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41st Annual IASA Conference

In collaboration with AMIA (Association of Moving Image Archivists)

TOGETHER FOR A SOUND VISION

Where: the Loews Philadelphia Hotel in Philadelphia, Pennsylvania, USA

When: November 2-6, 2010

The sound, audiovisual and moving image collections of the world have grown in response to the varied needs of their collectors, creators and users, and reflect the diversity of their owners, curators and managers. There is much about these sound and moving image archives that is unique and specific only to those formats or collections. However, there is an even greater range of issues and concerns that all share in common, where convergence is a possibility, standards are communicated and mutual solutions are shared. This conference will be a forum to investigate and discuss all these issues, and many more besides.

In 2010, IASA and the Association of Moving Image Archivists (AMIA) will come together for the first time in a joint conference. The IASA/AMIA Conference will provide an opportunity for colleagues and those interested in all aspects of the field to meet, share information and discover mutual solutions.

Papers, panels and posters will cover all issues to do with sound and audiovisual archives, but especially on the following sub-themes:

- Archives, Libraries and Museums. Does convergence work?
- Challenges of Multimedia in archives (convergence or multiplication of formats)
- The user and the archivist (convergence of roles)
- Social networks (converging to where the user is)
- One nation, one world catalogue (convergence of access)
- Turning archives into assets
- Collection preservation and workflows (convergence of practice?)
- Open Access and Standards (convergence in modus operandi)
- Organisations and associations (convergence of colleagues)
- Rights in a converging world

The call for presentation proposals is now closed.

Closed meetings of the IASA Board and Technical Committee will be held on 1 November 2010.

Please find all conference information on the conference website at:

www.iasa-conference.com

A short editorial this time: you'll see it's a packed issue and not much space is left for me to tell you about what is in it!

Once again, most of the papers have been drawn from the most recent annual conference, in Athens 2009, where we were discussing the realities of the digital archive, which we now all agree we face. Inevitably, when talking of digital information we head towards the internet — intellectual property and rights management, metadata creation and extraction, search engines, information management and dissemination. This issue has articles dealing with all of these. Some detail innovative projects that hopefully we can use in our thinking as we develop our own digitization and presentation models. Others give guidelines at a more general level. Of course we have nothing to disseminate or manage if we don't digitize in the first place. Nadja Wallaszkovits, our friendly audio engineer from Vienna, gives us the benefit of her experience working with small-scale collections in Eastern Europe.

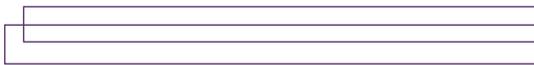
I do hope you'll enjoy the articles and find them useful.

At our Athens conference we engaged in an ongoing discussion about the degree to which technological developments are bringing all the information managing professions together. There is little doubt that the users of collection material are benefiting from this convergence, as integrated web-based discovery services deliver a wide variety of available material, including sound and audiovisual items. Many of IASA's members all over the globe are participating in projects that are delivering on this aspect of technological convergence. However, the power that these systems have in providing the valuable and useful information they do, is built on the foundation of specialist knowledge and expertise. And access and discovery is only one aspect of collection management; In order to make appropriate decisions about collections and their management, let alone their discovery and use, it is vital that the managers of these collections understand how convergence and specialisation are necessary partners in the expanding technological world. This remains an important topic for IASA's members and colleagues, and one we expect to continue for some little time yet.

In another type of convergence, the IASA Executive Board, and the conference organising committee of the Association of Moving Image Archivists (AMIA) converged on Philadelphia to meet and hammer out the details of our upcoming joint conference. As befits such an historic meeting, the subjects for discussion ranged widely. However, the current hot topics of video preservation standards and technological convergence will be features of the 2 - 6 November conference (<http://www.iasa-conference.com/>). There was a lot of good will and mutual support for our forthcoming joint conference, and all agree that the program will benefit from our cooperative planning. The historic town centre of Philadelphia is a beautifully laid out part of the city, full of people, parks, bars and restaurants, and your hardworking board strove to find the most suitable ones. I expect it to be a great conference, a marvellous city to meet in, and an excellent example of professional collaboration in the sound and audiovisual archiving community.

At our IASA mid-year board meeting in Philadelphia the board was also very pleased to hear about the work that the latest co-opted member to the Executive Board has been undertaking. Richard Ranft, who volunteered in Athens to take on the role of IASA's web manager, submitted a plan to the executive board, and with their approval, commenced building many of the new features we need to help IASA participate more fully in the online world. Many benefits will accrue to members, including online spaces for committees and sections to work, members sign-in, and the delivery of more information, some specifically for the membership, and others for all to use. For example, the IASA publication, TC04 "Guidelines in the Production and Preservation of Digital Audio Objects" will be made freely available as a printable PDF to all IASA members, and as an online document that non-members can browse through. Of course the printed version of the book can still be ordered, and signed-in IASA members will be able to order the book at the members' price, while non-members will pay a more expensive price. Other benefits to members will include recent journals and digitised copies of previous publications. All of this will allow us to more easily work together and to provide information that will help support the community of sound and audiovisual archives.

The Board also discussed the growing concern amongst IASA members about some of the shortcomings of the rules, laws and guidelines that govern IASA and agreed that there is probably a need for some adjustments. The IASA constitution has been serving us well in allowing us to function as an organisation, and though it has flaws, we manage to continue working and providing all the useful services that IASA does through interpreting that constitution and selectively applying it as best we can. This is no different to the way that all organisations, right up to nation states, function. Every now and then events occur which alter the way an organisation functions and the constitution becomes a limitation and has to be changed. The growing digital environment, and the changed way that branches and affiliated organisations relate to the parent body are demonstrably different to how we used to be, and there needs to be some thinking done on how we might do it better. We need to review these aspects to make them more logical and functional with the aim of improving the relevance of the organisation and increasing membership, so we can do more of the



things we see as important. The complex part of this process is trying to find a way that increases involvement, and membership, but doesn't constrain the work of the organisation by bringing conflicting aims and purposes into, well, conflict.

The other side of this is that IASA has been an association representing institutions, as archives and institutions have been the organising force behind archival innovation. Most of our innovations and developments have come about as a result of the archives themselves. The changing shape of the sound and audiovisual archiving world means that the innovators are less likely to be the institutions and more likely to be the private companies working with the archives and institutions. If IASA is going to be relevant we have to continue to work with the private sector, and we don't have to look very far to find some very fine examples of private/public sector working together within IASA. However, our membership categories are not really appropriate, and we need to face up to this issue and find a way of supporting the diversity of our membership.

With something as complex as this, and with so many competing and vested interests, it is going to be very important to get the opinion of membership in shaping the changes, so here is the plan. Past President Richard Green will, on behalf of the Board, put together a panel for the upcoming IASA-AMIA conference in Philadelphia. We'll be scrutinising the issues and problems as we see them, and seeking input from the members as to their views and matters to raise. We will also be representing some of our ideas and canvassing widely for our members' ideas. It will be in terms of "do not tell us how the constitution should be changed, rather, tell us the sort of organisation you want IASA to be in the future and help us shape changes that will bring that into being". After the conference, the board and any helpers we have will have around 6 months to draft the changes to the constitution. Then, in accordance with the constitution, the draft will be submitted to the membership in time to be voted on and ratified at the 2011 conference in Frankfurt.

So, yet another reason to be in Philadelphia in November. I look forward to seeing you all there.

Yours truly,
Kevin Bradley
President IASA

Penelope Eckersley (1920 - 2010)

Rolf Schuursma



Penelope in Bardsey, 1992, by Puck de Raadt

On Wednesday January 20, 2010, Penelope Eckersley died. Those of us who helped found IASA or joined the small group of pioneers in its early days, vividly remember her and her husband Timothy, IASA's second President. Tim was instrumental in bringing the organisation out of its infant state into an International Association in its own right. During this period it was Pen who added a special flavour to the many meetings and dinners in their lovely house at 72 Westbourne Park Road. She was a gracious host and a good friend for all of us who frequented '72' in that period, as well as later when Tim was Vice-President and also acted as co-editor of the Phonographic Bulletin. In September 2001, during the IASA Annual Meeting in London, many years after Tim passed away, some of us once more enjoyed Pen's hospitality for a charming dinner party at '72'. With her death this part of IASA's history has now come to a closure. We fondly remember Pen and Tim and wish their children well.

