation of on-demand video streaming platforms and file sharing services that quickly followed set standards and expectations that others couldn't compete with; the video store is perhaps the most recognisable casualty of the revolution. The impact of this is that users now have virtually unlimited, 24/7, on-demand access to video at little, or no cost.

In 2015, New Zealand experienced a boom in the use of on-demand streaming video services. In less than two years, Lightbox, Neon, and Netflix services launched in New Zealand<sup>2</sup> further supplementing the epic levels of content already available on the Internet. Over half of New Zealand's population now watches online video content each week (Nielsen, 2015): doing so is so mainstream that the country experiences a noticeable drop in available bandwidth come 6:00pm each evening (Keall, 2016; Pullar-Strecker, 2015).

Libraries too have been part of the changing technological landscape, but have left less of an impression. It is true that libraries have significant digital history compared to the upstarts of the 2000s, though they weren't the only ones to find themselves in that position. Following decades of investment in standardisation and cataloguing, and being technologically progressive, libraries were suddenly on the back foot as others leaped into the Internet age. The result of this is that libraries are now *on* the Internet, but not *of* it. Anyone can quickly

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<sup>2</sup> Lightbox, August 2014 (Spark New Zealand, 2014); Neon, December 2014 (Sky Network Television, 2014); and Netflix, March 2015 (Netflix, 2015).



search for and purchase a book online, though searching for a book will never tell you whether it is available to borrow from a local library. Just one sad example of this digital disconnection.

It is also true that libraries have had other issues to deal with, and for part of it been dependent on vendors and publishers to navigate some of these changes. Combine this with inflexible copyright legislation, prohibitive distribution rights, and funding challenges, and it is hard not to be a little forgiving. Even then, libraries have to share some of the blame for the slow entry in to the new millennium. Academic libraries in particular play a key role advancing teaching, learning, and research in the institutions they support. They may now find themselves in an uneasy position, drawn between upholding their traditional values, and having to respond to the fast, consumer focused world their users now function in.

The technological progress made in delivering films, television, news, and documentaries to users is marked. Vast libraries of content are delivered to users as modern, highly crafted experiences, and the combination of these two elements has fostered high user expectations. Users of these services are the same users who are engaging with academic libraries and their collections—including moving images. Where in the past the library media collection represented a unique service for users, libraries are now competing with functional, accessible, sexy online alternatives. For these users, the library is simply another ‘thing’ on the Internet.

With large collections of mainstream and unique materials, libraries need to act upon these signals to innovate; respond to research and user expectations, and present users with modern useful services to deliver their own collections. In many respects, academic libraries are in a unique position but are being held back by a substantial legacy. The goal should now be to match the technology that users can expect elsewhere on the Internet, and then add to it the best of the library so they become of the Internet, and not on it.

### **3. Research Objectives**

The primary objective of this study is to evaluate how responsive video digital libraries and catalogues are to the needs of users.

#### **3.1. Primary Question**

- How well do existing catalogues and video digital library platforms perform against criteria found in evaluation and design frameworks?

#### **3.2. Secondary Questions**

- How could delivery systems of audiovisual materials be made more responsive to the needs of users?
- How well are libraries differentiating audiovisual materials from other materials?

## 4. Definitions

### 4.1. Terms

#### 4.1.1. Digital Library (DL)

A collection of electronic materials...created and managed for (and sometimes by) one or more user communities, and technical and user services are provided that add value to the materials (Pomerantz, Abbas, & Mostafa, 2009).

#### 4.1.2. Video Digital Library (VDL)

Video digital libraries are systems that enable users to retrieve, discover, assess and use video information, spanning the entire interactive process from initial query modelling to actual playback and/or query refinement or reformulation (Albertson & Ju, 2015).

#### 4.1.1. Online Public Access Catalogue (OPAC) or Catalogue

Wells (2007) finds an OPAC to have three distinct functions, though his first is most relevant to this study:

[An OPAC] acts as a bibliographic database, an electronic version of the card catalogue that it replaced, acting as an index for the user in search, for example, of a particular book. As a logical extension of this, the OPAC increasingly also provides links to electronic texts, freeing the user from the necessity of physically locating material on the library's shelves.

#### 4.1.2. Usability

There are varying ideas about what usability is, and how to define it. The International Standards Organisation (1994) defines usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use”. Blandford and Buchanan (2003) talking specifically about digital libraries, ask how well a system fits within the context in which it is used. Guo (2012) places usability in the

context of user experience, along with value, adoptability, and desirability. He claims usability is “increasingly used in a narrow context” where it specifically refer to “the ease for users to complete their intended tasks and is closely associated with a “testing” connotation”.

## 4.2. Acronyms

4.2.1. AACR	4.2.10. MARC
Anglo-American Cataloguing Rules	Machine-Readable Cataloguing
4.2.2. ACRL	4.2.11. OPAC
Association of College and Research Libraries	Online Public Access Catalogue
4.2.3. ALA	4.2.12. RDA
American Library Association	Resource Description and Access
4.2.4. ARL	4.2.13. FRBR
Association of Research Libraries	Functional Requirements for Bibliographic Records
4.2.5. CBIR	4.2.14. VOD
Content-Based Information Retrieval	Video-on-Demand
4.2.6. ILS	
Integrated Library System	
4.2.7. ISBD	
International Standard Bibliographic Description	
4.2.8. LCRI	
Library of Congress Rule Interpretations	
4.2.9. LCSH	
Library of Congress Subject Headings	

## 5. Literature Review

### 5.1. Audiovisual Materials in Academic Libraries

A look at the collection of audiovisual materials in academic libraries offers a useful background to this study.

#### 5.1.1. Purpose and Use

Academic libraries have collected audiovisual materials for teaching, learning, and research for as long as there has been demand, and as long as it has been practicable to acquire them. This has been guided both by the desire of libraries to collect (Widzinski, 2010), and by faculty who use or create audiovisual resources. During the early development of library media collections, their role as part of the learning process was obvious (Grove, 1975). It is now accepted by the profession<sup>3</sup> that audiovisual materials have become increasingly important in supporting faculty and student information needs, and that libraries have a role in supporting this (ACRL Guidelines for Media Resources in Academic Libraries Task Force, 2012a).

A study of 20 academic institutions in the United States found that the “use of video on campus is accelerating rapidly in departments across all disciplines” and that librarians in these institutions expected the use of video in education to grow significantly in the near to mid-term (Kaufman & Mohan, 2009). Similarly, Otto (2014) in a survey of faculty from Rutgers University confirmed that libraries are expected to provide support in the use of audiovisual materials in teaching and learning, and that there is increasing need for both materials and support by faculty. Survey respondents “spoke to the power of moving images to educate, how they can speak more forcefully than a lecture” and also reported that “student ratings have risen dramatically”.

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<sup>3</sup> The Association of College & Research Libraries (ACRL) is a division of the American Library Association (ALA) representing over 50,000 members.

Additional research by the ACRL shows that as well as collection of audiovisual materials for use by academic communities, there is also a role for the library to encourage their use. The setting of standards for visual literacy competency is an indication of this with the ACRL stating that “visual imagery is no longer supplemental to other forms of information”. In developing the guidelines they also found that while faculty and the library might expect students to understand, use, and create images in academic work, they are not always prepared to do so (ACRL Guidelines for Media Resources in Academic Libraries Task Force, 2012b).

Looking at data from recent reports in to changing trends in the consumption of audiovisual content, assumptions on the use of audiovisual materials that faculty and libraries have of students are not unreasonable. In their ninth *Digital Democracy Survey* of United States consumers, Deloitte found that more than half of all consumers, and three-quarters of those aged 14–31, stream movies online on a monthly basis. Trends are similar for television programmes where those in the 14–25 age group predominantly stream television programmes online, with approximately three-quarters using a streaming service during any given month (Deloitte, 2014).

Similarly, a 2015 report on the habits of New Zealand video consumers found that that while television is still the primary means of video consumption, over half of New Zealanders watch online video content each week. Of that cohort, those under the age of 45 are the most likely to watch video online. They also found that the younger a person is, the more likely they are to watch video on a smart device (Nielsen, 2015). This is confirmed in an Ericsson report of the same year that finds Millennials in particular have a preference for watching video on their mobile devices. Overall there has been a 71% increase in the number of consumers that watch video on their smartphones since 2012 (Ericsson, 2015). Chorus—New Zealand’s largest telecommunications infrastructure provider—reported in 2014 that online video made up 71% of Internet traffic in New Zealand, with this figure projected to increase over the short-term (Chorus, 2014).

The 14–30 age group referred to in all three surveys is the same cohort currently progressing through college and university. Prensky (2011) suggests that constant exposure to technologies

like computers, cell phones, the Internet, and video games have led today's students to "think and process information fundamentally differently from their predecessors". It is suggested that the generation known as Gen-Y or the Millennials are "intuitively visual learners who come to us with a significant degree of visual literacy" (Brumberger, 2011). Coats (2006) goes so far as to claim that the Millennials are "the most visual of all learning cohorts".

### 5.1.2. Formats

The format of audiovisual materials has always been an important factor for libraries when building their collections (Grove, 1975). This has been especially true of audiovisual media. Though experiments led to the first motion pictures being presented on film in the late 19th century, it wasn't until the 1930s that the collection of motion pictures could be considered a mainstream activity of academic institutions in the United States (Brancolini, 2002). When the activity did become common-place, the collection of films was left to administrative units outside the library. These units maintained their own processes and budgets but had requirements similar to the library for supporting learning and teaching (Lemler, 1948).

The 1970s began a transition in video collections with the introduction of the first videocassette formats. The first of these was U-matic which saw fast adoption by educational producers and was widely collected by libraries, it was followed with libraries continuing to collect new formats as they were introduced, including VHS, videodisc, and DVD (Widzinski, 2010). Laskowski (2000) comments that "some priceless educational material was only released in one particular format...that is one reason why so many academic media centers still consider some of the older formats essential to their collection". More recently however, academic libraries have begun to recognise and address preservation concerns surrounding their media collections (Casey, 2015). Many analogue media formats (and their playback hardware) held in these collections have already entered stages of obsolescence, and digital physical formats are likely not far behind (Clark, 2002).

Libraries have attempted to address these preservation and access issues in multiple ways, often looking to replace older formats with modern equivalents, most often DVD media.



More recently, libraries have begun purchasing digital video materials for online delivery, or subscribing to video-on-demand (VOD) databases. As well as addressing the obsolescence issue, it also begins to bring audiovisual collections in line with other library resources, giving users 24/7 access from any location (Handman, 2010). Despite the user benefits of delivering audiovisual materials online, Handman notes that VOD licencing models are largely different from print and online journal subscriptions currently purchased by libraries. He also notes that the technology supporting these services will also likely have requirements unfamiliar to most librarians.

Bergman (2010) in a 2009 survey of academic libraries found that 39% had purchased streaming media for their collections, however “almost every respondent...felt that, although not a perfect delivery method, digital delivery was the direction that educational video will take as the next step”. Farrelly & Hutchison (2013) surveyed 336 academic libraries on the use of streaming video. They found that 70% of the libraries surveyed delivered streaming video, and that 52% had replaced or converted physical media formats with a streaming format. They also confirm that libraries are still rapidly acquiring physical media, and that the Blu-ray format has seen little adoption in library collections despite being the logical next step from DVD. Their conclusion is that “streaming video has become a common vehicle for content delivery in academic libraries” and that “video remains an outlier in the day-to-day treatment of content in academic libraries”.

## 5.2. Description and Access

Academic libraries are being faced with challenges presenting users' with the ability to discover and access an ever-increasing amount of information. While this is especially true for electronic materials, audiovisual materials have routinely presented challenges to libraries when it comes to description and access and have gained a reputation as materials that are “Different, Difficult, and Diverting” (Howarth, 1999).

### 5.2.1. Description

In its broadest sense, metadata should (Hurley, Price-Wilkin, Proffitt, & Besser, 1999):

- Help the user discover or locate resources
- Describe those resources in order to help users determine whether the resources would be useful
- To provide physical access to the electronic resource

Metadata always exists with a purpose in mind. Metadata elements that are produced are inherently tied to the ways in which the corresponding object will be retrieved and the relationship the object has to others in the collection. The purpose of the collection also affects the metadata elements that are produced.

The *Anglo-American Cataloguing Rules (AACR)* were published in 1967 with the goal of unifying bibliographic entry on both sides of the Atlantic (American Library Association, Library of Congress, Library Association, & Canadian Library Association, 1967). Part III was somewhat cautiously dedicated to the treatment of “*non-book*” materials, including ‘Motion Pictures and Filmstrips’, and audio recordings placed under the heading ‘Phonorecords’.<sup>4</sup> Rules in Part III were based on publications issued earlier that decade<sup>5</sup> though they underwent several revisions and amendments before the second edition of the *AACR*—the *AACR2*—was published in 1978 (JSC for the Development of RDA, 2009a).

Due to the speed in which it was written, and limited consultation outside of the Library of Congress, Part III of the first edition of the *AACR* largely failed to address concerns many cataloguers had working with audiovisual materials (Howarth & Weihs, 1995). The rules were acknowledged as a step forward, though at the time difficulties still existed when applying the *AACR* to films with only some of the rules “worthy of mention” (Burlingame & Farmer, 1975).

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<sup>4</sup> Used as a term to cover all aural media types.

<sup>5</sup> Both supplementary releases to the Library of Congress’ *Rules for Descriptive Cataloging in the Library of Congress* (1949). Firstly, *Motion Pictures and Filmstrips*, and secondly *Phonorecords*.

Similarly, the new rules with sound recordings were limiting, and few librarians accepted all of the rules when cataloguing those materials (Gibson, 1975). Both Burlingame & Farmer, and Gibson advocated for a 'wait-and-see' approach before any decision was made on audiovisual cataloguing rules, though both also saw Machine-Readable Cataloguing (MARC) as an option to be looked at for the computer storage and retrieval of catalogue records.

In the decades following, the AACR2 became the *de facto* standard for description, along with MARC formats for the exchange of bibliographic information, including non-book, audiovisual materials. A 1995 study of bibliographic description in Canadian libraries found that it was still common for university and college libraries to have alternative methods for cataloguing audiovisual materials, sitting alongside or replacing the AACR2 (Howarth & Weihs, 1995). It was also not uncommon for universities and colleges to have video or sound recordings that were not catalogued at all.

In 2012, the ACRL approved the latest version of their *Guidelines for media resources in academic libraries*. The guidelines developed to help librarians and library administrators "improve [their] media resource collections and services" (ACRL Guidelines for Media Resources in Academic Libraries Task Force, 2012a). Based on these guidelines, a 2013 survey looked at cataloguing practices and access methods at academic and public libraries in the United States of America (Ho, 2013). As the ACRL Guidelines require media resources to be catalogued "in accordance with current national standards and practices", Ho's survey in part looks at how well the AACR2 and the *Library of Congress Rule Interpretations (LCRI)* are applied against audiovisual materials.

The results of Ho's (2013) survey are not too dissimilar from Howarth & Weihs' Canadian study (1995) in that some academic libraries still held uncatalogued audiovisual materials and/or maintained separate catalogues for those materials. For those that did catalogue following the AACR2, there were differences in the level to which audiovisual materials were catalogued, with cataloguing practices varying within and between institutions. Ho also found that there was an inconsistent application of the rules, or that they were interpreted at odds with the *LCRI*. She concluded that "it may be useful to re-examine the current cataloguing rules for videos...to

more accurately reflect the actual practices and concerns of librarians and the needs of users” (Ho, 2013).

Concurrent to the ongoing application of rules in the cataloguing of audiovisual materials, two other important discussions were occurring with regard to description and access in libraries. Firstly, the development and replacement of the *AACR2* (with its eventual successor: the *Resource Description and Access* framework.) Secondly, the future of MARC as the primary standard for bibliographic entry. Those cataloguing audiovisual—and other non-book—materials were routinely highlighting areas where the existing standards were failing. This was becoming especially evident with the increase in electronic resources that libraries were expected to acquire and deliver.

The *Resource Description and Access (RDA)* standard was introduced as a new approach for cataloguing in libraries, designed specifically for a ‘digital world’ (JSC for the Development of RDA, 2009b). As with the *AACR2*, its development was a combined effort<sup>6</sup> led by the Joint Steering Committee for Development of RDA and was published in 2010 as the ‘*RDA Toolkit*’. It was conceptually different from the *AACR2* relying on the Functional Requirements for Bibliographic Records (FRBR) model to deliver many of its benefits (JSC for the Development of RDA, 2009).

It was met with two contradictory angles of criticism: either *RDA* was unnecessary, or it didn’t go far enough. Following the 1997 *International Conference on the Principles and Future Development of AACR2*, the then Editor of the *AACR2*, Michael Gorman, reported back accepting the need for innovation, standardisation, and simplicity, as well as a clear way to deal with electronic publications. (Gorman, 1997). However a decade later in 2007, Gorman condemned a draft of the *RDA* framework, calling its development disorganised. He claimed

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<sup>6</sup> The committee was made up of representatives from the: American Library Association, Australian Committee on Cataloguing, British Library, Canadian Committee on Cataloguing, Chartered Institute of Library and Information Professionals (CILIP), and the Library of Congress (JSC for the Development of RDA, 2009).

that it needlessly did away with many of the established practices of the AACR2, and that the ISBD<sup>7</sup> was being wilfully ignored (Gorman, 2007).

Conversely, while there are notable differences between the AACR2 and RDA, it was its continued bibliocentric emphasis that led many who dealt with non-book materials to believe that RDA wasn't going to provide the change that libraries needed. Perhaps equally condemning of RDA were Coyle and Hillman (2007) writing in *D-Lib Magazine*. Their primary criticism is that RDA is torn between dual goals of being a past and future standard and that "RDA cannot be successful without addressing the key changes in the information environment that have caused libraries to fall behind as primary information providers". Tennant (2007) too expresses his frustrations with the profession, suggesting that many in the industry "are heavily invested in traditional ways of doing things and may not fully appreciate the opportunities offered by modern computer systems".

Changes to catalogue technologies and uses, as well as changes in users, user activities, and library collections are also cited as areas that the RDA development committee had failed to recognise. Importantly too Coyle and Hillmann (2007) highlight the fact that such disagreement within the profession about the future of something as fundamental as bibliographic control should not be dismissed lightly. This conflict was also recognised by some immediately outside the profession, for whom RDA was also intended to supply a bibliographic solution (JSC for the Development of RDA, 2009). Landis (2007) an archivist at Yale University presents his views of the library profession's bibliographic goals in the following way:

AACR, and with it the broader notion of bibliographic control, have taken a somewhat universalizing approach to defining a concrete scope for bibliographic standards. Library materials are clearly the focus of these standards, but more precisely their aim is the creation of descriptive surrogates like catalog records for materials that are consciously published and/or distributed in multiple copies. Dissatisfactions similar to

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<sup>7</sup> The International Standard Bibliographic Description (ISBD) used in combination with a description standard to create human-readable bibliographic catalogue records.

those within the archives and museum communities discussed in this article have led some communities of format-based professionals to develop their own rules that are based on, but differ from, AACR's format-specific chapters.

Where some in the archival community have split to develop their own rules (especially for non-book materials,) libraries had always tried to unify around one standard.

Others, such as Knight, saw *RDA* as focusing too heavily on physical objects and that “describing resources as book-like things is clearly problematic in the digital environment. Trying to maintain a system oriented around the finite, self-contained book format leaves the library profession walking backward into the future” (Knight, 2011). In a later presentation to the Ontario Library Association, Knight succinctly outlines the evolution of bibliographic space and identifies with clear examples the failings of the *AACR2* to satisfy modern materials, including audiovisual materials *and* books (Knight, 2012).

In 2012 the Library of Congress announced that it would fully transition to *RDA* by the end of March 2013 (Library of Congress, 2012). This followed a 2011 report (itself the recommendation of an earlier 2008 report)<sup>8</sup> testing the implementation of *RDA* in the Library of Congress, the National Agricultural Library, and the National Library of Medicine. The report made several recommendations if *RDA* was to be implemented, stating that there was “little discernible immediate benefit in implementing *RDA* alone” (US *RDA* Test Coordinating Committee, 2011). The other part of the equation the Committee were referring to was the future of the *MARC* format, which after “[serving] the community for nearly 50 years” had “reached the end of design life and cannot reasonably accommodate *RDA*’s new approach to relationships and data structures”.

This view of *MARC* was also shared by the Library of Congress’ Working Group on the Future of Bibliographic Control. In their report *On the Record* (Library of Congress Working Group on the Future of Bibliographic Control, 2008) they confirmed that the then forty-year old

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<sup>8</sup> *On the Record* for the Library of Congress (Library of Congress Working Group on the Future of Bibliographic Control, 2008).

MARC format was “out of step” with modern technologies. The result was the announcement of BIBFRAME, “an initial model for the interchange of data in a Linked Data environment based on the analysis and synthesis of related activities” (Miller, Ogbuji, Mueller, & MacDougall, 2012).

Those working with non-book materials have already begun to look at how BIBFRAME might support these items. Wacker and Billey (2016) explore how art objects might be expressed in a BIBFRAME model. Hansen and Crowe (2015) look at how BIBFRAME might increase the visibility of digital collections, and members of the Music Library Association are in active online discussion about how BIBFRAME might best express musical sound recordings and scores (Music Library Association, n.d.).

In 2014, van Malssen of AVPreserve reported back to the Library of Congress with her report defining a flexible model for description of audiovisual materials. The report looked specifically at the challenges faced by libraries when dealing with these materials, and comments that the “description and access of content contained on time-based media has been a daunting challenge for many decades, as catalogers have struggled to apply a data model predominantly designed to describe published books to these resource types” (van Malssen, 2014). She concludes that the BIBFRAME model aligns well with the generic content model but makes recommendations to the Library of Congress to better allow for the description of audiovisual materials in future drafts of the standard.

### 5.2.2. Access

Many academic libraries wrestle with how to provide access to video material and although the differences are not as marked as they are with description, access to non-book audiovisual materials presents challenges for user accessibility (Macke & Sewell, 2011). There are varying opinions on whether audiovisual materials should be kept in closed stacks and to which patrons they should be allowed to circulate. In a survey of academic libraries, Bergman (2010) found that 80% allowed students to checkout videos, which was a marked increase from the findings of Brancolini & Provine (1993) who found only 33% of students were previously able to do so.

She also found 48% of respondents indicated video collections were primarily shelved in closed stacks, but that there was a trend toward opening of collections.

Several reasons are given for holding audiovisual collections in closed stacks. These include security of the items, their durability and ease of acquisition, the application of user-unfriendly or non-standard classification schemes, and requirements to keep items free for faculty use (Bergman, 2010; Macke & Sewell, 2011; Merry, 2004). Having adequate facilities to view audiovisual materials also had an effect on the shelving and lending policies. This was found to be especially true for legacy formats such as VHS where materials could be several decades old with equipment used for playback difficult to maintain and no longer manufactured. Despite cases presented for closed audiovisual collections, the trend is moving toward open access collections (McGeary, 2015). Though McGeary's views are direct, considering closed stack audiovisual collections a "vestige of a time", he does appreciate the large effort that larger academic libraries may have to undertake to move to an open stack environment.

Sullenger (2010) looked at the move of low use periodicals to closed stacks as online availability increases. She found that the library benefited from not having to physically process the materials as thoroughly, but also found that patrons who preferred browsing did not generally request materials from the closed stacks. In a study of video collection browsing behaviours of patrons in an academic library, Chuttur (2011) found that a patron's browsing behaviour of a video collection was not significantly different from that of websites of print materials. Chuttur's study observed patrons in a media collection room and made notes on their movements through the space, and their body language.

A common patron action was to remove an item from a shelf and read its back cover, after which it would be placed back on the shelf or held on to. It was not uncommon for patrons to have more than one item in their hands at a time. Perceived levels of satisfaction were also noted, which found that frustrations exhibited by patrons affected their ability to successfully leave with an item. This was likely the result of having only a limited amount of information on which to make a selection. For media collections in a closed stack environment, Nelson and Frantz (1999) emphasise that it is critical that cataloguing be "full and in-depth" for users to



successfully access materials, and that there is a greater requirement for staff involvement when providing access materials in closed stacks.

In her case study looking at the establishment of a popular DVD collection, Dimmock (2007) found that the biggest challenge the library faced was access. The processing procedures put in place were almost identical to print materials: items were removed from their original packages, placed in generic containers, assigned LC call numbers, catalogued, and made available through the OPAC. Having been established through a student body initiative, she notes that it “clearly was not Blockbuster”<sup>9</sup> and that users were “quick to voice their disappointment with the scholarly shelving and labelling arrangement”. Students were also confused by the OPAC where it was largely “out of step with users’ mental models of video collections”. This resulted in changes to cataloguing procedure, and the development of an OPAC alternative for videos only (Dimmock, 2007).

Otto (2014) conducted an extensive study of the use of moving images by faculty at Rutgers University. They found that 25% of respondents found the catalogue difficult to use, and note that faculty have trouble browsing the catalogue. Limiting searches by location also presented issues excluding materials from other libraries, or streaming video which weren’t physically located anywhere. She also surveyed on preferred moving image formats. She found that 44% of respondents preferred Web-based video for its “immediacy, flexibility, practicality, and convenience,” though also found that over 35% agreed or strongly agreed that reliability was an issue delivering video to the classroom (Otto, 2014). This supports an earlier report by Kaufman & Mohan (2009) on video use in higher education, which found that 40% of faculty indicated they would use more online video. They also found that 7% of faculty identified the library catalogue as an obstacle in the use of video, as well as 10% having inadequate information about library acquisitions.

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<sup>9</sup> For the sake of posterity, Blockbuster was a chain of video rental stores popular in the United States.

### 5.3. Content-Based Information Retrieval (CBIR)

The aim of CBIR, and multimedia information retrieval (MIR) is to “make capturing, storing, finding, and using digital media an everyday occurrence in our computing environment” (Rowe & Jain, 2005). Libraries spend their time generating metadata for a variety of different types of materials. It is time-consuming and costly process, especially for audiovisual materials (Enser & Sandom, 2002). It can also be a difficult and complicated exercise, particularly when working within the bibliocentric *RDA/MARC* library universe. Primarily driven out of the computer science community, research in to CBIR has been ongoing for some years (Rowe & Jain, 2005) and is a means of retrieving visually encoded information based on the attributes of an image, rather than what it represents (Sandom & Enser, 2003). It is inclusive of still and moving images, audio, and textual information retrieval.

Cox, Haskell, LeCun, Shahraray, & Rabiner (1998) suggest that “powerful browsing capabilities are essential in a multimedia information-retrieval system”. The limited precision of existing search mechanisms often ends with the user being presented with a large number of results. With audiovisual materials, even being presented with a small number of results may prove a challenge when the information of interest could be distributed across multiple points in time, or across domains. CBIR, combined with appropriate interfaces, and metadata, present opportunities to increase browsing capabilities in digital libraries.

Lee, Smeaton, Berrut, et al. (2000) present six interfaces for browsing digital video information. These are based on top of *Físchlár*, an indexing, browsing, and playback system for broadcast television programmes. The browsing interfaces are reliant on successful segmentation of the video using shot boundary detection. Using CBIR techniques, *Físchlár* analyses the differences in video frames, breaking them in to segments. This allows for video to be structured in to higher units for indexing, browsing, searching, and summarisation (Browne et al., 2000). Though they acknowledge that there is a need to “specifically categorise users’ browsing tasks depending on a person’s cognitive direction in browsing, rather than covering it all as simply ‘browsing’”, CBIR is improving the browse experience for users.

Digitisation has provided both a means of preservation, and for making audiovisual materials more accessible. Enser & Sandom (2002) outline the potential benefits that MIR research presents to the archival community. Using the film as an example, they note that shotlists and synopses present a division between the 'of-ness' and 'about-ness' of visual image content. A synopsis is the work as a whole, with a shot-list being a detailed representation of the contents of each shot. If any features are not described in either the shot-list or synopsis, they are effectively irretrievable without scanning the entire film.

Both look at VIRAMI (Visual Information Retrieval for Archival Moving Imagery,) a project investigating the information needs and retrieval strategies of users of moving image archives. One objective of the project was to determine whether content based image retrieval could reduce an archive's dependency on content and subject descriptive cataloguing. Analysing user requests of over 1200 individuals for archival film footage, they found that 90% of requests were for footage on a particular subject. The remainder were for specific titles, directors, actors, shot types and the like (Enser & Sandom, 2002). Due to the nature of requests, staff taking part in the study held the view that "such techniques offered very little prospect of reducing the heavy reliance on human intellectual input". They conclude that content-based information retrieval techniques are unlikely to replace the collection, domain, and tacit knowledge of a film archivist or librarian, but that techniques such as video skimming, shot segmentation, and speech recognition would be an invaluable tool for film cataloguers.

An early example of a CBIR platform is the Informedia system developed by Wactlar, Christel, Gong, & Hauptmann (1999) of Carnegie Mellon University. Development was begun in 1994, looking to address the challenges of building a video digital library by automating extraction of information from digital video, and creating interfaces that allowed users to successfully access that information. The library contained more than 1000-hours of television news programming, and 400-hours of documentary video, and was continually added to.

Informedia made use of three primary MIR techniques: speech recognition, image processing, and information retrieval. Wactlar et al. (1999) found that these techniques were highly complementary and when used together improved accuracy and coverage. Speech recognition

was performed using the CMU Sphinx system (another Carnegie Mellon research project,) where processing time for recognition is many times real-time, and even with sufficient training could still have an error rate as high as 30%. Despite this they found that retrieval precision and recall were only degraded by 10% due to the repetition of key words multiple times in each broadcast. Their finding is that “even relatively high word error rates in speech recognition...permit relatively effective information retrieval”.

Image processing was used to identify shots and key frames, recognise faces and colour, and perform video OCR. The Infromedia project was restricted by the technology available at the time, limited to MPEG-1 encoded video at a resolution half that of contemporary standard definition television. Despite this they were able to successfully segment programming into shots and generate key frames, furthermore face detection was found to be adequate on shots where both eyes were clearly visible. Optical character recognition of text superimposed on the video was also successful, finding that text areas were correctly identified 90% of the time, with a word recognition rate of 70% (Wactlar et al., 1999).

The tangible outcome of the Infromedia project was that automatically generated metadata and indices for retrieving programming from the library were continuously available online for local users to use. In a retrospective of the project, Hauptmann (2005) cites integration of CBIR techniques, as well as the quality of the Infromedia interface as key reasons for its success. Making use of several visualisations and abstractions, timelines and geographic visualisations, as well as “video skims”, collages, and storyboards presented dramatic breakthroughs in the presentation of large result sets for a video archive. Despite the project’s success and numerous contributions to the discourses, Hauptmann still acknowledges there is a “fundamental “semantic gap”” in the application of CBIR to audiovisual materials.

Lichtenstein, Plank, & Neumann (2014) describe their experiences building an audiovisual media portal to “[combine] automatically extracted content metadata from speech, text, or visual information within the video with manually created archive metadata”. It does this by applying a number of CBIR techniques including: scene, speech, text, and image recognition. One concern is the selection of an appropriate metadata standard to use for audiovisual

materials, especially when faced with the uncertain nature of automatically extracted metadata. They found that using CBIR techniques and manual indexing “can improve the search for and the search in videos for library users”.

Wan & Liu (2008) discuss the applications and importance of CBIR for digital libraries. They suggest that while some might argue that text-based retrieval techniques are good enough to locate multimedia information, the success of retrieval is heavily dependent on an initial description. They conclude that “the machine understanding of semantic information still remains to be a great difficulty”. Similarly, Lew, Sebe, Djeraba, & Jain (2006) after conducting an extensive review of literature around multimedia information retrieval, summarise that all of the general problems around information retrieval from multimedia sources still need significant further research.

#### 5.4. Search and Retrieval

There is a broad body of research looking at information retrieval and information seeking methods (Vakkari, 1999). Most often this examines the user’s information needs, but does so for the purposes of improving indexing, the effectiveness of retrieval, or interface design (Albertson, 2010b). Much more literature exists looking at the analysis of search methods and user needs when looking at textual and image information retrieval. Research specifically covering video retrieval is much less common.

In one study covering video material, Albertson (Albertson, 2010b) investigated whether familiarity with search topics might influence information retrieval in a video platform. He found that user impressions of a video digital library were related to the perceived ability to successfully use it, and that that developers of video digital libraries would benefit from understanding user information needs in order to increase its effectiveness. In addition, van der Heuvel (2010) found that the user search strategies used by broadcast professionals varied more between test subjects than they did between tasks. This reinforces the notion that the prior knowledge of a user is at least as much an influence on search strategies as the interface itself.

In addition, browsing has an important role to play when retrieving visual materials. When studying how journalists retrieved photos, Markkula & Sormunen (2000) found that browsing was an essential search strategy and that queries were non-complex, most often single words or featured proper nouns, such as specific people, places, or things. In another study Batley (1988) found that the use of browsing increased as the specificity of his given tasks decreased. Keywords were used for specific tasks, but less specific tasks often resulted in the user randomly browsing the collections. Similarly, in a study of the search behaviour of media professionals at an audiovisual archive, Huurnink, Hollink, van den Heuvel, & de Rijke (2010) find that only 9% of users utilised the advanced search function and, again, most searched using keywords of specific people, places, or subjects. They also find the level of cataloguing of an item directly effects the time it takes a user to find what they're looking for.