Messages of sympathy may be sent to Toby Eckersley Toby.Eckersley@southwark.gov.uk



Penelope in green by Daniel Shadbolt

Alternative system for non-commercial use of intellectual property in consideration of free P2P file-sharing¹

Dionysia Kallinikou, Athens Law School, National & Kapodistrian University of Athens; Marinos Papadopoulos J.D., M.Sc., Attorney-at-Law (Athens Bar Association); Alexandra Kaponi, LL.M., Attorney-at-Law (Athens Bar Association); Vassiliki Strakantouna M.Sc. Athens Law School, National & Kapodistrian University of Athens

Introduction

The Hellenic National Audiovisual Archive (HeNAA) is an organization that is evolving into a Digital Library (DL) leveraging on technological applications for making available online audiovisual works. An architectural element of DL is the application of Peer-to-Peer (P2P) technologies. The application of P2P in DL is not being seen positively by content-providers and subsequent right-holders of copyright. P2P is targeted and comes under fire in most cases from content providers and subsequent right-holders who have interwoven their business interests and business models with the commercial availability of content online. However, P2P per se is a technological system that was not invented to facilitate copyright infringement; rather, it is a technological solution to a problem of computer network architecture. Also, P2P represents a great technological advantage in information and communication core technological infrastructure for the evolution of DLs such as HeNAA. In this short whitepaper we ask whether it is possible to have a system for non-commercial use of intellectual property in consideration of free P2P file-sharing. We express the opinion that a solution to the problem of P2P file-sharing can come only if the focus is on the process to legitimize P2P file-sharing based on proper respect and due payment of the equitable remuneration as is provided by law aiming at fair compensation of authors and creators, and on a balancing of the interests of all the involved parties, i.e. creators, subsequent right-holders, and the general public, in the process of making copyrighted works available online.

Ladies and Gentlemen:

We are here today gathered on the occasion of the 40th IASA 2009 Conference entitled “Towards a new kind of archive: the digital philosophy in audiovisual archives” aimed at discussing insightful ideas upon the role of audiovisual archives in the new technological Internet-networked environment. We are supposed to delve into the possible answers to questions such as how users’ expectations of the use of audiovisual material available online and offline have changed and what strategies have been employed by organizations, such as the co-organizer of this event, the Hellenic National Audiovisual Archive (HeNAA), to meet them. We are here today to discuss the pressing need to change and evolve on the eve of digital libraries (DL) such as HeNAA rather than waste time discussing the common practice to leverage upon pre-technological era practices and regulations with the aim to avert change and dissolve the possibility of making knowledge and culture widely accessible to the public under certain circumstances that cater for the interests of all the involved parties — namely, creators, subsequent right-holders, and the general public — while regarding the protection of intellectual property of works.

HeNAA has evolved into a DL. The DL of the 21st century is a hybrid form of a library that deviates from the traditional book-keeping library of the past. The term “Digital Library” was coined because of the Internet and refers to an evolving new form of a library that could cover a wide range of information services.² The DL of the 21st century is not merely a host of digitized books and collections. Rather, it’s an integrator of information management systems, that consists of important elements such as data and metadata, human contribution (creators, users, managers), IT infrastructures (computers, networks, software) which are all orchestrated with the aim to organize, manage, and make available, i.e. provide open access

¹ This work is licensed under a Creative Commons Attribution—Non-Commercial-No Derivative Works 3.0 Greece License. (<http://creativecommons.org/licenses/by-nc-nd/3.0/gr>). The paper is presented here as it was delivered at the 40th IASA conference in Athens 2009 with only minor grammatical changes.

² Bokos, G. D. (2001), Introduction to Information Science, Papassotiropou, p.168.

to knowledge, art, culture, and information to library-users.³ The DL of the 21st century is a borderless organization much like the Internet is a naturally borderless network of networks. Access to DLs does not depend any more upon proximity to the local physical premises of the organization. In addition, access to the contents of a DL does not require ownership of an item that becomes available through it. Instead of “owning” the item — audiovisual material mostly in the case of HeNAA — DLs could “lease” it under a license agreement. DLs’ focus has turned from the quest for how to digitize materials, store them and make them available, to the quest for how to manage the rights upon the materials along with the materials.⁴

And that is because the architecture per se of a digital library is different from what we’ve been used to. It is a peer-to-peer (hereinafter, P2P) architecture. P2P technological networks are of vital importance for the evolution of DL.⁵ Actually, on the eve of DL, P2P technological networks are evolving as technological infrastructure that is an important architectural element for DLs’ networking with peers. As such, they acquire a competitive advantage. During the ‘90s, the Internet consisted mainly of client/server models which are uncomplicated methods to manage and control the distribution of content. During the last years, however, several aspects of IT developments — such as the widespread penetration of broadband Internet, more connectivity, mobility, the evolution of compression technology, the demand for more storage capacity, more CPU power, and a large amount of content residing on the personal computers of end-users — have changed the way in which users and prospective DL stakeholders connect to the Internet and make use of the content available online.⁶ The combination of IT developments makes it difficult for DLs to gain profit via the client/server model. DL infrastructure cannot scale based on the client/server model; but it can if it leverages on the P2P architecture.⁷

The widespread penetration of the Internet causes content providers to explore new distribution platforms that provide solutions for the disadvantages of the client/server models. DLs, publishers, the media industry and end users are exploring systems and platforms to publish and distribute online services and content. P2Ps have demonstrated the opportunities of this disruptive technology regarding the evolution of DL. P2P systems have often been described as the counterpart of client/server networks.⁸ In client/server systems, centralized servers manage and control the network and provide services and resources, whereas the clients consume these resources. Several client/server networks can hardly meet the demand for resources because of an increasing number of users, higher bandwidth traffic and the arrival of a variety of applications. The major drawbacks of client/server systems in comparison with P2Ps is that the client/server models suffer from inefficient

- 3 Atkins, D. E. (1997), Report of the Santa Fe Planning Workshop on Distributed Knowledge Work Environments: Digital Libraries, Report Version September 20, 1997, in which it is stated that “the concept of a “digital library” is not merely equivalent to a digitized collection with information management tools. It is rather an environment to bring together collections, services, and people in support of the full life cycle of creation, dissemination, use, and preservation of data, information, and knowledge.” Available at URL: <http://www.si.umich.edu/SantaFe> [last check, Sept. 15, 2009]. See also Griffin, S. M., NSF/DARPA/NASA Digital Libraries Initiative, A Program Manager’s Perspective, available at URL: <http://www.dlib.org/dlib/july98/07griffin.html> [last check, Sept. 15, 2009], and L. Candela, L., Castelli, D., Ferro, N., Ioannidis, Y., Koutrika, G., Meghini, C., Pagano, P., Ross, S., Soergel, D., Agosti, M., Dobreva, M., Katifori, V., Schuldt, H. (2007), The DELOS Digital Library Reference Model available at URL: http://www.delos.info/files/pdf/ReferenceModel/DELOS_DLReferenceModel_0.98.pdf [last check, Sept. 15, 2009], which defines a digital library as: An organization, which might be virtual, that comprehensively collects, manages and preserves for the long term rich digital content, and offers to its user communities specialized functionality on that content, of measurable quality and according to codified policies.
- 4 Coyle, K. (2004), The rights in the Digital Rights Management, D-Lib magazine, September 2004, Vol.10 n. 9, available at: <http://www.dlib.org/dlib/september04/coyle09coyle.html> [last check, Sept. 15, 2009].
- 5 See Ioannidis, Y., Schek, H.-J., Weikum, G. (2005), Future Digital Libraries Management Systems: System Architecture and Information Access, 8th DELOS Thematic Workshop, Schloss Dagstuhl, Germany, available at URL: http://dbis.cs.unibas.ch/delos_website/DI.1.2%20-%20Workshop%2011%20on%20DL%20Access%20and%20Architecture%20jointly%20with%20WP2%20FUTURE%20Digital%20Library%20Management%20Systems%20System%20Architecture%20and%20Information%20Access.pdf [last check, Sept. 15, 2009].
- 6 De Boever, J., Peer-to-Peer Networks as Distribution and Publishing Model, available at URL: http://elpub.scix.net/data/works/att/128_elpub2007.content.pdf [last check, Sept. 15, 2009].
- 7 Krishnan, R., Smith, M. D., Tang, Z., Telang, R. (2006), Digital Business Models for Peer-to-Peer Networks: Analysis and Economic Issues, available at URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=917899 [last check, Sept. 15, 2009], Travis, H. (2005), Building Universal Digital Libraries: An Agenda for Copyright Reform, Pepperdine Law Review, vol. 33, p. 761-829, available at URL: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=860784 [last check, Sept. 15, 2009].
- 8 See Pourebrahimi, B., Bertels, U., and Vassiliadis, S. (2008), A Survey of Peer-to-Peer Networks, available at URL: http://ce.et.tudelft.nl/publicationfiles/1075_526_prorisc05.pdf [last check, Sept. 15, 2009].

allocation of resources and limited scalability which can result in bottlenecks and eventually in single points of failure. Furthermore, additional users stand for additional costs as they consume more bandwidth of the system. Nodes in P2P networks do not only act as clients, but they exhibit server functions as well.⁹ In addition, while client/server networks are not scalable and are susceptible to bottlenecks and single points of failure, P2P networks are characterized by scalability, decentralization, transient connectivity, cost efficiency, fault tolerance, self organization, sharing of resources and autonomy.¹⁰ In theory, P2P systems exhibit positive network externalities in a way that additional users¹¹ add value to P2P networks by introducing extra resources into the system. In this way, users preserve the system and influence the functioning, performance and control of the network by making their resources available. Therefore, the deployment of a P2P system that is able to cope with the transient presence of nodes, network/computer failures, and to self-organize itself in the absence, more often than not, of centralized coordinating components, is a critical issue for the further development and long-term viability of HeNAA as a DL.

Examples of peer organizations provide sufficient evidence to support that conclusion. For example, in the Federated Digital Library (hereinafter, FDL) model, which is one of the classic solutions for sharing information among libraries in relevant topics, there is a group of organizations, working together formally or informally, that agree to support a set of common services and standards, thus providing interoperability among their members.¹² Conventionally, most FDLs were built in the client/server fashion. However, with the sharp rise in the number of DLs, especially moderate-sized ones, a performance bottleneck problem has been created in FDLs based on the client/server model. The solution to this bottleneck problem in FDLs appears to be P2P architecture. Additionally, P2P architecture in DLs seems to provide solutions to problems arising not only from scalability, but also from the granularity and meaning in metadata elements used widely in DLs. Due to the semantic heterogeneity resulting from the different metadata schemas employed by various DLs, the client/server models cannot furnish DL users with a search application that does not end up as a difficult, complex, and ineffective task across distributed and heterogeneous digital repositories. DLs may also collaborate with one another to provide content preservation by storing each other's material. Systems such as OceanStore¹³ and Intermemory¹⁴ employ this idea.

Attempting to deprive DL from P2P technological architecture and applications on the grounds of considerations for P2P legality, will result in the imposition of higher than projected costs on the deployment of DL projects: depriving them of a method of distributing their output efficiently without incurring high costs, results, simply, in higher costs. File-sharing software, including P2P applications, is capable of cheaply and quickly distributing thousands of public domain literary works, such as those made available through Project Gutenberg¹⁵ as well

⁹ This is why nodes or peers have been described as servents (SERVer + cliENTS).

¹⁰ See Androutsellis-Theotokis, S., Spinellis, S. (2004), A Survey of Peer-to-Peer Content Distribution Technologies, *ACM Computing Surveys*, Vol. 36, No. 4, p.335–371, available at URL: <http://www.spinellis.gr/pubs/jrnl/2004-ACMCS-p2p/html/AS04.pdf> [last check, Sept. 15, 2009], Eberspächer, J., and Schollmeier, R. (2005), First and Second Generation of Peer-to-Peer Systems, In R. Steinmetz, R., and Wehrle K. (Eds.). *Peer-to-Peer Systems and Applications*, Berlin Heidelberg: Springer-Verlag, p.35-56.

¹¹ Such as DL, content providers, end-users, third-party DL-supporting and affiliated organizations, etc.

¹² Gonçalves, M.A., France, R. K., Fox, E.A., and Doszkocs, T.E., MARIAN Searching and Querying across Heterogeneous Federated Digital Libraries, available at URL: http://www.ercim.org/publication/ws-proceedings/DelNoe01/11_Fox.pdf [last check, Sept. 15, 2009]. An interesting example of a FDL requiring interoperability is the Networked Digital Library of Theses and Dissertations (NDLTD), at URL: <http://www.ndltd.org> [last check, Sept. 15, 2009], which is an international federation of universities, libraries, and other supporting institutions interested in worldwide access to electronic theses and dissertations (ETDs).

¹³ Chen, Y., Katz, R., and Kubiatiowicz, J. (2000), SCAN: A dynamic, scalable and efficient content distribution network, Computer Science Division, University of California at Berkeley, USA, available via URL: <http://www.springerlink.com/content/wmxcyyp86urbnpx> [last check, Sept. 15, 2009].

¹⁴ Chen, Y., Edler, J., Goldberg, A., Gottlieb, A., Sobti, S., and Yianilos, P. N. (1999), A prototype implementation of archival intermemory, available at URL: <http://pnylab.com/pny/papers/improto/improto.pdf> [last check, Sept. 15, 2009].

¹⁵ See Project Gutenberg at URL: http://www.gutenberg.org/wiki/Main_Page [last check, Sept. 15, 2009]. Project Gutenberg is the first and largest single collection of free electronic books, or eBooks. Michael Hart, founder of Project Gutenberg, invented eBooks in 1971 and continues to inspire the creation of eBooks and related technologies today.

as those historic public domain films released by the Prelinger Archive.¹⁶ P2P technology is an excellent fit for HeNAA to which works that are not in the public domain are inferred by right-holders with the aim of benefitting the public at large, preserving said works, and making them accessible to users. Distributing audiovisual works over the Internet can be prohibitively expensive for DLs, as well as non-profit entities such as HeNAA, Project Gutenberg or the Internet Archive, which, if they are not allowed to leverage upon P2P architecture and applications, must divert scarce resources to purchasing bandwidth and data storage instead of digitizing audiovisual materials and archived items. File-sharing software permits these entities to shift storage and bandwidth costs onto readers and Internet users more generally, and preserve limited budgets for core mission tasks. File-sharing programs let Internet users do much more than substitute video-file or audio-file format downloads for DVD purchases: they can locate public domain works, watch recordings of live performances in which creators do not claim copyright, rediscover out-of-print or hard-to-find audiovisual works before buying.¹⁷ If it works so for Internet users, it works the same for DLs and HeNAA. P2P represents a great technological advantage in information and communication core technological infrastructure for the evolution of HeNAA.

Currently, in the minds of most regulators, P2P technology is associated with the 'copyright infringement in cyberspace' problem. Content providers and intellectual property right-holders — most commonly, subsequent right-holders and collecting societies, the viability of which depends upon copy-dependent business models — put all their efforts and resources into the fight against P2P. They turn a blind eye to P2P technological advantages and opt for only the technological solutions that favour their old-fashioned business models. However, none of the great advances in information and communications technology, from the photocopier to the videocassette recorder, personal computer, and Internet, would have been viable had all copyright infringements by their users been imputed to their manufacturers.¹⁸ The legal assault on P2P technologies and the "zero tolerance policy" articulated in the Napster and Aimster cases (among others) in the U.S. — and which has been used henceforth from content providers and intellectual property right-holders to attack every possible P2P application that may appear — represents a radical departure from the legal principles of civil law, and will unnecessarily deprive Internet users of a variety of content available for non-commercial use, and many of the benefits of P2P technology and DLs, such as HeNAA, leveraging upon it.¹⁹

Thus, the question is, is it possible to have a system for non-commercial use of intellectual property in consideration of free P2P file-sharing? A system which DLs such as HeNAA could leverage upon in order to meet both the need to make audiovisual works available to the general public with respect to Intellectual Property law, as well as the need to deploy P2P technologies which are a core element for HeNAA's long-term technological and operational viability?