An investigation of searches performed by image professionals provided by a commercial image provider found that three quarters of users started with a single term query, which generally resulted in a large number of results. While some resorted to using Boolean operators to further refine their search, 86% resorted to browsing image thumbnails before selecting an item to view. Users who downloaded images had browsed twice as many images as the average. They conclude that “a useful browsing interface is important in the final image selection process” (Jørgensen & Jørgensen, 2005).

Using a collection of digital visual images, specifically images of artwork, Frost et al. (2000) found that the preferred mode differed between art history specialists and non-specialists. Groups of users found that each mode had a role to play depending on information need, and found value in a system combining both browse and direct search. They concluded that “browsing is an important means of searching for image information on occasions when users are not sure of search terms or lack the domain knowledge to specify exact terms for a search query”.

One of the implications of the differing search strategies employed by users is that interfaces should be designed to accommodate this. In a still image collection usability study, Hung (2005) found that “many image systems are being designed without a clear understanding of how users

search for images” and that the design of image systems should be based on an understanding of image seeking and searching behaviour. In another analysis of search practices, Fidel (1997) also found that “exploration into image-retrieval tasks reveals that they are likely to have implications for the design and evaluation of image databases”.

Libraries spend their time generating metadata for a variety of different types of materials, including still and moving images. Libraries have a very bibliocentric bias towards metadata production, and non-book materials are relegated to secondary focus. As such, metadata fields such as title or author are antiquated, or insufficient for objects that do not necessarily lend themselves to such schemes. Early research regarding library searches was focussed mainly on the retrieval of analogue images, using manually created descriptive catalogues. The increased prevalence of digital objects and non-book materials in libraries implores further research into the types of searches users undertake and the access points they require. The increase in digital content has led to an increase in the requirement of precision in order to locate specific materials (Addis, Lowe, & Middleton, 2009).

While textual materials have clear access points (title, author and subjects,) the access points of visual materials are less obvious (Choi & Rasmussen, 2003). Layne breaks the description of an image into four attributes: biographical, subject, exemplified, and relationship (Layne, 1994). She does this in order to cover the more abstract levels of detail required when describing images. Similarly, Panofasky details three layers of description when describing visual materials: iconography, pre-iconography, and iconology (Panofasky, 1955). Although they were developed as a tool for looking at Western Renaissance art, Shatford (1986) adapted them to analyse any pictorial work. Panofasky’s categories work downward from the primary factual and subject matter, through expressional information, to the intrinsic meaning of an image (Enser, 1995).

## 5.5. Video Digital Libraries

There is limited research directly addressing the video digital library as tools that enable users to “retrieve, discover, assess and use video information” (Albertson & Ju, 2015) compared to the extensive body of work dedicated to other types of digital library (Borgman, 1999). Research

on content-based information retrieval (CBIR) techniques in video by the computer science field is much more extensive (Rowe & Jain, 2005). Some research in this area has resulted in the development of platforms that could fit Albertson & Ju's definition, however they are a product of the technologies they are based on, rather than fully conceptualised platforms in their own right.

The Informedia system developed at Carnegie Mellon University is likely the most comprehensive example of a video digital library to come out of CBIR research. Hauptmann (2005) who worked extensively on the project makes its aims clear: "the overarching goal of the Informedia Digital Video Library project has been to achieve machine understanding of video media". The system was then developed to have an advance query interface in order to test the effectiveness of the technology behind the platform. In one study using television news and documentary broadcasts, Christel, Winkler, & Taylor (1997) found that having just one representative image for a clip "improves performance time and subjective satisfaction" when retrieving content from a video library. Christel (2007) later undertook a number of studies looking at user interactions with the Informedia system. Albertson (2010a) summarises Christel's study:

The experiments involved exploratory video search sessions where evaluation methods were guided by certain HCI metrics, including efficiency, effectiveness, and satisfaction. As part of this user-centric methodology, transaction logs and comments deriving from interviews and think-aloud protocols were collected in order to analyze user interaction and perceptions about the system. Findings suggested potential enhancements to future user-centric studies in video retrieval research and exhibited that progress in user-centric research is under way.

The Físchlár Digital Video System is another example of a video digital library built out of CBIR research. It was developed at Dublin City University using a small collection of television recordings to demonstrate the effectiveness of video shot boundary detection techniques (Lee, Smeaton, O'Toole, et al., 2000). It was further developed into an "end-to-end digital library



system which supports capture, indexing, storing, browsing, searching and summarising of digital video information” (Smeaton, Lee, & McDonald, 2004).

In *Designing the User Interface for the Físchlár Digital Video Library*, Lee & Smeaton (Lee & Smeaton, 2002) evaluated a number of information seeking studies before implementing the video browser design framework of the *Físchlár* system. These included Norman’s (1988) ‘seven stages of action’ and Marchionini’s (1995) information-seeking sub-processes. Petrelli & Auld (2008) use the CBIR techniques and key frame extraction of the *Físchlár* system to measure user preferences and interactions. They found that users “showed a strong preference” for search interactions, though browsing was used as a post-search action, or when users were having difficulty producing search terms.

## 5.6. OPACs and Discovery Layers

The Online Public Access Catalogue (OPAC) is traditionally oriented towards searching rather than browsing. When searching, users are required to have some type of ‘entry point’ metadata to in order to locate the items they wish to retrieve. That is to say, they need some idea about what they are looking for in order to find it. Some types of material, particularly audiovisual materials, do not lend themselves to this paradigm. In situations where users do not have a complete idea of what they wish to find, browsing can help them to develop their ideas further.

When libraries moved from card catalogue systems to OPACs, a number of studies found that users were unsatisfied with their attempts to discover audiovisual materials. Previously patrons had the option to browse card catalogues for audiovisual items, and then found themselves locked into a digital search interface. Antelman, Lynema, & Pace (2006) note that “whatever the shortcomings of the card catalog, a user could approach it with no query in mind...with the advent of online catalogs, this is no longer possible.” Marchionini (1995) suggests that “browsing is an approach to information seeking that is informal and opportunistic”. McGrath (2006) described the situation in the following way:

[The] naïve patron who wants to browse our OPAC for a video to watch on Friday night is likely to have a rough time of it. Certainly, the user can search by title and by name,

and by genre if the movie is in a genre that has an authorized subject heading, the heading has been assigned correctly to the right set of records, and the user can figure out the right heading or headings.

Hume (1995) looked at the needs of cinema studies students, and the problems they encountered when searching for media materials in an OPAC. Hume noted several key issues that existed for the students, including:

- The lack of browseability compared to the card catalogue it replaced (audiovisual holding cards were previously indexed separately)
- A lack of useful access points provided for items (many of them film specific)
- A lack of awareness of the platform's functionality
- Top level access to items by media type to allow for browsing

Ho (2002) echoes many of the issues raised by Hume, particularly the lack of video specific access points as a limiting factor, noting also that there should be a way to list all videos and nothing else.

Even for records with comprehensively applied access points, the OPAC itself has a significant impact on users extending from its usage of MARC records and available search functionality. In her paper *MARC data, the OPAC, and library professionals*, Jo Williams (2009) discusses at length how manipulating MARC data can be used to improve information retrieval using an OPAC. Alternatively, this sentiment could also be expressed as 'hijacking MARC to address failures in OPAC indexing and display'. Williams gives examples of how MARC 700 - *Added Entry - Personal Name* and 505 - *Formatted Contents Note* fail to be fully indexed in OCLC's WorldCat database. The proposed solution is to use another added entry to present the data for indexing, however from the cataloguers perspective it would definitely be considered redundant entry, and potentially suspect depending on how closely the AACR is being followed.

Other reasons given for weak OPAC performance are poor or inadequate cataloguing, the skills of user services librarians and patrons in using the OPAC, and the configuration of the OPAC and the abilities of their technical services teams to fully implement features of the software (J.

Williams, 2009). Ultimately Williams advocates for the well-formed bibliographic record, and hints that the next-generation discovery tool combined with MARC would provide a solution to these issues. The degree to which next-generation systems have delivered is questionable, and potentially worse, though there is little in-depth research into the indexing performance of current next-generation services. One ILS for example does not completely index every MARC field in both back-office and discovery modules, limiting the discovery of one of a library's most valuable assets by its own creators and users alike.<sup>10</sup>

Mi & Weng (2008) looked at the interface, searching ability, relevance ranking, layout, and linking functionalities of 123 academic library OPACs (offered by several major library vendors.) They present extensive findings on the performance of bibliographic display and reach similar conclusions to J. Williams (2009), with the ineffectiveness of the OPACs offered reduced into three categories:

- The limitations of the OPAC as provided by the vendor
- The configuration of the OPAC by the library
- The unsuitability of MARC and the use of AACR for online display

They also cite the evolution of user behaviours such as changes in mental search models in response to the 'Google-isation' of search, and expectations of browsing as reasons behind an OPAC's poor performance. Luther (2003) suggests that "Google has radically changed users' expectations and redefined the experience of those seeking information" and ends that for many users "the quality of the results matter less than the process—they just expect the process to be quick and easy". Yu and Young (2004) find that metasearching, relevance-ranked results, and relevance feedback should be integrated into the OPAC.

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<sup>10</sup> An e-mail from a colleague (L. Li, personal communication, September 25 2015) indicated that adding a MARC 5XX - Note Field to the ILS search index may be possible, but would have to be submitted as an enhancement and be voted on to gather community support before the vendor would consider it for implementation. A list of existing mappings are available on the vendor's Web page, *Search Indexes* (Ex Libris, 2015d).

Since their inception, OPACs have struggled to natively incorporate non-book materials. More generally, Pace (2005) and Tennant (2005) both complain about the stagnant nature of the library OPAC when compared to other modern services emerging on the Internet. Pace placed the blame with MARC and the AACR2. Tennant, poetically, places the blame on the library vendors who are providing a 'pig', only to let libraries doll it up with lipstick and a tiara. Markey (2007) was more succinct, blaming the OPAC's lack of progress on "the failure of ILS vendors to monitor shifts in information-retrieval technology and respond accordingly with system improvements". Antelman et al. (2006) claimed that vendors were hiding behind technology of the past and convenient business practice, that "it can no longer be said that more sophisticated approaches to searching are too expensive computationally; they may, however, be too expensive to introduce into legacy systems from a business perspective".

Mi & Weng (2008) also suggest that because integrated library system (ILS) vendors have been slow to act, libraries have been forced to seek other options. Deng (2010) discusses her experiments in creating featured collection Web sites from data in the Ex Libris Voyager ILS, with the aim to create more flexible and better Web presentations, easier discovery, and greater user awareness. Thomas (2011) also created an alternative to the OPAC that contained musical sound recordings and scores. It was found to be a more effective tool for users' needs than the general purpose library catalogue interface. Similarly, McGrath (2006) looks at the *Media Finders* interface for audiovisual materials, developed in response to the "inadequacy of browsing access" found in the Sirsi iLink OPAC. Responding to the findings of Hume (1995) and Ho (2002) it improved browse capabilities, created a targeted subset of materials, made fuller use of catalogue records, and automated previously lengthy searches.

One limitation upon OPACs is that they must operate based on the level and type of metadata provided, and allowed in catalogue entries. Chung (2001) looks at the inflexibility of MARC and the AACR2 in preventing the OPAC from distinguishing materials types from each other, as well as indicating the limitations of the OPAC, for example the failure of an OPAC to index all information contained in the MARC record. Chisman, Diller, & Wallbridge (1999) found that tools to refine search results (by date or type of material type) were not readily understood

by users. They also noted that the use of MARC terminology—such as ‘projected medium’ to return only videos—was likely to cause confusion for users trying to locate those materials.

The US RDA Test Coordinating Committee (2011) found that MARC was lacking in its ability to fully take advantage of the benefits offered by *RDA* and the FRBR concepts sitting behind it. This is a particular concern for non-book materials which already present challenges to search and retrieval. ILS vendors have responded to the problems of the ageing OPAC and pressure from libraries by developing their own ‘Web scale’ discovery layers. These discovery layers incorporated features that libraries had been asking for, such as ‘single search box’ interfaces, federated searching, faceted search results, relevancy sorting, and a modern Web interface (Breeding, 2007; Murray, 2008). However these new discovery layers presented libraries with a new set of problems.

Yang and Hofmann (2011) studied the OPACs of 260 academic libraries in the United States and Canada, evaluating them against a set of criteria for next-generation catalogues. They found that 16% of OPACs in the study didn’t meet any of the criteria, and none of the OPACs evaluated displayed more than ten of the twelve criteria. Those that met seven or more of the criteria were exclusively discovery layers; classic/legacy OPACs only met one or two of the criteria. They conclude saying it’s unclear what direction vendors are taking when implementing the criteria and that while “next generation OPACs may possess a lot of new features...they may lack traditional ones, such as name/title browsing...that librarians and advanced users want or need”.

Way (2010) looked at the implementation of the Serials Solutions Summon discovery layer in an academic library. He found that despite some potential issues with indexing, the discovery layer was widely used in its first semester of use, increasing the use of most of the library’s resources. Williams and Foster (2011) conducted usability testing on an implementation of the EBSCO Discovery Service. They found that users still wanted instruction on how to use the system, and that there were some interface inconsistencies, however they conclude that “gaps in content and other local user needs mean there is still a place for federated search systems and standalone subject databases”.

The FRBR framework incorporated into *RDA* has the potential to improve search and retrieval of audiovisual materials (Dickey, 2013). However, this is dependent on vendors developing software compatible with the framework, and providing sufficient documentation detailing how it is implemented (Hooper, 2012). Hooper experiments with the Ex Libris Primo discovery layer in order to appropriately FRBRise the display of musical sound recordings and scores. He finds that there are limits to the customisation of the discovery layer. In particular, that it relies on having well formed, rule abiding MARC records in order to take advantage of the FRBRisation algorithms offered by the software. He concludes that the discovery layer “is at its best when a diverse team of catalogers, reference librarians, systems, and subject specialists work together”.

### 5.7. Material Types Facing Similar Issues

Similarities can be seen between audiovisual and other non-book materials in libraries. Knowlton et al. (2007) look at the microform and its place in a linked world, outlining several issues effecting the ongoing use of the format. They suggest that the problem of bringing the microform to the attention of researchers is two-part: finding, and distributing. As with audiovisual materials, they find that inadequate or inappropriate cataloguing plays a large role in their accessibility, and that the catalogue should include records for each title in the collections.

After a user has found an item they would like to use, the hardware used to view the item also has to be accessible and user-friendly. This is summed up by Cheney (2010):

Microforms appear different in every possible way, not only because their format requires separate shelving/storage approaches, but because libraries have failed to mainstream the most important and valuable parts of their collection into services and systems which are pro forma for other collections. What appears to be missing is a lack of understanding or belief that these collections are a valuable and important part of the library's collections and that if libraries makes [*sic*] them visible they will be used.

Music librarians and their collections also have similar challenges to audiovisual. Zager (2000) promotes that the study of music continues to rely on three interrelated formats: scores, audio

and video recordings, and books and journals. In an article looking at how the FRBR framework would benefit music libraries and their users, Dickey (2013) looks at the current state of the cataloguing and how it currently fails to meet user expectations. He outlines the difficulties presented by MARC and the state of the ILS/OPAC. As with video materials, a compact disc or a musical score is likely to contain more than one work, meaning that “for one of the central material formats collected by a music library...users routinely find themselves searching for a distinct subset of the item record”. He finishes his explanation of FRBR perhaps somewhat frustrated:

...research has tended to demonstrate what music librarians have always understood—that relatedness among items and complexity of families is most prevalent in audiovisual collections.

Though later in the decade than their SPEC Kit release on video collections, the Association of Research Libraries (ARL) was also interested in the use and treatment of cartographic materials by member libraries.<sup>11</sup> As with their audiovisual counterparts, usage was steadily increasing and the demand for—and creation of—digital resources was also beginning to draw attention of map librarians. A more recent ARL survey saw that trend continue with the number of spatial data users increasing by 72% from 1999–2005 (Salem, 2005).