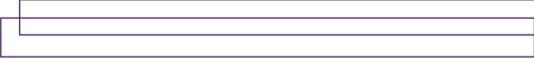
Since 2003, the Electronic Frontier Foundation (hereinafter, EFF) has proposed an alternative approach that gets artists paid while making file-sharing legal. EFF's proposed solution caters

16 See Prelinger Archive at URL: <http://www.archive.org/details/prelinger> [last check, Sept. 15, 2009]. The Prelinger Archive was founded in 1983 by Rick Prelinger in New York City. Over the next twenty years, it grew into a collection of over 60,000 "ephemeral" (advertising, educational, industrial, and amateur) films. In 2002, the film collection was acquired by the Library of Congress, Motion Picture, Broadcasting and Recorded Sound Division. Prelinger Archive remains in existence, holding approximately 4,000 titles on videotape and a smaller collection of film materials acquired subsequent to the Library of Congress transaction. Its goal remains to collect, preserve, and facilitate access to films of historic significance that haven't been collected elsewhere. Included are films produced by and for many hundreds of important US corporations, non-profit organizations, trade associations, community and interest groups, and educational institutions. Users of the Prelinger Archive are warmly encouraged to download, use and reproduce these films in whole or in part, in any medium or market throughout the world. They are also warmly encouraged to share, exchange, redistribute, transfer and copy these films, and especially encouraged to do so for free. Any derivative works that they might produce using these films are theirs to perform, publish, reproduce, sell, or distribute in any way they wish without any limitations. Their right to use these films is granted by the Creative Commons Public Domain license.

17 Travis, H., *ibid.*, (2005), p.824.

18 Travis, H., *ibid.*, (2005), p.826, and note 425 attributing this argument to Justice David H. Souter and Justice Antonin Scalia, with respect to Xerox photocopier and Apple iPod MP3 player

19 Travis, H., *ibid.*, (2005), p.826, and note 427 regarding Lawrence Lessig's arguments presented in his book *Free Culture—How Big Media Use Technology and the Law to Lock Down Culture and Control Creativity*, The Penguin Press, 2004, available at URL: <http://www.free-culture.cc/freeculture.pdf> [last check, Sept. 15, 2009].



for file-sharing of works and leverages upon the existence and operation of collecting societies. The concept is simple: users of works pay a few dollars each month in exchange for a blanket license to share and download whatever they like; collecting societies collect the money and distribute it between their member artists and right-holders. So long as they pay, the users are free to keep doing what they are going to do anyway — share the works they love using whatever software they like on whatever computer platform they prefer — without fear of lawsuits. The more people share, the more money goes to right-holders. The money collected gets divided among right-holders based on the popularity of their works.²⁰ EFF's proposed solution is based on a voluntary collective licensing scheme that leverages upon the existence and role of collecting societies. It is not a taxation option, but rather it's a flat-fee payment option to access all available works online without restrictions over copying or further distribution. Payment for file-sharing is implemented through as many mechanisms for payment as the market can support. For example, some file-sharers could buy the right for P2P file-sharing directly through a collecting society's website or could buy it from their ISPs which could bundle the P2P file-sharing fee into the price of their broadband services for users who are interested in P2P file-sharing and downloading of protected works. Payment mechanisms in the market such as channelling the P2P file-sharing fee through ISPs could allow ISPs to advertise a broadband package that includes "free downloads of all the works that the user wants."²¹ A P2P file-sharing fee could also be channelled through universities that could make it part of the cost of providing network services to their students. P2P file-sharing software vendors could bundle the fee into a subscription model for their software, which would neatly remove the cloud of legal uncertainty that has inhibited investment in the P2P software field. Digital TV and IP-TV service providers could also bundle a P2P file-sharing fee with their subscription fee for pay-TV services and/or promote P2P file-sharing in the market as an added-value service of their TV and ISP bundled services.

EFF's proposed solution is not a taxation-based scheme, thus it should not be seen as what some have dubbed "an ISP tax."²² It is a solution that may have an additional cost to the user added to the existing subscription cost of an ISP, but it's not a tax imposed on ISPs directly and/or indirectly from the government. When it was first introduced, the idea for a P2P file-sharing fee channelled through ISPs was met with resistance and/or dismissed from collecting societies in the U.S. Their stance towards it has changed, however, since they realized that all their anti-piracy alternative solutions have proved to be futile so far.²³ In that sense, and in mind of the voluntary nature of the proposed solution, it is noteworthy that EFF's proposal does not necessarily impose an additional cost to an ISP subscriber unless said subscriber is a P2P file-sharer and chooses the ISP subscription option which includes legitimate P2P file-sharing and downloading services. People who do not share protected works online and/or offline shouldn't have to pay for the P2P file-sharing fee.

The P2P file-sharing fee must be worth the value of becoming lawful, i.e. it should not be high enough so as to discourage users from legitimising their file-sharing habits. It should also have a value that encourages the user to opt for paying a flat fee in exchange for unrestricted content available online rather than opting for a pay-per-view scheme. Moreover, all creators who are members of a particular collecting society should not be forced by their collecting society's regulations to participate in the P2P file-sharing in exchange for a P2P file-sharing fee channelled via ISPs if they don't want to. Participation should be an option for the

²⁰ See Electronic Frontier Foundation, *A Better Way Forward: Voluntary Collective Licensing of Music File Sharing*, April 2008, available at URL: <http://www.eff.org/wp/better-way-forward-voluntary-collective-licensing-music-file-sharing> [last check, Sept. 15, 2009].

²¹ This is something that's already happening in Greece in some respect and regarding works of music. Almost all bundled Mobile services operators & ISPs allow for file-downloading (P2P file-sharing is the next thing to happen) at the cost of an added-value subscription service. See, for example, the Vodafone Live service of Vodafone available at URL: <http://www.vodafone.gr/portal/client/cms/viewCmsPage.action?pagelD=1082> [last check, Sept. 15, 2009] and Cosmote My World Music Zone available at URL: <http://www.musiczone.cosmote.gr/content/web2/dyn/home> [last check, Sept. 15, 2009].

²² See Electronic Frontier Foundation, *Monetizing File-Sharing: Collective Licensing Good, ISP Tax Bad*, March 2008, available at URL: <http://www.eff.org/deeplinks/2008/03/monetizing-file-sharing-collective-licensing-good-isp-tax-bad> [last check, Sept. 15, 2009].

²³ See Rose F., *Music Industry Proposed a Piracy Surcharge on ISPs*, *Wired Magazine*, March 13, 2008, available at URL: http://www.wired.com/entertainment/music/news/2008/03/music_levy [last check, Sept. 15, 2009]. See, also, Electronic Frontier Foundation, *RIAA v. The People: Five Years Later*, September 2008, chapter VII: *Is It Working?*, available at URL: <http://www.eff.org/wp/riaa-v-people-years-later> [last check, Sept. 15, 2009].

creator too. However, all collecting societies should be forced by law to include a solution of this kind for their members provided that it was finally deemed to be the best alternative option for compensating authors and creators. If the implementation of a solution like EFF's proposal were voluntary to adopt by a collecting society, then the risk for an imbalance between those which have adopted and those that have rejected it in the same local market could inevitably cause competition, friction and distortion in the transparency demand of their operation imposed by collecting societies' members. The EFF's proposed solution is "technology agnostic", therefore there should be no room for the implementation of such a solution through a technological platform of a certain kind and/or of certain origins: whatever the technological platform — Linux, Mac, Windows, iPod, cell phone, downloads, streaming, buffered streams — the end-user should have the right to make a choice upon it. No ISP and no collecting society should impose any technological platform on the end-user. Once the P2P file-sharing fee is paid, it's nobody's business where the protected work comes from or where it ends up.

We find the no-taxation option of the presented solution hereto, which we acknowledge to be fair enough to cope with the file-sharing problem, to be closer to the Greek reality regarding possible options for amending the Intellectual Property Law in Greece and legitimizing P2P file-sharing of protected works. The nature of the equitable remuneration of article 18§3 of L.2121/1993 is not a tax,²⁴ but rather it is a kind of a collective licensing imposed by Law on the users indirectly, i.e. said licensing has a monetary value the cost of which is paid by the importers or producers of devices which the user is buying. Judicial precedent in Greece is in sync with this view that the nature of the equitable remuneration of article 18§3 of L.2121/1993 is not a tax, but rather is an obligation imposed by Law, a liability recognised in the provisions of L.2121/1993.²⁵ The equitable remuneration of article 18§3 of L.2121/1993 is set with the aim of balancing the conflicting interests between right-holders on one side and the general public on the other. The Greek Copyright Law caters for statutory limitations, one of which is the right to private use of a work without any obligation on the user's part except for the equitable remuneration of article 18§3 that is set at a predetermined percentage of the value of the devices for the reproduction of the work. The meaning in L.2121/1993 is that the equitable remuneration is imposed in any case, and regardless of whether a work was reproduced for private or other use or not reproduced at all. Private use of a work does not prevent the application of L.2121/1993, which caters for fair compensation for the right-holders insofar as is permitted by it.²⁶ Also, any use of a protected work, including private use, of course is limited by the three-step-test of articles 18§2 and 28C of L.2121/1993.