Lage (2007) examines the current cataloguing practices for electronic cartographic materials. She highlights the limits and inconsistencies of the current tools available to map librarians, in particular the AACR2, the LCSH, and MARC. In detailing this, she also illustrates how libraries have pushed these three standards to their limits. She uses the disconnection between the OPAC and an underlying MARC record, and its inability to display, and search by material types relevant to cartographic materials as an example of this. Welch & Williams (1999) also present challenges faced in cataloguing digital cartographic materials, citing a “lack of cataloguing

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<sup>11</sup> *The ARL Geographic Information Systems Literacy Project* (Davie, Fox, & Preece, 1999) following *Video Collections and Multimedia in ARL Libraries* (Brancolini & Provine, 1993).

rules” and the “highly technical nature of the information” as a reason maps are considered an equally “challenging” media type.

Other visual formats have also encountered issues. McRae & White (1998) in the ALA’s *ArtMARC Sourcebook* acknowledge the difficulties encountered cataloguing and presenting materials such as slides, paintings, and architectural drawings through MARC in existing library catalogues. A 2013 survey of 81 research libraries found that while standards were increasingly being used to catalogue images, not one prevailed (Kandiuk, Lupton, & Davidson, 2013). Dublin Core (81% of libraries) was used twice as often as MARC as a metadata standard for describing digital images with half indicating they were still using the AACR2 as a content standard.

## 5.8. Evaluation Frameworks

There are a range of definitions of what a digital library is. Borgman (1999) explores some of the ‘competing visions’ and concludes that there are two opposing ideas of what a digital library might be:

The research community’s definitions serve to identify and focus attention on research problems and to expand the community of interest around those problems. The library community’s definitions focus on practical challenges in transforming library institutions and services.

The library community vision is best summed up by the definition provided by the Digital Library Federation:

Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities (Waters, 1998).



Research community definitions are more varying in scope, however most share the attributes outlined by Fox (1993) when defining the National Electronic Library for the Digital Library Initiative:

1. A service
2. An architecture
3. A set of information resources, databases of text, numbers, graphics, sound, video, &c
4. A set of tools and capabilities to locate, retrieve, and utilize the information resources available

Fox usefully defines users as: students, teachers/professors, researchers/scholars, librarians, authors, publishers, information providers, practitioners; and contributors as: publishers, universities, professional societies, libraries, authors, editors, compilers.

Both library and research community definitions of 'digital library' in some part share a focus on the collection of 'digital works'. This study looks uses the research community definition of the digital library in order to assess evaluation criteria, and to apply those criteria in an evaluation of a digital library platform. The diversity of definitions also means that digital libraries can be viewed and evaluated from a number of positions. This study will use user-centred evaluation criteria in evaluating the digital library platforms.

#### 5.8.1. User-Centred Evaluation

The purpose of digital library evaluation is to assess what extent a digital library meets its objectives and offer suggestions for improvements (Chowdhury & Chowdhury, 2003). There are no standardised evaluation methods for evaluating digital libraries, though Xie (2008) summarises existing research in to the following categories:

- General digital library framework and evaluation criteria
- Specific digital library framework and evaluation criteria
- Usability studies
- Evaluation studies on other aspects

Of these categories, research on specific evaluation issues of digital libraries has received the most attention. While generalised evaluation criteria have been researched to some degree, these are largely derived from evaluation criteria of traditional libraries, human-computer interaction, and digital technologies (Xie, 2008).

Similarly, there has been an even smaller amount of research looking at frameworks and evaluation criteria for video digital libraries. Albertson (2015) notes that existing research has provided generalisations that could guide the development of frameworks or criteria, however this has often been concurrent with the development (and evaluation) of platforms developed for various visual collection types. He also highlights the lack of generalised evaluation criteria used for assessing visual digital libraries, and the issues faced applying study specific criteria to other collections, projects, or user groups.

Albertson & Ju (2015) define the video digital library as a system that enables users to retrieve, discover, assess, and use video information, spanning the entire interactive process from initial query modelling to actual playback and/or query refinement or reformulation. This definition is largely supported by descriptions of existing video digital library platforms such as the Informedia Digital Video Library (Wactlar, Kanade, Smith, & Stevens, 1996), the Físchlár Digital Video Library (Lee & Smeaton, 2002), and the Open Video Digital Library (Marchionini, 2004).

Though digital library framework and evaluation criteria (general or specific) for traditional digital libraries can be applied to video digital libraries, the characteristics of video materials such as the inherently visual and aural aspects, the temporal nature of the medium, diverse content, and broad appeal mean that these need to be supplemented further with criteria and standards that are designed for this in this context. The differences in the information search and retrieval methods used with video compared to more traditional textual resources also have to be taken in to account when developing or applying evaluation criteria for video digital library platforms. The need for this distinction is summed up by Albertson (2013):

The uniqueness of video as an information resource spurs independent examination of users, needs, and interactions, all as part of a comprehensive conceptual analysis of video retrieval, interface design, and digital library research.

Functionality, usability, and accessibility testing of digital library information platforms are essential for providing high quality services to a broad and diverse population of users (Bertot, Snead, Jaeger, & McClure, 2006). User-centred evaluation is a common approach for evaluating digital libraries, and is focused on assessing the functionality and value of these platforms from the perspective of end users. There have been a number of studies that aim to create frameworks and define criteria for the evaluation of digital libraries.

Saracevic & Covi (2000) highlighted that significant resources have been expended on digital library research and practice, though comparatively little attention at that time had been given to the evaluation of the digital library. They go on to speculate that this may be due to the relative infancy of the digital library, but then conclude that it is likely the complexity of the digital library as a concept meant that evaluation could not be undertaken with any standard evaluation techniques.

In agreement with Borgman (1999), they acknowledge the duality existing in the definition of a digital library and the library communities behind each. They suggest that this has presented some disagreement when answering the 'Why? What? How?' in relation to the development of evaluation criteria. They go on to outline five elements they believe must be met to satisfy initial requirements for an evaluation in the context of effectiveness and efficiency:

1. Construct
2. Context
3. Criteria
4. Measures
5. Methodology

However they admit that it's not clear what should be specified in each of the elements, and emphasise that more research is needed to reach a resolution.

Xie (2006) assesses user expectations of digital libraries to identify user-centred criteria for evaluation. In her study, she surveyed 48-subjects asking them to develop a set of evaluation criteria for digital libraries, and then apply them to an existing digital library platform. Following an analysis of the survey responses, she forms five common areas of evaluation criteria:

1. Interface usability
2. Collection quality
3. Service quality
4. System performance efficiency
5. User feedback solicitation

Xie's study not only identifies a common set of evaluation criteria, but also identifies areas of concern in existing digital library platforms. Although Xie's study differs from others before it in that evaluation criteria were developed by participants, the results are not dissimilar to criteria that were proposed by other studies.

Tsakonas & Papatheodorou (2008) in the development of their user-centred Interaction Triptych Framework define three criteria categories for evaluation to be used when measuring success in a digital library context: usability, usefulness, and performance. These sit between the three main components of the digital library: system, content, and user.

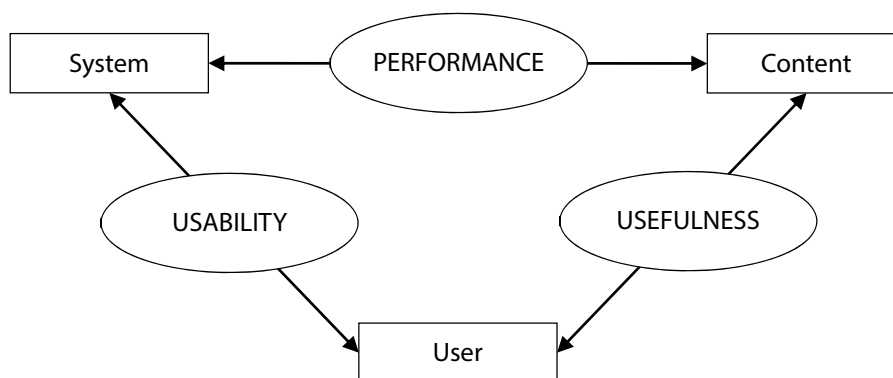


Figure 5-1: Interaction Triptych Framework (Tsakonas & Papatheodorou, 2008)

In their study, Tsakonas & Papatheodorou (2008) test the preferences of users in the three Framework categories. They find that usability and usefulness measures are higher, while scores for performance are lower. They also find that there is a correlation between usability and usefulness and that these jointly affect user satisfaction. Similarly, Buchanan & Salako (2009) look at both 'usability' and 'usefulness', breaking each down in to a number of attributes in order to develop an integrated and comprehensive model for evaluation. They determine that there are nine attributes to consider when evaluating the usability and usefulness of a digital library:

- Usability
  - Effectiveness
  - Efficiency
  - Aesthetic
  - Appearance
  - Terminology
  - Navigation
  - Learnability
- Usefulness
  - Relevance
  - Reliability
  - Currency

Like Tsakonas & Papatheodorou (2008), they conclude that usability and usefulness are not just related properties, but dependent properties of system satisfaction and usage that should be jointly considered and evaluated.

Zhang (2010) identified the lack of an holistic digital library evaluation model and constructed one using statistical techniques. She identified six areas that an evaluation should focus on:

1. Content
2. Technology
3. Interface
4. Service
5. User
6. Context

As an experiment, Zhang asks distinct groups of stakeholders to prioritise evaluation criteria for digital libraries. Her research identifies that there is a difference in criteria between each stakeholder group about what should be prioritised in the evaluation of a digital library. Service, interface and user evaluation criteria gained greater consensus among the groups whereas technology, context and content criteria received more divergent prioritisation.

### 5.8.2. User-Centred Design

The common threads of usability and usefulness in the above studies can be also described as *form vs. function*: usability focusing on characteristics of human-computer interaction (HCI) and interfaces, and usefulness concerned with the functionality promoted by a system. In their respective studies Tsakonas & Papatheodorou (2008), Xie (2006), Buchanan & Salako (2009), and Albertson & Ju (2015) all acknowledge that the way content is presented to the user has the potential to affect the usability of a digital library.

User-centred design is a design philosophy and approach that places users at the centre of the design process from the stages of planning and designing the system requirements to implementing and testing the product (Baek, Cagiltay, Boling, & Frick, 2008). Though this study is not concerned with the immediate design process of video digital libraries, the user-centred design process also provide some guidance on how evaluation criteria might be formulated.

#### 5.8.2.1. *The Elements of User Experience*

In *The Elements of User Experience*, Garret (2003) explores what it is to build a successful Web site and puts forward a model for how the user experience is designed. He presents a user-centred model broken into five 'elements' that exist within the 'planes' of the development process. Every Web site builds from the bottom up over the five planes:

1. Strategy
2. Scope
3. Structure
4. Skeleton
5. Surface

Importantly, each of the planes is split in two acknowledging the Web's dual functionality as a software interface, and as a hypertext system. The software system is mainly concerned with tasks, or the steps involved with a process and how users think about completing them. The hypertext system deals with information on the site and the meaning it has for users. Both of these feed into the creation of a satisfying user experience.

	Web as software interface	Web as hypertext system	Concrete
Surface	Visual Design		
Skeleton	Interface Design	Navigation Design	
	Information Design		
Structure	Interaction Design	Information Architecture	
Scope	Functional Specifications	Content Requirements	
Strategy	User Needs		
	Site Objectives		
			Abstract

Figure 5-2: The Elements of User Experience (Garrett, 2003)

Each of the planes is dependent on the planes below it; moving from strategy to surface they also move from being more abstract to concrete concepts.

Garrett's model helps to explain how the software interface and hypertext system elements relate to each other in the creation of a user experience. The lower three planes of strategy, scope, and structure, help answer the following questions:

- What are the needs of an organisation (and users,) and what do they want achieve?
- What functionality is required to meet those needs?
- How does that functionality best work together to meet those needs?

The top two planes, skeleton and surface, are design planes, asking:

- What form will functionality take?
- How will users do things and navigate, and how is that functionally arranged?
- How will functionality be visually presented to users?

Though users only see the results of the surface plane, their overall experience is created by the combination of all planes below it. “The choices you make on each plane affect the choices available to you on the next plane above it” with conclusions reached at the abstract levels manifesting in one complete design concept (Garrett, 2003).

Garret’s model can also be applied as a user-centred evaluation framework, using the five planes as a basis for evaluating usability of existing Web sites or systems, including digital libraries, and video digital libraries.

#### 5.8.2.2. *Don’t Make Me Think*

*“Sincerity...if you can fake that, the rest is easy”*<sup>12</sup>

The overarching theme of Krug’s *Don’t Make Me Think* (2000) is that a Web site should be as self-evident, obvious, and self-explanatory as humanly possible—that a Web site should always have a user’s best interests at heart. He is primarily concerned with how Garrett’s structure, scope, and strategy planes should be visualised, and how their implementation influences a user’s satisfaction of a Web site.

The design of a Web site, and the visualisation of three planes is largely limited by the Web technologies available to designers. The first of the ‘browser wars’ in the late 1990s (“Browser wars,” 2016) between Internet Explorer and Netscape Navigator was ultimately about making the Web more interactive—making it less about documents, and more about experience.<sup>13</sup> Both competitors aimed to achieve this interactivity by wilfully ignoring parts of—or unofficially manipulating—Web standards in order to outdo one another on the climb to the top.

The three core Web standards, HTML, CSS, and JavaScript were to some degree affected by this, and although designers and developers tried their best to support the varying non-standard implementations, the Web was largely a compromise between compatibility and functionality

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<sup>12</sup> This quote is largely un-attributable, but is well discussed by O’Toole (2011).

<sup>13</sup> This is the same duality that Garret (2003) presents for the Web as hypertext system vs. a software interface.



until the second browser war was won in the mid-2000s. Ultimately it was the user who was presented with a lesser—or at least frustrating—Web experience. At the same time, the Web was developing design conventions that users were beginning to respond to. These included visual hierarchy, navigation, structured content, and virtual metaphors; all have conventions associated with them (Krug, 2000). Using these conventions helps the user to do as little ‘thinking’ as possible, creating a ‘sincere’ user experience.

Krug suggests that exploiting (or not exploiting) these conventions can significantly effect a user’s impression of a Web site. He presents this as the ‘Reservoir of Goodwill’, the notion that users arrive at a Web site with a level of goodwill which can be lowered (or raised) depending on the success of the interactions a user has on a Web site. The reservoir is limited and if a user has too many unsuccessful experiences, they may leave the site, or form other views. It may influence whether a user revisits a site, or forms opinions about the organisation responsible. The reservoir is variable between users, often situational, refillable, and able to be ‘emptied’ in one go (Krug, 2000).

The ability of a Web designer to take advantage of available technologies, and design conventions has a significant impact on the usability of a Web site—including digital libraries, and video digital libraries.

## 6. Methodology

### 6.1. Research Design

This study seeks to address the question of how well existing catalogues and video digital library platforms perform against criteria found in interaction and design frameworks. This will be accomplished by comparing the literature with real-world practices as embodied by a variety of video digital libraries in academic environments.

Firstly, this study will present a list of evaluation criteria. This will be used to evaluate the catalogues and video digital library platforms examined in this study.

The catalogues and video digital libraries that will be examined are:<sup>14</sup>

1. Avalon Media System
2. Ex Libris Digitool
3. Ex Libris Primo
4. Ex Libris WebVoyage
5. Filmmakers Library Online
6. Kanopy Streaming Service
7. Moving Image Research Collections
8. Naxos Music Library
9. Open Video Project
10. TV and Radio
11. UDVD
12. Vanderbilt Television News Archive

These were selected based on the following criteria (Albertson & Ju, 2015):

- They present video materials, or records to identify and locate video materials
- They are easily recognisable as an information retrieval tool
- The audience and their needs are able to be identified

The following additional criteria were also applied:

- Platforms are either publically accessible, or are available after authenticating with The University of Auckland or Victoria University of Wellington Libraries.
- Platforms are used or created by academic libraries

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<sup>14</sup> Further details about the platforms are available in *Appendix A: Platform Details*.

Next the chosen catalogues and video digital library platforms were judged against the evaluation criteria defined in 6.2.1 *Evaluation Criteria*.

Lastly, the final section will examine issues raised by applying the evaluation framework to various catalogues and video digital library platforms. It will contain some discussion about how future projects can be improved to better adapt to the changing needs of library users.

When a search term was required during the evaluation of a platform, the keyword *water* was used to begin a search.

From this point forward, the term *platform* will be used to refer to either a catalogue or video digital library unless otherwise specified.

## 6.2. Evaluating Video Digital Libraries

In their article *Design criteria for video digital libraries: Categories of important features emerging from users' responses* Albertson & Ju (2015) report on findings of a survey conducted to answer two primary research questions:

1. What are users' criteria for video digital libraries? In other words what do users expect as part of their experiences with a video digital library?
2. And, subsequently, what are the ranked priorities for the different criteria based on frequencies among actual responses of users?