Rather than attacking human rights of people by considering solutions such as those furnished through the 2007 Report of Denis Olivennes²⁷ — which the Nicolas Sarkozy administration in France has attempted to implement through the passing of the Hadopi Law and which the European Parliament has already rejected,²⁸ and which the French Constitutional Court has already found to be in conflict with the holiest of French legal documents, i.e. the Declaration

24 For the meaning of "tax", see Supreme Court in plenum, 22/2006, "Isocrates" database for Athens bar Association's members, Hellenic Jurisprudence (Elliniki Dikeosini), 2005, vol.47, p.1071. See also, Supreme Court in plenum, 18/1994, "Isocrates" database for Athens bar Association's members, Legal Podium (Nomiko Vima), 1996, vol.44, p.37. See, also, Supreme Special Court, 8/2007, "Isocrates" database for Athens bar Association's members, Armenopoulos, 2007, p.1773. Contra State's Council, Fourth Department, 949/2000, "Isocrates" database for Athens bar Association's members, 2001, vol.49, p.1071, Legal Podium (Nomiko Vima), 2001, vol.42, p.1063, Hellenic Jurisprudence (Elliniki Dikeosini).

25 See Court of First Instance of Athens, Decision 121/2008, and Decision 3860/2001, Commercial Law Review (EEmpD) 2011, p.790-794, "Isocrates" database for Athens bar Association's members. See, also, Supreme Court Decision 1125/2006, "Isocrates" database for Athens bar Association's members.

26 See also Directive 2001/29/EC introductory note 45.

27 See Rapport au Ministre de la Culture et de la Communication, Mission confiée à Denis Olivennes, November 2007, available in French at URL : <http://www.culture.gouv.fr/culture/actualites/index-olivennes231107.htm> [last check, Sept. 15, 2009].

28 See Phillips L., Commission backs internet users over content providers, EUobserver.com, 9.10.2008, available at URL: <http://euobserver.com/871/26903> [last check, Sept. 15, 2009], the same, French internet law clashes with EU position, EUobserver.com, 31.10.2008, available at URL: <http://euobserver.com/871/27026> [last check, Sept. 15, 2009].

of the Rights of Man and Citizen of 1789²⁹ — we believe that a solution to the problem at hand could come only if the focus is on the process of legitimizing P2P file-sharing on condition of proper respect and due payment of the equitable remuneration as is provided by law aiming at fair compensation of authors and creators. The equitable remuneration of article 18§3 of L.2121/1993 in the provisions of the Greek Copyright Law will be violated by illegal P2P file-sharing of protected works for as long as legislators do not take action and amend L.2121/1993 in consideration of the interests of all the involved parties, i.e. right-holders, subsequent right-holders, and the general public. The interests of right-holders and subsequent right-holders are not served well by turning a blind eye to the widespread practice of P2P file-sharing, which the general public considers positively. The interests of all the involved parties regarding intellectual property via Internet networks and P2P file-sharing practices are not served well by conducting biased public consultations intended to create statistical background data and present a distorted perception for P2P file-sharing as if it had been the general public's negative stance upon it. The general public's stance opposes such measures as those proposed by the Hadopi Law. This has become clear even in France where the current public administration³⁰ found severe resistance from the opposition (the Socialists, mainly) to pass legislation that will cut off access to the Internet to those who are found to be repeatedly downloading copyrighted material without permission. Massive protests against the passing of such legislation have expressed clearly the public's dissent for the enactment of measures that could transform the Internet from a technology of freedom to a technology of surveillance.³¹ After the French Constitutional Court's negative verdict on the constitutionality of the Hadopi Law, the proponents of it failed in "saving" intellectual property in cyberspace from the ingrained dangers of P2P file-sharing.

The interests of all the involved parties cannot be served at all if the focus is on solutions the implementation of which requires violating the Constitutional principle of proportionality and/or Constitutional principles upon which human rights are founded. This cannot happen in a democratic society, such as Greece. The exchange of copyrighted materials on P2P networks is inevitable. Some users will use P2P technology to infringe. If that alone is enough reason to target P2P with the aim of shutting down the technology, then those who do so sacrifice technological progress for the sake of content providers' financial interests, a poor choice of technology policy at a time when technology has never held more promise.³²

29 See Phillips L., Sarkozy tries to rescue Internet Law after court decision, EUobserver.com, 12.6.2009, available at URL: <http://euobserver.com/871/28294> [last check, Sept. 15, 2009]. In June 10, 2009, the French Constitutional Court ruled that cutting off internet access by the Hadopi agency—Haute Autorité pour la Diffusion des Œuvres et la Protection des Droits sur Internet (Hadopi), or High Authority on Diffusion of Works of Art and the Protection of the Rights on the Internet—without recourse to a court of law contravened three articles of the Declaration of the Rights of Man, France's fundamental document setting out the rights of French citizens, breaching rights to freedom of expression and the presumption of innocence. The ruling echoes the arguments the European Parliament put forward in its attempt to outlaw the French bill by tacking on an amendment to a package of legislation liberalising the European telecommunications sector.

30 On Wednesday, March 11 and Thursday, March 12, the French parliament debated the "creation and internet" law that introduces the three strikes or so-called graduated response against illegal downloading. Under the legislation those accused of such activities are first sent an email warning them of their infraction by a new government agency. They are subsequently sent a warning letter in the post. If after this second warning they continue to illegally download copyrighted content, the internet service provider will cut off access to the internet for a year. The legislation passed in the Senate, with a massive cross-party majority of 297 votes to 15. Only a handful of conservatives, centrists and socialists voted against, while the Communists abstained. However, in the lower house, the bill faced stiffer resistance as 'internauts', as web-surfers are known in France, mobilised against the law. On April 2, 2009, the French National Assembly finally passed the three-strikes-bill to combat Internet piracy despite Socialists' opposition to the bill. See Phillips L., French websites blacked out to protest piracy bill, EUobserver.com, 13.3.2009, available at URL: <http://euobserver.com/871/27769?rk=1> [last check, Sept. 15, 2009], and the same, French National Assembly passes three-strikes internet piracy bill, EUobserver.com, 3.4.2009, available at URL: <http://euobserver.com/871/27910?rk=1> [last check, Sept. 15, 2009].

31 See Phillips L., *ibid.*, 13.3.2009, according to who, La Quadrature du Net (Squaring the Net), a French internet civil liberties pressure group backed by the Open Society Institute and the Electronic Frontier Foundation, has successfully organised a 'Black-out' protest, in which web designers, bloggers and others on the internet darken their web pages in protest at the bill. The group says it is difficult to put a precise figure on the number of blacked-out sites, but say the number of unique domains joining the protest has reached over 12,000 and the number of URLs (web addresses) is at over 500,000. "To be safe, we are just saying tens of thousands," Jeremie Zimmerman, a spokesperson with La Quadrature du Net, told EUobserver: Facebook profiles were also being blacked out, and, in the first such protest of its kind in France, users of Twitter, the increasingly popular micro-blogging service, were blacking out their avatars as well. The entire "island" in Second Life, the virtual online world, went black on Saturday, March 14, 2009. "The law is based on the surveillance of internet users by a public body but employing so-called proof of illegal activities supplied by private actors - such as collecting societies and the music companies - over which, unlike the police who would normally be the actors who monitor for illegal activities - we have no democratic control," said Mr. Jeremie Zimmerman. And he continued, "It will also use harvested IP addresses as proof - which is so imprecise that it is certain that there will be innocents that will be caught up in its net, and finally, there is no recourse against this until after your internet access is cut off. It's a kafkaesque legal procedure."

32 See Schaumann N. (2005), Direct Infringement on Peer-to-Peer Networks, William Mitchell Legal Studies Research Paper No. 9, available at URL: <http://ssrn.com/abstract=703882> [last check, April 30, 2009].