From the results of the survey, they were able to present four primary categories of user requirements:

1. Retrieval functionality
2. User interface
3. Collection qualities
4. User support

These were broken in to a further 28 subcategories based on user responses.

The four primary categories used in this evaluation are consistent with the findings of those exploring the usability of digital libraries in 5.8 *Evaluation Frameworks*.

### 6.2.1. Evaluation Criteria

The video digital libraries selected in this study will be evaluated against the four primary and 28 subcategories presented by Albertson & Ju (2015) detailed in the following table:

Primary Categories	Identifiers	Subcategories	Example responses	
1. Retrieval functionality	1a	Query customisation	Advanced and fielded search choices	
	1b	Categorical browse	Videos grouped by categories or topic	
	1c	Filtering (facets)	By date, source, alphabetical, &c.	
	1d	Search effectiveness	Relevance rank	
	1e	Social retrieval	Most popular, most viewed, user rated; trending topics	
	1f	Search history	Viewing previously watched and saved videos	
	1g	Free text query ability	Keyword searches	
	1h	Search results browse	Video thumbnails; results sorting	
	1i	Video linking	Recommended "more like this" videos and based on previous searches	
	1j	Query assistance	Search term recommendations	
	2. Collection qualities	2a	Video quality	Streaming, watching, durations
		2b	Image quality	Quality still images and graphics
2c		Audio quality	Audio quality matching up to video; high quality audio	
2d		Video formatting	Compatibility	
2e		Credibility/unbiased	No ads; reliable source	
2f		Originality	Content is original and relevant	
2g		Current	New content page or list; latest programmes	
2h		Extensiveness	Collection size; archived videos available	
2i		Video permissions	Downloadable	
2j		Item metadata	Accurate titles, video descriptions, representative images	

Primary Categories	Identifiers	Subcategories	Example responses
3. User interface	3a	Clear design and layout	"Usability"; easy to use; ease to search and navigate the collection
	3b	Playback/player	Resolution; large viewing area; player functions
	3c	Surrogates	Representative image, ability to assess video content
4. User support	4a	Help	FAQ
	4b	User communication	Discussion boards
	4c	Accessibility	Subtitle; multi-lingual; text fonts
	4d	Linking/posting externally	On same topic; social media posting
	4e	Outside video use support	Embedding in PPT; generating citations for videos

*Table 6-1: Table of Evaluation Criteria taken from Albertson & Ju (2015)*

### 6.2.2. Evaluation Method

Each platform selected for this study will be surveyed and evaluated against the evaluation criteria. To provide clarity, only three options are provided for each criterion with comments made against each where applicable:

1. Y – Yes, fulfils the criterion
2. N – No, does not fulfil the criterion
3. P – Partial, fulfils some of the criterion

The results of the study are reported in a table. Following that, there is a discussion and analysis of the findings of the study.

### 6.3. Limitations

As a content analysis, this study does not directly measure the needs of actual users. Rather, the needs of users are inferred from the studies performed by other academics.

Another limitation is the relatively small sample of size. There is not a great wealth of literature specifically relating to video digital libraries in an academic setting, therefore much of the

literature is sourced from other fields, or related to other types of media. In addition, trends in academia may not necessarily reflect real trends in user needs.

Though Albertson & Ju's (2015) criteria were chosen to incorporate user-centred evaluation criteria specific to video digital libraries from a user perspective, some criteria go beyond the scope of this study. The main reason for this being that they require complex answers. Although these criteria could have been evaluated in a more nuanced way, it would have expanded the scope of the study significantly. These criteria are still incorporated in the evaluation table, though their response is indicated as N/A – Not Applicable.

- 2a – Video quality
- 2c – Audio quality
- 2f – Originality
- 2h – Extensiveness
- 2j – Item metadata

Albertson & Ju's (2015) criteria were developed in the context of only one video digital library platform. Though the *C-SPAN Digital Video Library* meets the criteria under *6.1 Research Design* there is research that suggests collections themselves can have an effect on user expectations (Mills, 2015), and that mass availability of digital materials has altered user expectations of digitised collections (Bantin & Agne, 2010; Oliver, 2011). The use of only one video digital library in Albertson & Ju's study may have influenced the development of the evaluation criteria.

Evaluation of the video digital libraries was undertaken on a PC with a widescreen display, running Microsoft Windows, using the Google Chrome Web browser.<sup>15</sup> The most current version of Adobe Flash Player was installed to allow Google Chrome to display video on some video digital libraries. This configuration, especially the choice of Web browser, could present compatibility issues with some of the platforms during evaluation. However, testing each

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<sup>15</sup> Microsoft Windows, version: 8.1. Google Chrome, version: 49.0.2623.87 m. Adobe Flash Player, version: 21.0.0.197. Display resolution: 1920 x 1080.

platform against a diverse number of computing configurations would be time consuming and not necessarily represent real-world usage. As this study is concerned with the availability of functionality, rather than its display, this choice is unlikely to alter the findings.

The recommended Web browser requirements for some of the platforms (such as older versions of Microsoft's Internet Explorer and Mozilla Firefox,) are no longer supported or have negligible usage. The configuration used in this study is in line with current desktop Web browser, operating system, and display trends.<sup>16</sup>

### 6.3.1. Conflict of Interest Disclosure

I am currently employed by The University of Auckland Library as the Media Archives Systems Specialist. I am responsible for the on-going maintenance of several audiovisual collections, and am heavily involved with the development of the Library's video digital library, TV and Radio. I operate the platform as an administrator, and am a user of its publically accessible discovery interface. This may cause me to look less critically at the TV and Radio platform, however it does not feature as a major part of this study.

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<sup>16</sup> According to one data provider at February 2016. Microsoft Windows, share: 76%. Google Chrome, share: 69%. Display resolution: 97% of users at 1024 x 768 resolution or higher (w3schools.com, 2016).

## 7. Results

### 7.1. Table

Primary Categories	Identifiers	Subcategories	Avalon Media System	Ex Libris Digitool	Ex Libris Primo	Ex Libris WebVoyage	Filmakers Library Online	Kanopy Streaming Service	Moving Image Research Collections	Naxos Video Library	Open Video Project	TV and Radio	UDVD	Vanderbilt Television News Archive
1. Retrieval functionality	1a	Query customisation	N	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y
	1b	Categorical browse	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	1c	Filtering (facets)	Y	N	Y	N	Y	Y	Y	N	N	Y	Y	N
	1d	Search effectiveness	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y
	1e	Social retrieval	N	N	N	N	N	P	N	N	P	P	N	N
	1f	Search history	N	Y	Y	Y	N	N	N	N	N	N	Y	N
	1g	Free text query ability	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	1h	Search results browse	Y	P	P	P	Y	Y	Y	N	Y	Y	Y	P
	1i	Video linking	N	N	N	N	Y	Y	N	N	N	N	N	N
	1j	Query assistance	N	N	P	N	N	N	N	N	N	N	N	N
2. Collection qualities	2a	Video quality	N/A											
	2b	Image quality	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	N
	2c	Audio quality	N/A											
	2d	Video formatting	P	P	N	N	P	P	P	P	N	Y	N	N



Primary Categories	Identifiers	Subcategories	Avalon Media System	Ex Libris Digitool	Ex Libris Primo	Ex Libris WebVoyage	Filmakers Library Online	Kanopy Streaming Service	Moving Image Research Collections	Naxos Video Library	Open Video Project	TV and Radio	UDVD	Vanderbilt Television News Archive
	2e	Credibility/unbiased	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	2f	Originality	N/A											
	2g	Current	N	N	N	N	N	Y	N	Y	Y	P	Y	N
	2h	Extensiveness	N/A											
	2i	Video permissions	N	N	N	N	N	N	N	N	Y	P	N	N
	2j	Item metadata	N/A											
3. User interface	3a	Clear design and layout	Y	N	Y	N	Y	Y	Y	Y	N	Y	Y	Y
	3b	Playback/player	Y	Y	N	N	Y	Y	Y	Y	N	Y	N	N
	3c	Surrogates	Y	N	N	N	Y	Y	Y	P	Y	Y	P	N
4. User support	4a	Help	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N
	4b	User communication	N	N	N	N	N	N	N	N	N	N	N	N
	4c	Accessibility	N	N	N	N	P	P	N	P	N	P	N	N
	4d	Linking/posting externally	N	N	Y	N	Y	Y	N	N	N	N	N	N
	4e	Outside video use support	Y	N	N	N	Y	Y	N	N	N	N	N	N

Table 7-1: Table of Evaluation Results

- Evaluation of the platforms was undertaken during the period 1–8 April 2016

## 7.2. Totals

Evaluation Score	Avalon Media System	Ex Libris Digitool	Ex Libris Primo	Ex Libris WebVoyage	Filmakers Library Online	Kanopy Streaming Service	Moving Image Research Collections	Naxos Video Library	Open Video Project	TV and Radio	UDVD	Vanderbilt Television News Archive
Y	12	8	9	6	15	15	10	9	10	11	10	6
N	9	13	12	16	6	4	12	11	12	7	11	16
P	1	2	2	1	2	3	1	3	1	4	1	1

Table 7-2: Table of Evaluation Scores by Platform



### 7.3. Rankings

Primary Category	Identifiers	Subcategories	Y	N	P
1	1g	Free text query ability	12	0	0
2	2e	Credibility/unbiased	12	0	0
1	1b	Categorical browse	10	2	0
1	1d	Search effectiveness	10	2	0
3	3a	Clear design and layout	9	3	0
1	1a	Query customisation	8	4	0
2	2b	Image quality	8	4	0
1	1c	Filtering (facets)	7	5	0
3	3b	Playback/player	7	5	0
4	4a	Help	7	5	0
1	1h	Search results browse	7	1	4
3	3c	Surrogates	6	4	2
1	1f	Search history	4	8	0
2	2g	Current	4	7	1
4	4d	Linking/posting externally	3	9	0
4	4e	Outside video use support	3	9	0
1	1i	Video linking	2	10	0
2	2i	Video permissions	1	10	1
2	2d	Video formatting	1	5	6

Primary Category	Identifiers	Subcategories	Y	N	P
4	4b	User communication	0	12	0
1	1j	Query assistance	0	11	1
1	1e	Social retrieval	0	9	3
4	4c	Accessibility	0	8	4
2	2a	Video quality	N/A		
2	2c	Audio quality	N/A		
2	2f	Originality	N/A		
2	2h	Extensiveness	N/A		
2	2j	Item metadata	N/A		

Table 7-3: Table of Subcategories Ranked by 'Y' Count



## 7.4. Comments

Platform	Identifiers	Subcategory	Comments
Avalon Media System	2d	Video formatting	Video playback requires Adobe Flash Player
Ex Libris Digitool	1f	Search history	Search history available for current session and for save after login, though difficult to discover
	1h	Search results browse	Includes only some functionality: results sorting. Generic thumbnails are displayed indicating format rather than content
	2d	Video formatting	Video playback requires Adobe Flash Player
Ex Libris Primo	1a	Query customisation	Advanced and fielded search choices available, however they are broad terms which are difficult to map to audiovisual items
	1f	Search history	Search history available for current session and for save after login, though difficult to discover
	1h	Search results browse	Includes only some functionality: results sorting. Generic thumbnails are applied indicating format rather than content
	1j	Query assistance	Text auto-complete only available on Basic Search single search box
	2d	Video formatting	Only provides a link to content available elsewhere on the Web, or a location of physical copy
Ex Libris WebVoyage	1c	Filtering (facets)	Allows for filtering by non-dynamic pre-defined search limits
	1f	Search history	Search history available for current session and for save after login, though difficult to discover
	1h	Search results browse	Includes only some functionality: results sorting. Generic icons are displayed indicating format rather than content
	2g	Current	RSS feeds are available for new content, however this is managed outside the platform

Platform	Identifiers	Subcategory	Comments
Filmakers Library Online	2d	Video formatting	Video playback requires Adobe Flash Player
	4c	Accessibility	Captions aren't present on video player, but transcripts are available for some items
Moving Image Research Collections	2d	Video formatting	Video playback requires Adobe Flash Player
Kanopy	1e	Social retrieval	Includes categories 'Buzzworthy' and 'Student Picks' but it's unclear whether these are automatically or manually generated
	2d	Video formatting	Video playback requires Adobe Flash Player
Naxos Music Library	2d	Video formatting	Video playback requires Adobe Flash Player
	3c	Surrogates	Features thumbnails of production artwork, but not of the video itself
	4c	Accessibility	Includes only some functionality: captions (only for some items)
Open Video Project	1e	Social retrieval	Includes only some functionality: most popular
	2d	Video formatting	
	3b	Playback/player	Only available to display short excerpt using a deprecated browser plugin
TV and Radio Beta	1e	Social retrieval	Includes only some functionality: most popular, most viewed
	2g	Current	Functionality presented as a facet
	2i	Video permissions	Platform requires authentication. Only video from 'Recently Screened' available for download
	4c	Accessibility	Includes only some functionality: captions (only for some media)

Platform	Identifiers	Subcategory	Comments
Vanderbilt Television News Archive	1h	Search results browse	Includes only some functionality: results sorting. No icons or thumbnails displayed

*Table 7-4: Table of Comments Made During Evaluation*



## 8. Evaluation and Findings

### 8.1. Evaluation

Five of the 28 criteria presented in 6.2.1 *Evaluation Criteria* were excluded from the evaluation. Percentages under section 8.1. *Evaluation* are calculated out of the 23 remaining criteria.

#### 8.1.1. Retrieval Functionality

Criteria in primary category 1. *Retrieval Functionality* were the best performing with over half the category in the top 50% of criteria included in all platforms. All platforms fully achieved the 1g *Free text query ability* criterion providing at least a ‘single search box’ interface. Criteria 1b *Categorical browse* and 1d *Search effectiveness* also featured highly with almost all meeting the criteria. 1f *Search history* was achieved by four platforms. The three Ex Libris platforms allowed for search history to be saved as well as displayed for each session, though the functionality was not easy to discover. UDVD tracked search history for a single session only.

Four platforms did not meet the 1a *Query customisation* criterion, instead relying on 1g *Free text query ability* and 1c *Filtering (facets)* to deliver ‘advanced search’ functionality. Just over half of platforms achieved the 1c *Filtering (facets)* criterion with no partial implementations. Similarly, 1h *Search results browse* is achieved by seven platforms, though four also partially achieved this by only allowing for sorting of results, not displaying any thumbnail images, or only displaying generic format iconography. Only two platforms implemented any recommendation functionality to fulfil criterion 1i *Video linking*.

Two criteria from 1. *Retrieval functionality* did not fully feature in any of the platforms: 1e *Social retrieval* and 1j *Query assistance*. Some platforms however did partially implement these criteria: Ex Libris Primo featured search suggestions through its ‘single search box’ interface; three other platforms (Kanopy Streaming Service, Open Video Project, and TV and Radio) featured a combination of most popular, most viewed, user rated, or trending topics displays as social retrieval features.



### 8.1.2. Collection Qualities

All criteria excluded from the evaluation came from primary category 2. *Collection qualities*.

All platforms achieved the *2e Credibility/unbiased* criteria, none including adverts on Web pages or as part of the video stream.<sup>17</sup> Two-thirds of platforms included quality still images and graphics (including interface elements and *3c Surrogates*) fulfilling the *2b Image quality* criterion.

Five of the evaluated platforms fully or partially provided a list or page featuring new content satisfying the *2g Current* criterion. The criterion *2i Video permissions* was the poorest performing of primary category 2, with only one platform each fully and partially providing functionality to download video.

Only one platform evaluated fully achieved criterion *2d Video formatting* not relying on a browser plugin to deliver video to users. Half of the platforms evaluated partially achieved the criterion, offering video playback with the assistance of a plugin.

### 8.1.3. User Interface

In primary category 3. *User Interface* platforms generally performed well on the *3a Clear design and layout* criterion. Three platforms did not achieve this criteria: Ex Libris Digttool and WebVoyage, and Open Video Project. These platforms did not fulfil the criterion because they were the least consistent with *5.8.2 User-Centred Design*.

Platforms that achieved the *3b Playback/player* criterion all included the ability to play video directly in the browser rather than provide the video as a file download. The player available on each platform included basic control functionality (play/pause, volume control/mute, full screen/windowed.)

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<sup>17</sup> TV and Radio does feature advertising in its streaming media, however this is due to its nature as an ex-air collection of television and radio broadcasts.

Six platforms achieved the *3c Surrogates* criteria by presenting at least one thumbnail image of the content of a video. The platforms that partially met the criteria only presented related images (still photographs or DVD cover art) and not an image that was directly extracted from the video. Those that did not meet the criteria did not display any image or only displayed generic format iconography.