Regulations that restrict P2P networks and the freedom of speech through them could be necessary in a democratic society under certain exceptional conditions. But restrictions are deemed necessary in a democratic society only if they answer a pressing social need and are proportional to the legitimate aim of the restriction. This is obviously not the case with current content-providers and subsequent right-holders' negative stance towards P2P file-sharing technologies.

Also, those who promote the implementation of solutions such as those furnished through the Hadopi Law in France, seem to sacrifice access values for the sake of property values. We object to this idea strongly since we find it out of place and context in our democratic and Internet-networked society. The attempted broadening of criminalization of P2P file-sharing with the aim of blocking access and dissemination of works in the Internet is in direct conflict with article 10 of the European Convention for the Protection of Human Rights and Fundamental Freedoms as it was amended by Protocol 11 which came into force as of November 1998, with Protocols 1, 4, 6, 7, 12, & 13 (ECHR).³³ An explicit recognition of the importance of the ECHR and its binding character for EU-member countries is embodied in article 6 of the Treaty of the European Union.³⁴ ³⁵ Article 10 of ECHR is applicable, at the very least, into the communication of facts, news, knowledge and scientific information. The conflict with article 10 of ECHR occurs because measures such as those suggested through the Hadopi Law do not allow for certain socially valuable uses which are exempted from the copyright scope in order to pursue the objective of dissemination of copyrighted works while protecting user-privacy and stimulating the creation of new works by follow-on authors. Blocking access to and dissemination of works in the Internet for certain socially valuable uses which are exempted from the copyright scope, results in a blocking of the freedom of speech which is constitutionally protected in all EU-member countries. In its Recital 22, Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, states that *The objective of proper support for the dissemination of culture must NOT³⁶ be achieved by sacrificing strict protection of rights or by tolerating illegal forms of distribution of counterfeited or pirated works.* Therefore, the objective of proper support for the dissemination of culture must NOT be achieved by sacrificing strict protection of the right to freedom of speech in as much as other fundamental human rights. Article 10 of ECHR is intended to be interpreted broadly and applied to old and new media alike — including the Internet, of course.³⁷ In consideration of this fact, it is reasonable to argue that the rights to impart, distribute, and receive information in the Internet without government interference applies also to

33 See The European Court of Human Rights, The European Convention for the Protection of Human Rights and Fundamental Freedoms at the URL: <http://www.echr.coe.int/ECHR/EN/Header/Basic+Texts/Basic+Texts/The+European+Convention+on+Human+Rights+and+its+P+rotocols> [last check, Sept. 15, 2009], article 10 of which states in §1: Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regard less of frontiers. This article shall not prevent States from requiring the licensing of broadcasting, television or cinema enterprises. And in art. 10§2: The exercise of these freedoms, since it carries with it duties and responsibilities, may be subject to such formalities, conditions, restrictions or penalties as are prescribed by law and are necessary in a democratic society, in the interests of national security, territorial integrity or public safety, for the prevention of disorder or crime, for the protection of health or morals, for the protection of the reputation or rights of others, for preventing the disclosure of information received in confidence, or for maintaining the authority and impartiality of the judiciary. The ECHR has been transposed in Greece via L.D. 53/1974.

34 See the Treaty of the European Union at the URL: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:115:0013:0045:EN:P+DF> [last check, Sept. 15, 2009] in which article 6§1 states: The Union recognises the rights, freedoms and principles set out in the Charter of Fundamental Rights of the European Union of 7 December 2000, as adapted at Strasbourg, on 12 December 2007, which shall have the same legal value as the Treaties. The provisions of the Charter shall not extend in any way the competences of the Union as defined in the Treaties. The rights, freedoms and principles in the Charter shall be interpreted in accordance with the general provisions in Title VII of the Charter governing its interpretation and application and with due regard to the explanations referred to in the Charter, that set out the sources of those provisions. And in art. 6§2 it states: The Union shall accede to the European Convention for the Protection of Human Rights and Fundamental Freedoms. Such accession shall not affect the Union's competences as defined in the Treaties. And in art. 6§3 it states: Fundamental rights, as guaranteed by the European Convention for the Protection of Human Rights and Fundamental Freedoms and as they result from the constitutional traditions common to the Member States, shall constitute general principles of the Union's law.

35 According to article 28§1 of the Constitution of Greece, The generally recognised rules of international law, as well as international conventions as of the time they are sanctioned by statute and become operative according to their respective conditions, shall be an integral part of domestic Greek law and shall prevail over any contrary provision of the law. The rules of international law and of international conventions shall be applicable to aliens only under the condition of reciprocity. Therefore, article 10 of ECHR prevails over any contrary provision of local law in Greece.

36 Emphasis added.

37 Hugenholtz, B. (2001), *Copyright and Freedom of Expression in Europe*, published in: Cooper Dreyfuss, R., First, H., and Leenheer Zimmerman, D., (eds.), *Expanding the Boundaries of Intellectual Property*, Oxford: Oxford University Press 2001, available at URL: <http://www.ivir.nl/staff/hugenholtz.html> [last check, Sept. 15, 2009].

file-sharing enabled by P2P networks. Freedom of speech in P2P communication is blocked so long as restrictive measures aim at protecting the rights of others established by copyright law with regard to the reproduction and making available of creative works through the Internet. Assuming that every copyrighted work consists, at least in part, of “information and ideas,” a potential conflict between copyright and freedom of expression is apparent. The potential restriction and alteration of the design of P2P networks stemming from the overstretched copyright liability criteria runs contrary to the principle of freedom of speech in so far as end-users are deprived of the opportunity to disseminate free information, ideas, and unprotected works and/or protected works used for certain socially valuable uses, such as personal non-commercial use, which are exempted from the copyright scope through P2P networks made available via the Internet.³⁸ Freedom of speech is also endangered by potential restrictions and alterations of the design of P2P networks as a direct consequence of the creation of policing duties for ISPs, network operators, hosting providers etc. The burden of monitoring and policing communication via the Internet imposed on ISPs etc will inevitably direct them towards blocking end-users’ access to P2P networks via ISPs’ services and networks in order to prevent the risk of ISPs’ liability based on copyright infringement.³⁹

Freedom of speech is safeguarded in Greece mainly through the provisions of articles 5§1 and 14§1 of the Constitution,⁴⁰ and the right to information is specified in article 5A§§1, 2.⁴¹ It is widely accepted in legal theory that the provisions for the protection of intellectual property do not conflict with the constitutional provisions for freedom of speech and the right to information, but rather the constitutional provisions, and especially article 5A aim at safeguarding for people the right to participate in Cyberspace so that they are not deprived of it.⁴² The protection of intellectual property is considered to be third-party’s right for which restrictions may be imposed in the constitutional right to information for the sake of protecting it. But these restrictions *may be imposed by law only insofar as they are absolutely necessary and justified*, i.e. restrictions are deemed necessary because they answer to a pressing social need and are proportional to the legitimate aim of the restriction. However, this is not the case with an attempted total ban of P2P networks and file-sharing which goes far beyond the scope of the constitutional rule and does not respect the principle of proportionality.

Instead, we could focus our attempts in amending the Copyright Law with the aim of balancing conflicting values, access and property, and legitimize P2P file-sharing on condition of proper respect and due payment of the equitable remuneration as is provided by law. We should be unwilling to allow content providers, collecting societies, and copyright holders to prevent infringement effectuated by means of a new technology such as P2P networks at a price of possibly denying non-infringing Internet and Intellectual Property users the benefit of the P2P technology. Blaming P2P technology just because content providers, collecting societies, and copyright holders can hardly control it and manage their — mainly financial — interests in the advent of P2P evolution, does not make any sense to the general public. If,

38 Hugenoltz, B., *ibid.*, (2001). See, also, for the United States: Nimmer, M., (1970), Copyright vs. the First Amendment, 17 Bulletin of the Copyright Society 255, Sobel, L., (1971), Copyright and the First Amendment: a gathering storm?, 19 ASCAP Copyright Law Symposium 43. For more recent discussion, see Weinstock Netanel, N., (1998), Asserting Copyright’s Democratic Principles in the Global Arena, 51 Vanderbilt Law Review 217, Fraser, S., The Conflict between the First Amendment and Copyright Law and its Impact on the Internet, 16 Cardozo Arts & Ent. Law J. 1

39 Mazziotti, G. (2008), EU Digital Copyright Law and the End-User, Springer-Verlag Berlin Heidelberg, p.239-241, Ploman, E.W., and Clark Hamilton, L., (1980) Copyright. Intellectual Property in the Information Age, London, p. 39, Jehoram, H. C., (1983), Freedom of expression in copyright and media law, GRUR Int. 385, Hugenoltz, B., *ibid.*, (2001).