#### 8.1.4. User Support

Criteria in primary category *4. User Support* were the least likely to be achieved by any platform, with only one of the category's criteria entering the top 50% of criteria. Just over half of the platforms included functionality fulfilling the *4a Help* criterion, though none achieved the *4b User communication* criterion. *4c Accessibility* was only partially achieved by three platforms, each offering the ability to display subtitles with each video when available. Some non-English language materials were accompanied by English subtitles, however all platform interfaces were exclusively in English.

Only three platforms provided the capability to directly share a video with other users to fulfil the *4d Linking/posting externally* criterion. Likewise, only three delivered functionality allowing users to embed the video outside the platform, fulfilling the *4e Outside video use support* criterion.

## 8.2. Findings

*How well do existing catalogues and video digital library platforms perform against criteria found in evaluation and design frameworks? – 3.1 Primary*

### *Question*

Not one of the video digital libraries or catalogues evaluated featured functionalities that allowed all criteria to be achieved. Criteria used for this evaluation were developed by Albertson & Ju (2015) following a survey of user expectations of video digital libraries. As none of the platforms evaluated achieved a full score, it is fair to conclude that none of the platforms evaluated completely meet user expectations.

There was a strong link between the age of a platform and its performance. The criteria used for evaluation were collated in 2014<sup>18</sup> and the expectations of modern users are likely to be different from users contemporary to the older platforms in this study. Older platforms no longer meet user expectations—assuming they did to begin with—though newer platforms don't meet all the criteria either. All platforms are still available for use by modern users, and therefore are open to evaluation with contemporary criteria.

Other than the age of the platforms, performance against the criteria can be broken into three categories: search and retrieval; technology; and structure, scope, and strategy.

### 8.2.1. Search and Retrieval

All platforms implemented at least a 'basic search' functionality allowing for keyword searches. Newer platforms were less likely to have 'advanced search' interfaces, relying on users to fall back on browse functionality, or to use post search faceting. Despite the lack of 'advanced search' in some platforms, it would seem that users are aware of the need to facet search results and browse post-search. This is supported by literature on search and retrieval, especially the findings of Huurnink et al. (2010) and Jørgensen & Jørgensen (2005). This shows that platforms have developed over time, both meeting pre-existing user expectations and fostering new expectations which have developed as a result of innovations such as social media and recommendation and query assistance algorithms.

This is also consistent with the preference for—and interactions promoted by—'single search box' interfaces. The lack of or obscurity of 'advanced search' functionality in some platforms is in line with literature observing the 'Google-isation' of search and the desire of libraries to emulate the 'Google experience' (Breeding, 2007; Luther, 2003; Murray, 2008). What isn't Google-like is the visual prominence initially given to the 'single search box' for the majority of the platforms evaluated in this study. Though the functionality is there, the 'single search box'

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<sup>18</sup> Albertson & Ju's (2015) user survey was undertaken in the Northern Hemisphere spring and summer of 2014.

is often smaller in size, and frequently placed in a location suggesting it might not be a primary function of the platform.

Although this study is not concerned with the visual design process of video digital libraries, in some cases it is difficult to remove the visual design from the interface, information, and interaction design of the platforms.<sup>19</sup> A majority of platforms gave prominence to browse functionality over searching to prompt the discovery process. The literature is clear about search needing a more prominent role in the retrieval of visual materials, relative to browsing. The literature is also clear about user preferences to begin a search with a query, and then browse as a way of refining and selecting materials. Reasons for this design strategy could be due to a lack of comprehensive metadata, the collection type, or simply to emphasise serendipitous discovery. Overall results from this study support the conclusion that the search strategy and retrieval techniques specific to audiovisual materials are, at best, being selectively used in the development of these platforms.

### 8.2.2. Technology

The impacts of technology were also visible in the results of this study with the age of each platform a strong indicator of its performance. It is evident that expectations and experiences of modern users differ from the historical expectations users had of the platforms evaluated. Technology available in 2014 was markedly improved from what was available in 1998 when the Open Video Project was first released, or the initial implementation of Ex Libris WebVoyage was being developed in the mid-1990s.

Delivering video materials over a network to users was historically one of the more challenging requirements of a video digital library. Delivery was reliant on sufficient network infrastructure, digital storage, processing power, not to mention readily available digital video; all things that have only become possible since the mid-2000s. Because of this, the newer platforms are more likely to offer streaming video, and in this study tended to achieve more of the criteria than

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<sup>19</sup> See 5.8.2.1 *The Elements of User Experience*.

those that didn't. The five platforms that didn't natively deliver streaming video to users (Ex Libris Digitool, Primo, and WebVoyage; UDVD, and Vanderbilt Television News Archive) were generally older, and the poorest performing of the platforms evaluated.

The majority of platforms that did deliver streaming video did so using Adobe Flash Player, restricting the availability of streaming video to a limited number of devices. This largely excludes mobile phones and tablets. Also, the future of Adobe Flash Player on the desktop Web browser is limited as by the end of 2016 Google Chrome will join Mozilla Firefox, deactivating Flash by default. This will require user interaction to enable it for all but a few high profile 'whitelisted' Web sites (Bright, 2016).

What we learn is that developers of the platforms evaluated have not frequently updated their products, and are not keeping pace with the changing expectations of the users. The newer platforms are better at delivering on user expectations, and it seems that developers are getting better at building platforms that meet user needs. With that being said, none of the platforms fully met all evaluation criteria though the trend is for delivery of more features, as well as users expecting more from technology.

### 8.2.3. Structure, Scope, and Strategy

*“The difference between a successful approach and one doomed to failure really comes down to two basic ideas: understand what problem you're trying to solve...[and] understand the consequences of your solution to the problem”*

*(Garrett, 2003)*

#### 8.2.3.1. One Size Fits All?

Platforms focussed on delivering a single material type tended to outperform those that delivered multiple types. These platforms had more in common with OPACs and discovery layers than video digital libraries. The platforms that were required to present multiple types did not achieve many of the key criteria for delivering audiovisual materials to users. The lack of specificity fell into two categories: visual elements and retrieval.

The platforms excluded *visual elements* such as thumbnail images from search results and on the display of a record, and lacked streaming or download support. Overall there was a distinct lack of any elements that would give the user the ability to visually assess audiovisual materials before playing or physically locating an item. *Retrieval* functionality, such as video browse and many of the social elements such as content recommenders, related content results, and trending content were also missing. Many of these are prohibited by limited metadata support and the lack of visual elements. Advanced search functionality and faceting in these platforms was also much less specific, excluding audiovisual elements such as duration, broadcast/release date, format, availability of captioning, or alternative language audio.

Research looking at the treatment of audiovisual materials in OPACs and discovery layers, description and access, and video digital libraries has provided clear indications of the different nature of audiovisual materials. Audiovisual materials are fundamentally different to the ‘books and paper’ traditionally delivered by libraries through their catalogues and it is reasonable to expect the requirements of discovery will also vary. Results of this study indicate that one size does not fit all, and existing OPACs and discovery layers are not enhanced for audiovisual materials.

#### 8.2.3.2. *One Day You’re In, and the Next Day You’re Out*

For both video digital libraries and catalogues it is also important to look at which criteria were and were not fully achieved. 11 of 23—almost 50%—of criteria were more likely not to be fulfilled by the platforms evaluated. These can be grouped into three broad categories: retrieval functionality, reuse, and feedback.

Five criteria fell into the *retrieval functionality* category:

- 1e – Social retrieval
- 1f – Search history
- 2g – Current
- 1i – Video linking
- 1j – Query assistance

These criteria focussed on the availability of functionality such as the display of most popular or viewed content, user ratings, and trending topics. Similarly video linking, providing recommendations for similar content, and display of newly added content is included here. Additionally, remembering, suggesting, and learning from a user's search behaviour is key in this area.

Many of these features are likely to be found in 'consumer' video digital libraries<sup>20</sup>, or Web search engines, which is likely to explain their inclusion as evaluation criteria to begin with. They are also features less likely to be found in the traditional library catalogues. This type of functionality is reliant on the collection of data, and ability of a Web site to allow for personalisation. For example, content recommenders, related content results, and trending content views either rely on manually linking content; comprehensively describing content using controlled, structured metadata; or using complex computer algorithms. Research into CBIR, description, and discovery has provided clear indications of the barriers encountered in implementing these features for audiovisual materials.

Search history and query assistance—possibly the poorest performing of all criteria—are implemented in a small number of platforms, however not in a way that modern users might expect it, or in a way that allows other functionality to be taken advantage of. Search history is persistent only for the session a user is active in at a time, and is not easily discoverable, being displayed as tables of data in a 'My Account' type section. Similarly, query assistance in the one platform where it was implemented was drawing on data from real user searches to provide autocomplete suggestions while typing, though it didn't make any attempt at correcting spelling mistakes or provide alternative searches in the event of no results being returned.

The most likely encounter for a user of these two features is the Google search engine. Though there is emphasis on, and evidence of, the 'single search box'—as discussed in 8.2.1 *Search and Retrieval*—it is evident that there is more to 'Google-isation' of search than simply creating 'one

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<sup>20</sup> See Appendix B: 'Consumer' Video Digital Libraries for examples.

box to rule them all'. These features, lacking in the majority of platforms in this study, are an indicator that they are still not meeting user expectations in this respect.

Criteria in the *reuse* category—2d – Video formatting, 2i – Video permissions, 4d – Linking/posting externally, and 4e – Outside video use support—are focussed on the use of content in a context outside the platform. For example the ability to share content on social media, embed or download content to use in other places, or automatic generation of citations. The poor performance of these three criteria is disappointing given the strong and increasing demand for audiovisual resources in teaching and learning at a tertiary level. It is also unfortunate as the same cohort of 'visual learners' currently at colleges and universities are also heavy users of social media who might benefit from distributing content in this way. Given the widespread use of learning management systems, and online delivery of classes in the tertiary sector, it does appear to place barriers between content and learning.

There are mixed opinions about how far social media service should be integrated into academic library platforms. Links between services such as Facebook or LibraryThing and library catalogues may be frowned upon in the context of an industry that prides itself as being an authoritative and controlled source of information. Some see the integration as contributing "little value" (Wenzler, 2007) though others acknowledge the benefits of allowing users to share their discoveries on social media (Farkas, 2007; Tarulli & Spiteri, 2012). Though there is much less literature on the integration of social elements with established library services such as the OPAC, there is good deal more documenting the experiences and benefits of libraries placing their search tools in social media contexts (Graham, Faix, & Hartman, 2009; Jacobson, 2011).

Licensing restrictions placed on content delivered through library subscriptions may also make implementing features in this category less attractive, or more difficult. Sharing content with an audience who aren't guaranteed to be able to view it may make it less appealing. Even if it were possible, technical issues in providing authentication to licenced services may prove challenging. Likewise licensing, digital rights management, and piracy issues are likely to have an effect on whether content is available for download rather than streaming, a common concern when delivering audiovisual content online to users.



The two final criteria, 4c – Accessibility and 4b – User communication, in the *feedback* category were also poor performing criteria. The World Wide Web Consortium’s (W3C) Web Content Accessibility Guidelines (WCAG) provide a basis for making content accessible for people with disabilities. The W3C is placing an increased focus on accessibility of multimedia content. Though there is some research on the usability of digital libraries, there is less specifically on the needs of the users with disabilities (Chandrashekar & Caidi, 2007). There is a marked absence of usability studies looking at the WCAG and video digital libraries. For time-based media, the WCAG lists transcripts, audio description, and video captioning as alternatives for video and audio content (World Wide Web Consortium, 2008). Four of the platforms evaluated partially filled the criteria for accessibility either providing captioning or transcripts, however none of the four did so for all items displayed to users. None provided any form of audio description. It is clear that there is further work and research to be done on the accessibility of video digital library platforms.

### 8.3. Secondary Findings

*How could delivery systems of audiovisual content be made more responsive to the needs of users? – 3.2 Secondary Questions*

For platforms to meet the needs of users, they have to respond to user needs. Taking a user-centred approach to evaluation and design can provide distinct feedback for creating and evaluating platforms to ensure they are responsive to the needs of users.

There are key themes around the functionality that is being implemented in the findings of this study, though not one platform achieved the same set of criteria as another. With such a varied set of results, it is unclear what direction developers of platforms are taking when creating platforms to deliver audiovisual materials to users. Frequent re-evaluation would benefit platforms, identifying changes in user needs and developments in technology. Placing users at the centre of the process would also improve outcomes.

*How well are libraries differentiating audiovisual materials from other materials? – 3.2 Secondary Questions*

Audiovisual materials are just one of many resource types offered by academic libraries. From the point of acquisition, through cataloguing, access, and circulation they have largely been treated in a homogeneous way with other library resources. At the same time however, they have been identified as materials that require special treatment by those who work with them closely. From a librarian's perspective, audiovisual materials are often acquired for different purposes, and need different approaches in cataloguing, classification, and shelving. From the perspective of a user, they are used, viewed, interpreted in different ways to non-book materials.

The 'behind the scenes' treatment of audiovisual materials by libraries is impacting on how well they are able to differentiate these materials to users. For example, discoverability and browseability are two areas that are lacking in OPACs and next-generation catalogues. The lack of visuals and audiovisual specific metadata available to the interface limit the impact of any iconographic or textual differentiation provided to the user.

## 8.4. Further Topics

### 8.4.1. Metadata and video digital libraries

Both the quality of metadata, and the choice of metadata schema can have an effect on the success of a digital library (Beall, 2006; Chan, 2008). There are a range of audiovisual specific metadata schema available, and different approaches to their usage and implementation. Exploring the role of metadata and schema in video digital libraries could explain more about the limitations of existing platforms and provide opportunities to increase user satisfaction.

### 8.4.2. The role of a browsing in academic video digital libraries

Though there is research detailing the role of browse techniques for other visual media, there is a smaller amount of research directly addressing audiovisual media. What research is available is largely in the context of various CBIR platforms. Though this gives some idea of the patterns of users, it is removed from the use of 'real world' video digital libraries—especially the type

evaluated in this study. An investigation of browse techniques in these platforms would be useful for understanding and improving user experience.

#### 8.4.3. Evaluating the non-evaluated criteria

There were five criteria that were not included for evaluation in this study: video quality, audio quality, originality, extensiveness, item metadata. Research suggests that at least some of these criteria can have an effect on a user's perceived experience. A study measuring the success of a platform based on these criteria would give further understanding of a user's perception of a platform.

#### 8.4.4. Evaluating 'consumer' video digital libraries<sup>21</sup>

'Consumer' video digital libraries outside academic libraries such as YouTube, Netflix, broadcaster on-demand platforms (TVNZ OnDemand, 3NOW), and others have large amounts of popular content, and large numbers of users. As this study has been limited to platforms in an academic library context evaluating the performance of these platforms is worthy of investigation.

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<sup>21</sup> See *Appendix B: 'Consumer' Video Digital Libraries* for examples.

## 9. Conclusion

This study investigated how well video digital libraries and catalogues used in academic libraries meet user expectations. It evaluated twelve platforms against 23 user-centred criteria, divided into four core areas: retrieval functionality, user interface, collection qualities, and user support. These criteria were developed following a survey on user expectations of a video digital library. The evaluation identified three key issues in the usability of the video digital libraries and catalogues. Additionally, a review of the literature summarised important areas of research relevant to audiovisual materials in libraries and presented an overview of the difficulties those working with audiovisual materials are facing.

In summary, not one of the video digital libraries or catalogues evaluated featured functionalities that allowed all criteria to be achieved. As none of the platforms evaluated achieved a full score, it is fair to conclude that none of the platforms evaluated completely meet user expectations. The evaluation identified three key issues: search and retrieval, technology, and structure, scope, and strategy. Firstly, search and retrieval techniques supporting audiovisual materials are not consistently used in the platforms evaluated. Secondly, developers of platforms evaluated have not frequently updated their products, and are not keeping pace with the changing expectations of the users. Finally, audiovisual materials are fundamentally different to the 'books and paper' traditionally delivered by libraries. Results of this study indicate that one size does *not* fit all, and existing OPACs and discovery layers are not enhanced for audiovisual materials. Single-purpose platforms evaluated in this study outperformed those supporting multiple material types.