40 See article 5§1 of the Constitution of Greece according to which All persons shall have the right to develop freely their personality and to participate in the social, economic and political life of the country, insofar as they do not infringe the rights of others or violate the Constitution and the good usages, and article 14§1 according to which Every person may express and propagate his thoughts orally, in writing and through the press in compliance with the laws of the State.

41 According to article 5A§1, All persons have the right to information, as specified by law. Restrictions to this right may be imposed by law only insofar as they are absolutely necessary and justified for reasons of national security, of combating crime or of protecting rights and interests of third parties, while according to article 5§2, All persons have the right to participate in the Information Society. Facilitation of access to electronically transmitted information, as well as of the production, exchange and diffusion thereof, constitutes an obligation of the State, always in observance of the guarantees of articles 9, 9A and 19.

42 See Kallinikou, D., (2008) Copyright and Related Rights, 3rd edition, P. Sakkoulas, p.11-12, Synodinou, T., (2008) Intellectual Property and New Technologies, Sakkoulas Publications, p.178-214, Supreme Court decision 752/1988, “Isocrates” database for Athens bar Association’s members, Supreme Court in plenum decision 812/1980, “Isocrates” database for Athens bar Association’s members.

however, content providers, collecting societies, and copyright holders want to enlist the public to help control copyright infringement, they must be willing to support propositions of copyright law that make sense to the general public. The general public leveraging upon the power of Internet-networked communications is probably the biggest threat to content providers and collecting societies. It is not piracy or online competitors that create the threat, but the *nonmarket alternatives* such as P2P networks in the hands of the general public. Content providers and collecting societies might rail against “pirates” and demand stronger copyright protection, but the real long term threat to their business models is the migration of consumer attention to amateur creativity and social communication. Social production on open networks such as P2P has become a powerful creative and economic force in its own right. Ordinary people can now find their own voices and develop folk cultures of their own that may or may not use the market.⁴³ The real long term threat to copyright is the widespread social defiance of the Copyright Law, which crops up as a consequence of content-providers’ and subsequent right-holders’ fight against technological solutions that pose a threat to their financial interests.

So far, we know of no scientifically conducted and unbiased report in Greece which has reached the conclusion that there is no general interest in people’s right to use creative works online and/or that information technology like P2P systems is against people’s interest in making use of intellectual property online. There has been no public — and unbiased — consultation in Greece which caters for the aggregation and scientific analysis of the feedback received from all the involved parties, i.e. creators, subsequent right-holders and the general public with conflicting interests regarding the “hot-potato” of P2P file-sharing and the legal use of intellectual property online. On the contrary, there have been efforts to demonize P2P technology as if it were the cause of all the evils that cropped up in the Intellectual Property online arena. There has been a stance of content-providers and subsequent right-holders towards P2P technologies in Greece similar to the “substantial contributory infringement”⁴⁴ claim in the famous Sony case⁴⁵ or the theory of inducement and the “active steps” liability claim in the famous Grokster case⁴⁶ in the U.S. Content-providers and subsequent right-holders who feel that their business models and financial interests are threatened by the advantages of P2P file-sharing are leveraging upon litigators with the aim to stop and prohibit any further use of P2P systems charging them as illegal. Those who attack P2P systems claim that P2P software providers are liable for exerting control upon illegal use of protected works through their network and/or have the possibility to exert control, and/or have a financial interest in the infringing activity, and/or are liable because they induce others who are members of a P2P network to infringe copyright, and/or are liable because of breach of their duty of care under tort law if the software provider is found either to support direct infringement actively by allowing parties to use its technology or for failing to exercise due care when giving shape to the technology itself.

The myopic legal assault on P2P systems — whatever is their nature and use — that we’ve come across during the last decade is problematic. It is a quirky reaction of lawyers who perceive Intellectual Property as if it were their terrain of expertise only in the advent of technological evolution that forces changes in almost all aspects — legal, business, social etc — of society and on how people make use of content that becomes available online.⁴⁷

43 Bollier, D., (2008), *Viral Spiral, How the Commons Build a Digital Republic of their Own*, The New Press, p. 133, available at URL: <http://www.viralspiral.cc/download-book> [last check, Sept. 15, 2009].

44 There are three possible forms of copyright liability under the U.S. Copyright Law: A) Contributory infringement, which refers to the conduct of one who, fully aware of his/her infringing activity, induces, causes or materially contributes to the infringing activity of another. B) Vicarious liability, which refers to the legal principle that one who has the right and the ability to supervise and direct an infringer and also has a financial interest in the infringer’s activity may be held liable for the conduct of the people under their supervision. C) The theory of inducement, which provides that one who takes active steps with the intent of promoting an infringement, is liable for the resulting acts of infringement by third parties. See, also, Von Lohmann, F., (2006), *IAAL: What Peer-to-Peer Developers Need to Know about Copyright Law*, Electronic Frontier Foundation, available at URL: <http://www.eff.org/wp/iaal-what-peer-peer-developers-need-know-about-copyright-law> [last check, Sept. 15, 2009].

45 See *Sony Corp. of America v. Universal City Studios Inc.*, 464 U.S. 417 (1984) case available at URL: http://www.law.cornell.edu/copyright/cases/464_US_417.htm [last check, Sept. 15, 2009].

46 See *Metro-Goldwyn-Mayer Studios Inc., v. Grokster Ltd.*, 545 U.S. Supreme Court, June 27, 2005, available at URL: http://w2.eff.org/IP/P2P/MGM_v_Grokster/04-480.pdf [last check, Sept. 15, 2009].

47 Intellectual Property is economically too important to be left to lawyers while at the same time it is too legally charged to be left to managers. See Goldstein, P., (2007), *Intellectual Property: The Tough New Realities that Could Make or Break your Business*, Portfolio, p.6.

Also, P2P is targeted and is exposed to fire in most cases from content-providers and subsequent right-holders who have interwoven their business interests and business models with the commercial availability of content online. However, P2P per se is a technological system that was not invented to facilitate copyright infringement; rather, it is a technological solution to a problem of computer network architecture.⁴⁸ It can be used for a wide range of uses, only some of which have been found to be illegal by the judiciary in consideration of the existing legal framework and which, at its biggest portion, is the result of laws and legal theories of the pre-technologically-sophisticated era. Skype, for example, which allows users to make phone-calls from one computer to another for free, and from their computer to the telephone network for a small fee is a P2P technology. Should we enact a legal assault on Skype just because it's a P2P application?

P2P is developing as a general approach toward producing distributed data storage and retrieval systems, just as open wireless networks and distributed computing are emerging to take advantage of personal devices to produce distributed communications and computation systems, respectively. As the social and technological uses of P2P technologies grow and diversify, the legal assault on all P2P developers becomes less sustainable⁴⁹ — both as a legal matter and as a social-technical matter.⁵⁰ Therefore, it is totally wrong to behave as if the thorny problem of copyrighted content via P2P systems were only a legal matter requiring the intervention of lawyers and law-making experts to resolve. Legal use of works available online via P2P systems is an issue wider than the limits of Intellectual Property Law, or, to phrase it otherwise, the form of regulation for Intellectual Property through P2P technologies requires proper consideration of other key-factors such as technological development, people's behaviour and society's response to the Intellectual Property online problem.