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<http://doi.org/10.1016/j.ipm.2007.10.003>
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<http://doi.org/10.1002/asi.21220>

## 11. Appendices

### 11.1. Appendix A: Platform Details

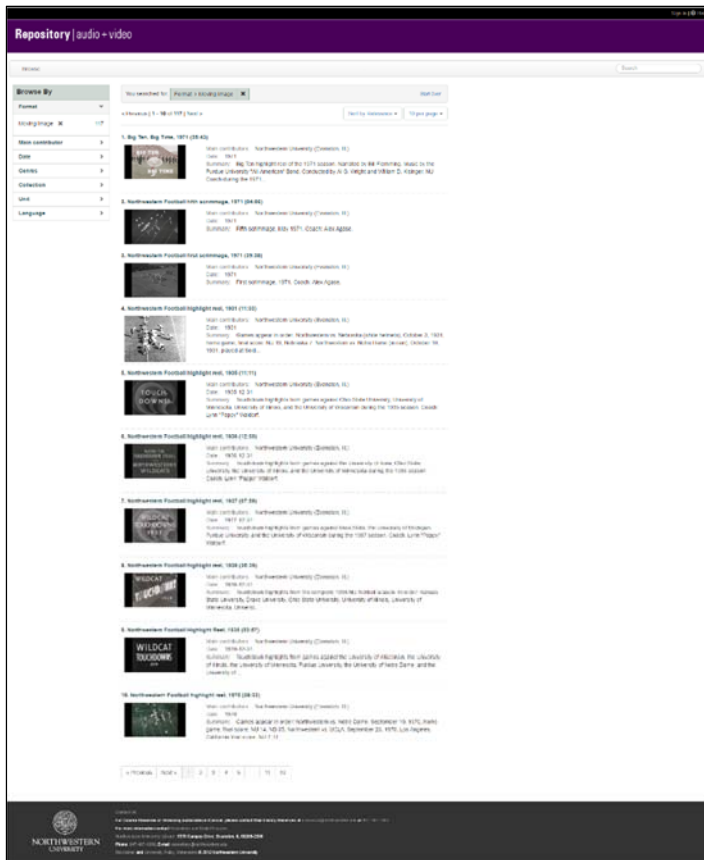
- Screenshots of the platforms were taken during the period 1–8 April 2016





### 11.1.1. Avalon Media System

<https://media.northwestern.edu/>



Institution

Northwestern University Library

Creator

Northwestern University

Indiana University

Release Year

Last Update

2010

2016

Type

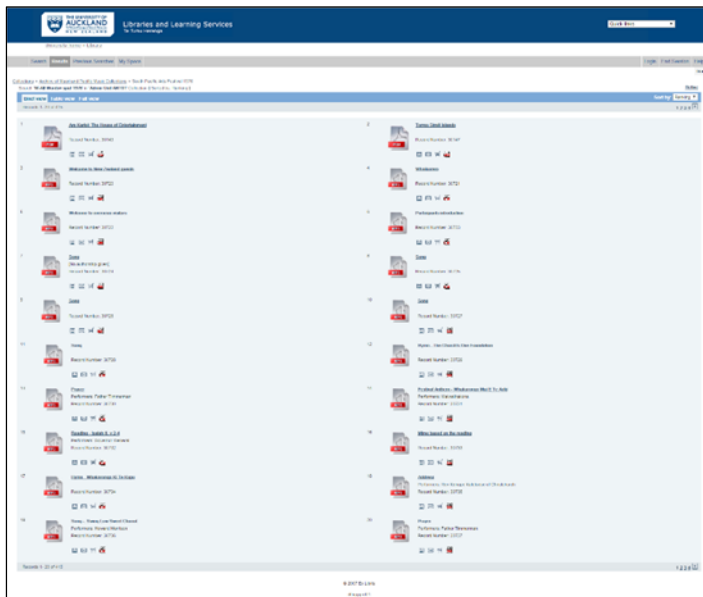
Video Digital Library

About

“The Avalon Media System is an open source system for managing and providing access to large collections of digital audio and video. The freely available system enables libraries and archives to easily curate, distribute and provide online access to their collections for purposes of teaching, learning and research.” (Avalon Media System, n.d.).

## 11.1.2. Ex Libris DigiTool

<https://digiTool.auckland.ac.nz>



Institution

The University of Auckland Library

Creator

Ex Libris

Release Year

Last Update

2003

2015

Type

Catalogue

About

“DigiTool enables academic libraries and library consortia to manage and provide access to digital resources, both those that are created for use within the institution and those that are collected and maintained by the library for the benefit of the public.” (Ex Libris, 2015a).

### 11.1.3. Ex Libris Primo

http://tewaharoa.victoria.ac.nz/

The screenshot displays the Te Waharoa Ex Libris Primo search results page. The interface includes a search bar at the top, navigation links, and a sidebar with filters. The main content area shows a list of search results, each with a thumbnail, title, and a brief description. The results are sorted by relevance and include various titles related to the TV series 'House of Cards'.

Institution

Victoria University of Wellington  
Library

Creator

Ex Libris

Release Year      Last Update

2007

2015

Type

Catalogue

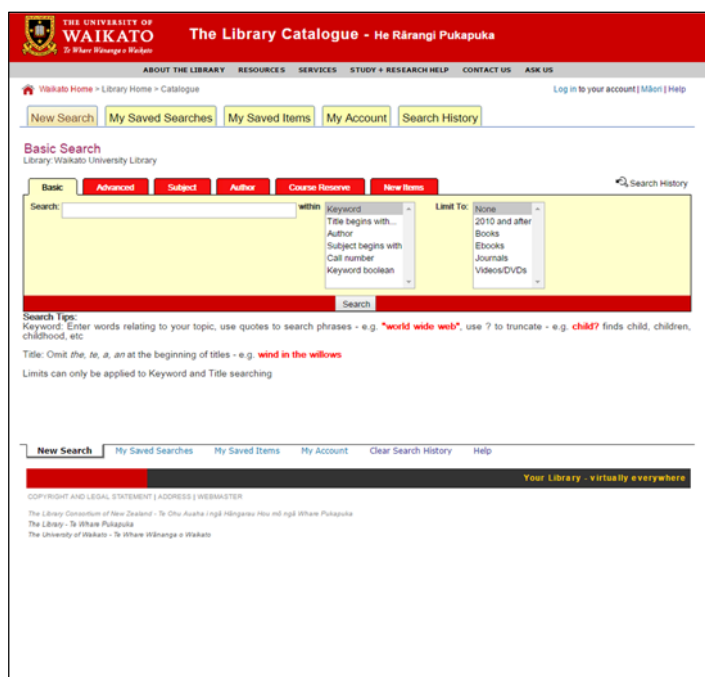
About

Ex Libris' Primo is an “end-to-end Solution for Information Discovery and Delivery”.

“Primo provides users with a one-stop solution that streamlines the entire search process from discovery to delivery, enabling users to quickly locate and obtain accurate, high-quality information.” (Ex Libris, 2015b).

#### 11.1.4. Ex Libris WebVoyage

<http://waikato.lconz.ac.nz/vwebv/searchBasic>



Institution

The University of Waikato Library

Creator

Ex Libris

Release Year

Last Update

c.1996

c.2008<sup>22</sup>

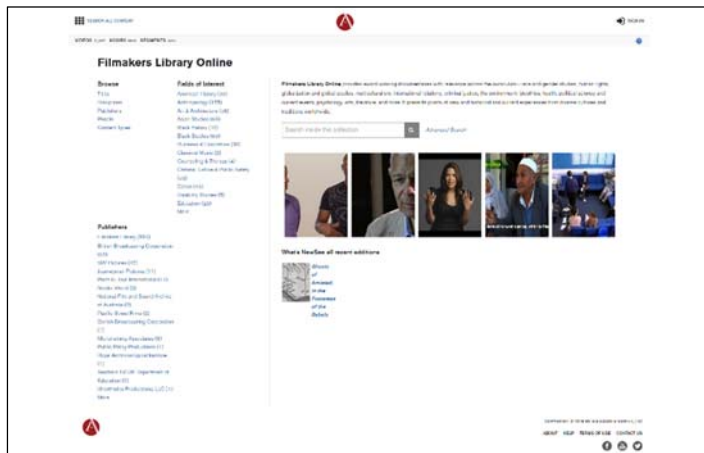
Type

Catalogue

<sup>22</sup> Although the Ex Libris Voyager ILS is now at version 9.x, no new features have been added to the WebVoyage OPAC by the vendor since version 7.0.1. was released in 2008 (Ex Libris, 2015c).

## 11.1.5. Filmmakers Library Online

<http://search.alexanderstreet.com.ezproxy.auckland.ac.nz/flon>



Institution

The University of Auckland Library

Creator

Alexander Street Press

Release Year

Last Update

2015

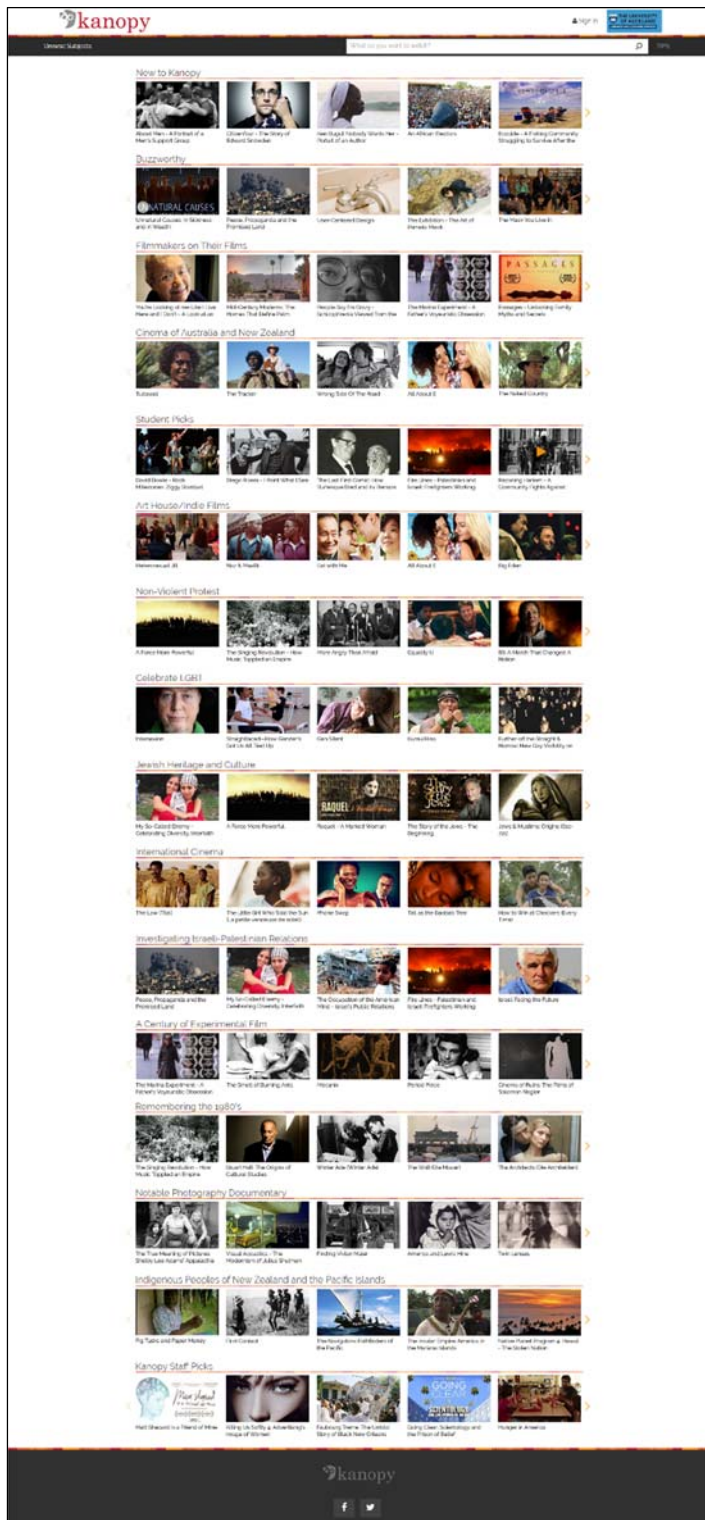
c.2015

Type

Video Digital Library

## 11.1.6. Kanopy Streaming Service

<https://vuw-kanopystreaming-com.helicon.vuw.ac.nz/>



Institution

Victoria University of Wellington

Creator

Kanopy Streaming Service

Release Year

Last Update

2008

c.2015

Type

Video Digital Library

## 11.1.7. Moving Image Research Collections

<http://mirc.sc.edu/>



Institution

The University of South Carolina

Creator

The University of South Carolina

Release Year

Last Update

2012

2013

Type

Video Digital Library

About

“The Moving Image Research Collections Digital Video Repository (MIRC-DVR) serves MIRC's preservation and access missions. It aims to engage researchers from all walks of life in the process of discovering, enjoying, and contributing to knowledge about the sounds and images it contains—all without adding wear and tear to the fragile originals in MIRC's care.” (University of South Carolina Library, n.d.).

## 11.1.8. Naxos Video Library

<http://vuw.naxosvideolibrary.com.helicon.vuw.ac.nz/>

Welcome, Auckland University [Create account](#) [Logout](#)

**naxos videolibrary**  [Go to Advanced Search](#)

[Home](#) [Genres and Programmes](#) [Labels](#) [Composers](#) [Artists](#) [Production Personnel](#) [Playlists](#) [Advanced Search](#) [Help](#)

The world's leading Performing Arts DVD distributor brings you an extensive streaming video library of classical music performances, opera, ballet, live concerts and documentaries. Watch the world's greatest opera houses, ballet companies, orchestras and artists perform on demand! Once you subscribe, stream any video in the library from anywhere in the world with an internet connection.

**Key features include:**

- Over 2605 full-length videos, available anytime, anywhere
- Create custom clips: edit and add them to individual playlists
- Subtitles available in over 5 languages
- Search videos by category, role, composer, artist, production personnel, work, venue or festival
- Access pre-defined video chapters and other points of interest including individual arias and scene breaks
- View video as Full Screen, 2/3 Screen or 1/4 Screen
- Videos stream at 700 Kbps (standard quality) and 2 Mbps (high quality)
- Libretto/text included when available
- Compatible with both PC and Mac

**Featured Additions** [More Recent Additions](#)


[Home](#) [Composers](#) [Search](#) [FAQ](#) [User Guide](#) [Contact Us](#)

Some titles may not be available to subscribers in certain territories due to the extent of rights held by licensors.  
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Institution

Victoria University of Wellington

Creator

Naxos Digital Services

Release Year

Last Update

2009

c.2010

Type

Video Digital Library



## 11.1.9. Open Video Project

<https://open-video.org/index.php>

The screenshot shows the Open Video Project website. At the top left is the logo 'OV THE OPEN VIDEO PROJECT a shared digital video collection'. On the right are links for 'Home' and 'About'. Below the logo is a search bar with a search button and a 'Detailed Search' link. A 'Browse' section follows, with filters for Genre (Documentary, Educational, etc.), Duration (Less than 1 minute, etc.), Color (In color, In black & white), and Sound (With sound, Silent). A 'Collections' list includes 'University of Maryland MLL Open House video reports', 'The Informedia Project at Carnegie Mellon University', and others. A 'Special Collection Spotlight' features 'NASA K-16 Science Education Programs'. On the right side, there are sections for 'Project News', 'Featured Video' (with a 'New' video 'Mental Hospital'), and 'Popular' videos (with a 'Popular' video 'Atom Bomb - Joe Bonia's Movie'). At the bottom, there are navigation links: 'Home • Search • Collections • Contribute • About • Project News' and a footer note: 'The Open Video Project is managed at the Interaction Design Laboratory, at the School of Information and Library Science, University of North Carolina at Chapel Hill'.

Institution

The University of North Carolina

Creator

The University of North Carolina

Release Year

Last Update

1998

2007

Type

Video Digital Library

About

“The purpose of the Open Video Project is to collect and make available a repository of digitized video content for the digital video, multimedia retrieval, digital library, and other research communities. Researchers can use the video to study a wide range of problems, such as tests of algorithms for automatic segmentation, summarization, and creation of surrogates that describe video content; the development of face recognition algorithms; or creating and evaluating interfaces that display result sets from multimedia queries.” (The University of North Carolina, n.d.)

## 11.1.10. TV and Radio

<https://www.library.auckland.ac.nz/tv-radio/>

The screenshot displays the 'TV and Radio Beta' website. At the top, it states 'Over 100,000 hours of Television and Radio Content including the Chapman Archive'. Below this is a search bar and navigation tabs for 'TV and Radio Beta', 'Search', 'Playlists', 'Recently Streamed', 'Live Streaming', and 'About'. The 'Trending Content' section shows a grid of video thumbnails with titles like 'The Bachelor', 'The Bachelor: Season 1', 'The Bachelor: Season 2', 'The Bachelor: Season 3', 'The Bachelor: Season 4', 'The Bachelor: Season 5', 'The Bachelor: Season 6', 'The Bachelor: Season 7', 'The Bachelor: Season 8', 'The Bachelor: Season 9', 'The Bachelor: Season 10', 'The Bachelor: Season 11', 'The Bachelor: Season 12', 'The Bachelor: Season 13', 'The Bachelor: Season 14', 'The Bachelor: Season 15', 'The Bachelor: Season 16', 'The Bachelor: Season 17', 'The Bachelor: Season 18', 'The Bachelor: Season 19', 'The Bachelor: Season 20'. The 'Featured Playlists' section includes 'New Zealand Election Results', 'New Zealand Election Results', 'New Zealand Election Results', 'New Zealand Election Results', 'New Zealand Election Results', 'New Zealand Election Results'. The 'Most Popular Programmes' section features logos for 'Punchbowl', 'Inside', 'Attitude', 'MasterChef', 'Life', 'Daily Show', 'University Challenge', 'Frontline', and 'One News'. The 'Browse by Channel' section shows logos for 'ONE', '2', 'TVNZ', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24', '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36', '37', '38', '39', '40', '41', '42', '43', '44', '45', '46', '47', '48', '49', '50', '51', '52', '53', '54', '55', '56', '57', '58', '59', '60', '61', '62', '63', '64', '65', '66', '67', '68', '69', '70', '71', '72', '73', '74', '75', '76', '77', '78', '79', '80', '81', '82', '83', '84', '85', '86', '87', '88', '89', '90', '91', '92', '93', '94', '95', '96', '97', '98', '99', '100'. The 'Browse by Genre' section includes 'News', 'Current Affairs', 'News/Magazine', 'Documentary', 'Business/Financial', 'Politics', 'Talk', 'Panel', 'Comedy'. The 'Work in Progress' section states 'TV and Radio Beta is a work in progress' and provides statistics: '497 programmes, recorded from 1960 onwards', '90,000 hours of archived TV content', '15,000 hours of archived audio content', and '55% of the collection with subtitles available'. It also includes sections for 'Collection Origin', 'Content Selection', and 'Searching'.

Institution:

The University of Auckland Library

Creator:

The University of Auckland Library

Release Year                      Last Update

2015

2016

Type

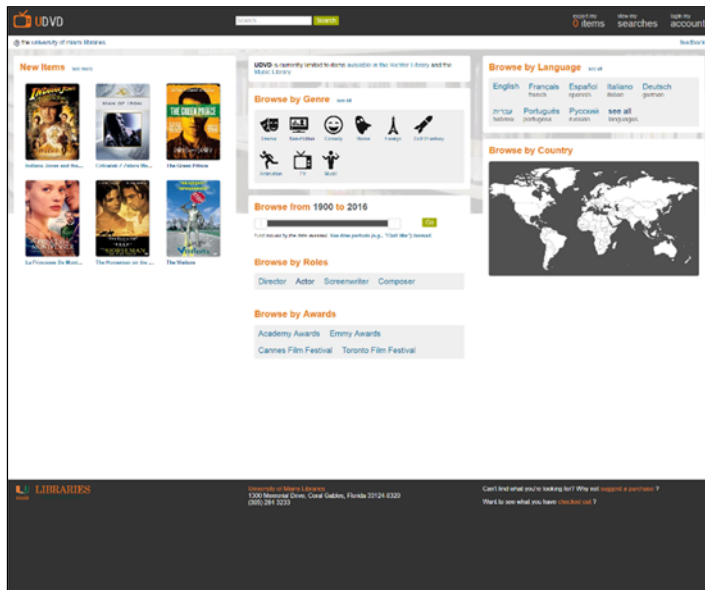
Video Digital Library

About

“TV and Radio is a collection of broadcasts, including the Chapman Archive, that accurately reflects New Zealand's political, social, cultural and economic history as shown through the media.” (The University of Auckland Library, 2016)

11.1.11. UDVD

<https://library.miami.edu/udvd/>



Institution

The University of Miami Library

Creator

The University of Miami Library

Release Year

Last Update

2014

2014

Type

Video Digital Library

About

“Blacklight based discovery layer for film and video content”. (University of Miami Libraries, 2014).

## 11.1.12. Vanderbilt Television News Archive

<https://tvnews.vanderbilt.edu/>



Institution

Vanderbilt University

Creator

Vanderbilt University

Release Year

Last Update

c.1996

2015

Type

Catalogue

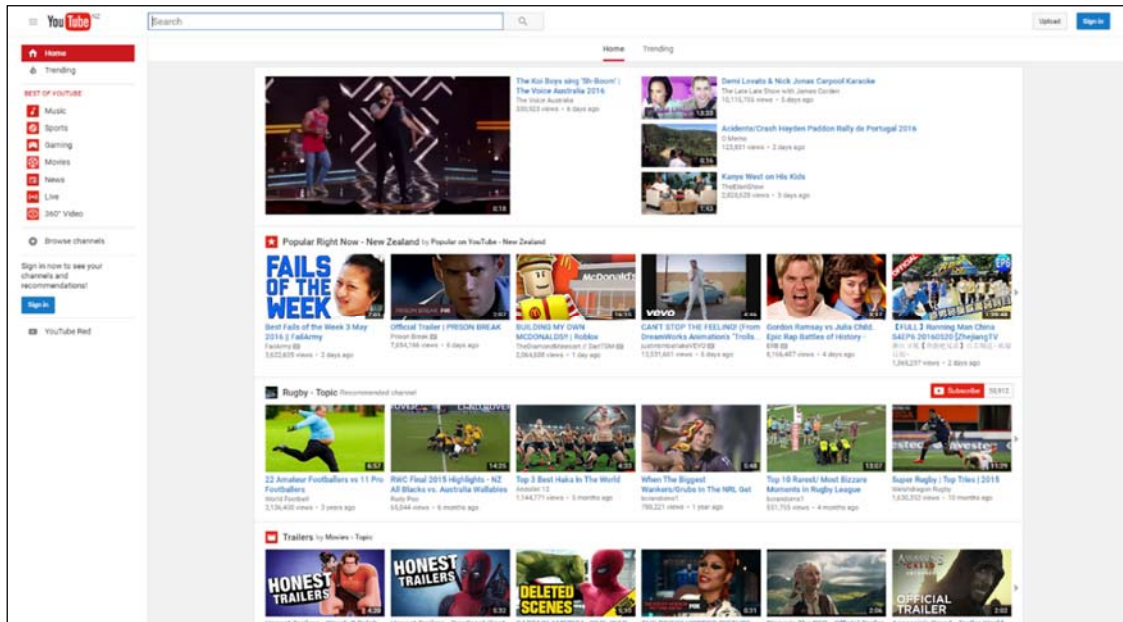
About

“The Vanderbilt Television News Archive is the world's most extensive and complete archive of television news. We have been recording, preserving and providing access to television news broadcasts of the national networks since August 5, 1968.” (Vanderbilt Television News Archive, n.d.)

## 11.2. Appendix B: 'Consumer' Video Digital Libraries

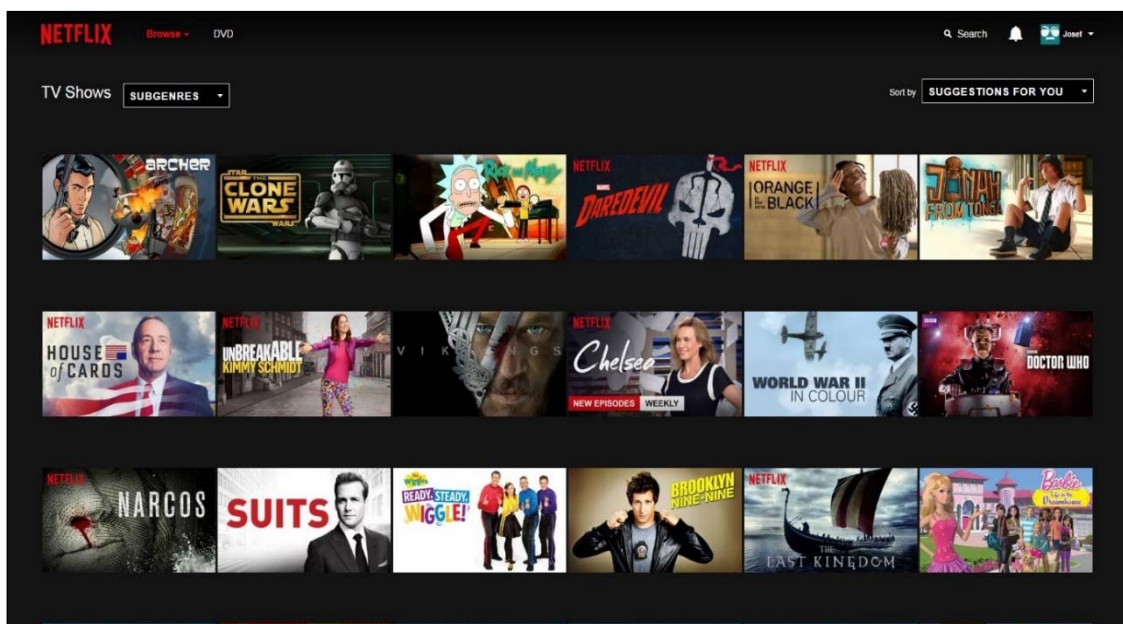
### 11.2.1. YouTube

<https://www.youtube.com/>



### 11.2.2. Netflix

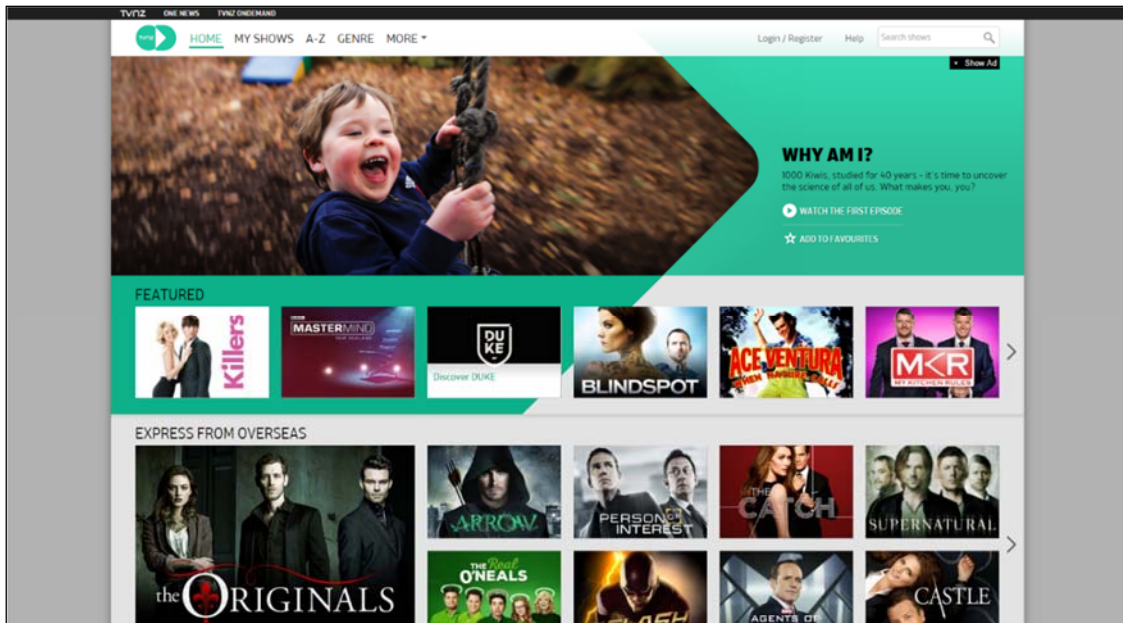
<https://www.netflix.com/nz>





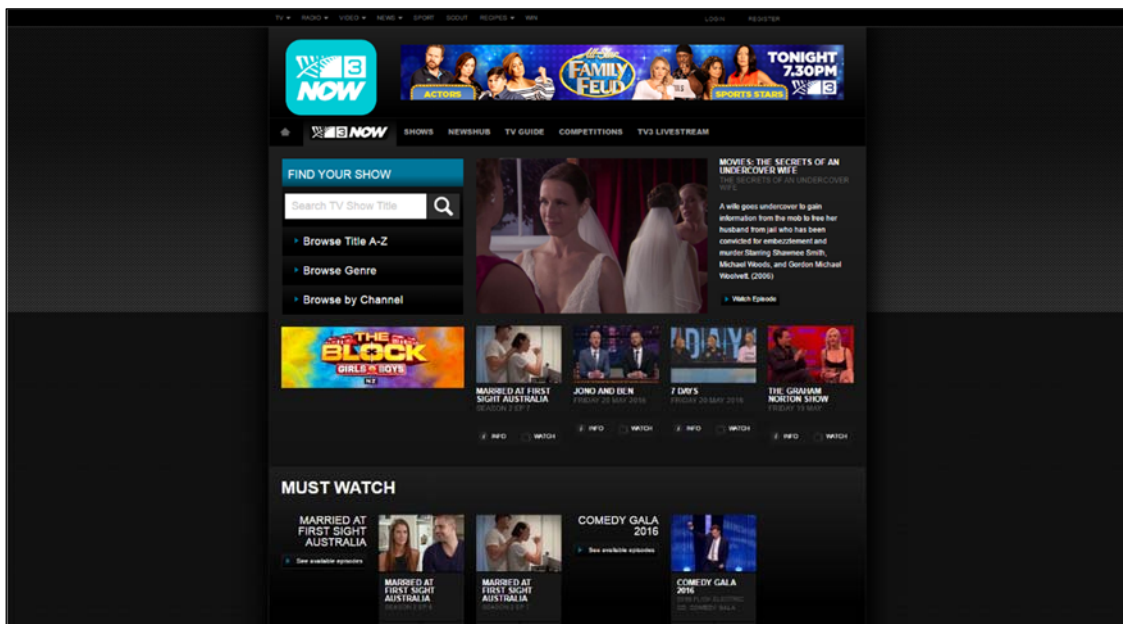
### 11.2.3. TVNZ OnDemand

<https://www.tvnz.co.nz/ondemand>



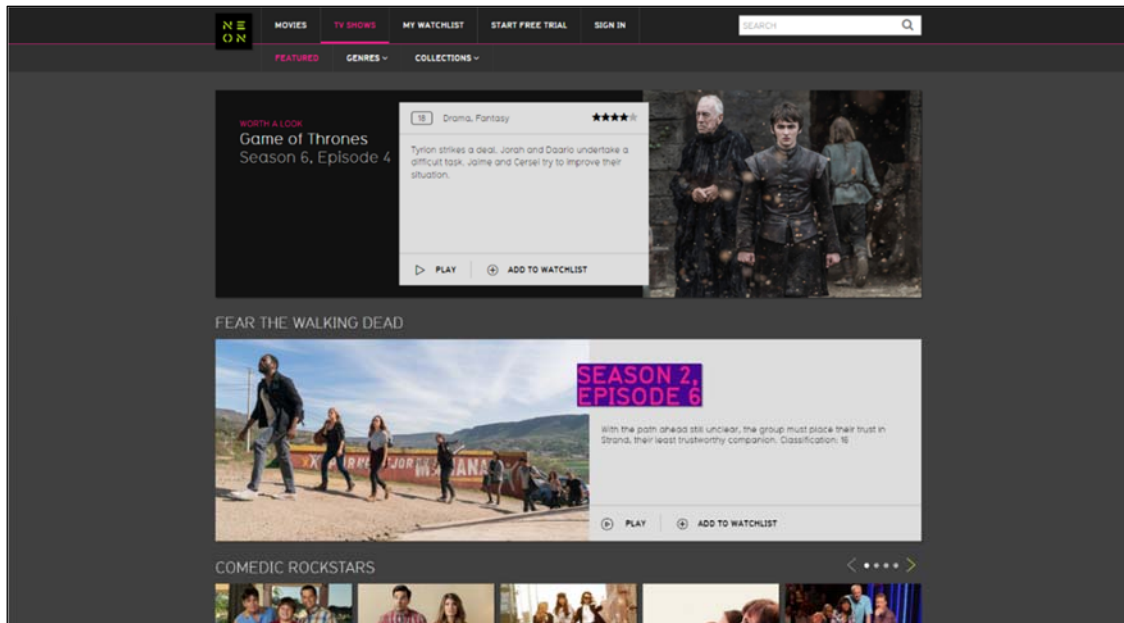
### 11.2.4. 3NOW

<http://www.tv3.co.nz/OnDemand.aspx>



## 11.2.5. NEON

<https://www.neontv.co.nz/tv>



## 11.2.6. LIGHTBOX

<https://www.lightbox.co.nz/>