In that sense, we believe that the 2003 EFF's proposal presented hereto and seen in the context of the Greek Copyright Law is in the right direction and capable of providing a balanced solution to a seemingly insolvable problem. Thus, we could design and implement a plan in which ISPs could bundle the P2P file-sharing fee into the price of their broadband services for users who are interested in P2P file-sharing and downloading of protected works. In that case, file-sharers could remunerate right-holders through collecting societies. The EC Directives on Copyright issues allow for the idea of mandatory collecting societies licensing in situations similar to the case of article 9§1 of "Council Directive No. 93/83/EEC of 27 September 1993 on the coordination of certain rules concerning copyright and rights related to copyright applicable to satellite broadcasting and cable retransmission". According to this article, *Member States shall ensure that the right of copyright owners and holders of related rights to grant or refuse authorization to a cable operator for a cable retransmission may be exercised only through a collecting society*. An amendment to Copyright Law which would cater for such mandatory collecting societies' licensing in the case of P2P file-sharing for non-commercial use would be in sync with existing regulation and could provide a solution to a seemingly insolvable problem. Also, the non-commercial use of intellectual property

⁴⁸ See Schaumann, N., (2005), Direct Infringement on Peer-to-Peer Networks, William Mitchell Legal Studies Research Paper No. 9, available at URL: <http://ssrn.com/abstract=703882> [last check, Sept. 15, 2009]. In the traditional ("one-to-many") model, users access a web site, physically located on a server — a computer whose task is to respond to user requests (for example, to view a file, to receive and process user orders, or any of the myriad functions performed by web sites). In this model, one server responds to many users, and the model was a vast improvement over that prevalent in the pre-network era, when information generally had to be delivered physically to the computer on which it was used. For all its relative efficiency, however, the one-to-many model has some shortcomings easily noticed by users and web site proprietors. From the user's perspective, a bottleneck is created when server capacity is overtaxed by the number of user requests. That is, logging on to a busy server results in very slow responses or even in some cases a complete failure to respond. From the web site proprietor's perspective, it is expensive to store vast amounts of information on servers. Moreover, a successful business model implies that the more information is stored, the more users will be attracted to the information, necessitating additional processing capacity — and thus additional investment — to avoid bottlenecks that will make response times unacceptably slow and thereby drive users away. P2P technology addresses these concerns by reconfiguring the model of information storage and retrieval. In the P2P model, each user's computer acts simultaneously as a server and as a client. The result is a "many-to-many" configuration; many servers to many users. Because each connected computer functions simultaneously as a client and as a server, each computer is a "peer" of the other connected computers; hence the term "peer-to-peer."

⁴⁹ It could sustain only as sufficient evidence of legal stupidity and myopia, which could, however, turn out dangerous for society when people expressing it are assigned the task to manage government-funded organizations that focus on the intellectual property legal and/or societal issues.

⁵⁰ Benkler, Y., (2006), *The Wealth of Networks—How Social Production Transforms Markets & Freedom*, Yale University Press, p.421, available at URL: http://cyber.law.harvard.edu/wealth_of_networks/Main_Page [last check, Sept. 15, 2009].

should be available for free through P2P file-sharing networks because of a work's "non-excludable" and "non-rival" nature once it becomes available online. Considering that a copyrighted work is both an input and an output of the process of intellectual creation,⁵¹ increasing the cost of use at the input stage, consequently increases the cost at the output stage. Or, to put it differently, the elimination of the free access to works and allowance for file-sharing through P2P networks would dramatically restrain the use of copyrighted works as an input to further creativity i.e. the output of the process of intellectual creation. In fact, only those who are willing to pay the costs mandated by the copyright right-holders would have the opportunity to access and build upon the protected work, the ideas and material described therein. Therefore, we need to craft and make use of an alternative system for non-commercial use of intellectual property in consideration of free P2P file-sharing. Once successful locally such an alternative system could be replicated internationally starting from the EU member-countries and expanding beyond EU borders; it could achieve sameness in the legal environment of different jurisdictions.

Legislators need to adopt an open-minded approach to the P2P file-sharing problem in Copyright or else they run the risk of losing the battle for the "hearts and minds" of the general public. They run the risk of turning the general public into Copyright's worst enemy by making it abolish copyright at social level and thus create an unprecedented crisis for the copyright system. The officially registered Pirates Parties in Sweden⁵² and some other EU countries,⁵³ as well as the similar movements in many other countries that have yet to register officially, are indications that speak volumes of the general public's revolt to legislators' hesitance in amending Copyright Law in a way that considers carefully the interests of all the involved parties. Legislators and copyright holders need to consider carefully whether a system that is routinely ignored — such as the existing copyright system that directly confronts P2P file-sharing technologies — may help to foster the belief that copyright is unimportant and unjustifiable and hence in the long term may undermine the entire copyright edifice.⁵⁴ They need to reform current Copyright legislation with the aim of adopting a system that is flexible and adaptable, just as new technologies enabled the creation of new kinds of works, far from the rigidity of the existing one which makes it unsustainable in the long term.⁵⁵

Legislators need to take measures to protect intellectual property in cyberspace but only after meticulous assessment in light of contemporary innovation research, and in respect of the principle of proportionality, the necessity for said measures, in consideration of

51 Scotchmer, S., (1991), Standing on the shoulders of giants: cumulative research and patent law, *Journal of Economic Perspectives*, p.29-41. Benkler, Y., (2001), *A Political Economy of the Public Domain: Markets in Information Goods vs. The Marketplace of Ideas in Expanding the Boundaries of Intellectual Property: Innovation Policy for the Knowledge Society* (Cooper Dreyfuss, R., Leenheer Zimmerman, D., & First, H., eds., Oxford University Press).

52 The Pirate Party (Swedish: Piratpartiet) is a political party in Sweden. It strives to reform laws regarding copyright and patents. The Pirate Party is the third largest party in Sweden in terms of membership. The Pirate Party's associated youth organization, Young Pirate (Swedish: Ung Pirat), is now the largest political youth organization in Sweden by membership count.

53 As of 2009, Pirate Parties are officially registered in the following countries: Austria (Piratenpartei Österreichs), Czech Republic (Česká pirátská strana), Finland (Piraattipuolue), France (Parti Pirate Français), Germany (Piratenpartei Deutschland), Poland (Partia Piratów), Spain (Partido Pirata), United Kingdom (Pirate Party UK). Unofficially registered Pirate Parties exist in the following countries: Argentina (Partido Pirata Argentino), Australia (Pirate Party Australia), Belgium (Pirate Party Belgium), Brasil (Partido Pirata do Brasil), Canada (Pirate Party of Canada), Chile (Partido Pirata de Chile), Estonia (Eesti Piraadipartei), Denmark (Piratpartiet), Ireland (Pirate Party of Ireland / Páirtí Foghlaithe na hÉireann), Italy (Partito Pirata Italiano), The Netherlands (Piratenpartij Nederland), Portugal (Partido Pirata Português), Romania (Partidul Piraților), Slovak Republic (Slovenská pirátska strana), Slovenia (Piratska stranka Slovenije), Switzerland (Piratenpartei Schweiz), Ukraine (Піратська Партия України), and United States (Pirate Party). Additionally, there are discussions on Pirate Party International about forming parties in Mexico, Brazil, Colombia, New Zealand, Serbia and a letter of notification that a party is forming in Peru. See Wikipedia EN at URL: http://en.wikipedia.org/wiki/Pirate_Party#cite_note-Stahl-25 [last check, Sept. 15, 2009].

54 Burrell, R., and Coleman, A., (2005), *Copyright Exceptions—The Digital Impact*, Cambridge Studies in Intellectual Property Rights, Cambridge University Press, p.278-279.

55 Samuelson, P., (2007), Preliminary Thoughts on Copyright Reform, *Utah Law Review*, 2007; U.C. Berkeley Public Law Research Paper No. 1002676. Available at URL: <http://ssrn.com/abstract=1002676> [last check, Sept. 15, 2009].

openness and its importance,⁵⁶ and the related legal framework that does not allow for systematic monitoring and surveillance of Internet users' P2P file-sharing behaviour online. We all need to delve into the causes of intellectual property infringement among which is certainly the excessive access restriction to works in cyberspace imposed by intellectual property right-holders, creators and, most commonly, subsequent right-holders.⁵⁷ We need to re-orientate our legal framework from P2P-resistant to file-sharing-friendly and amend Copyright Law so that it becomes possible to bridge the existing and constantly widening gap between regulation and technological advancement regarding the use of intellectual property in cyberspace. The current myopic assault on P2P leads to a dead-end and stems from a one-sided approach of, mainly, subsequent right-holders.

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⁵⁶ See Background Report for the 1st Internet Governance Forum, Athens, Greece, Oct.–Nov. 2006, available at URL: <http://igf.wgig.org/cms/index.php/athensmeeting> [last check, Sept. 15, 2009]. During the 1st IGF, many speakers and contributors highlighted the importance of openness as one of the key founding principles and characteristics of the Internet. The open nature of the Internet was seen as part of its uniqueness, and its importance as a tool to advance human development. The Internet provides for a robust and unencumbered exchange of information, and welcomes millions of individuals as users from all corners of the world. Internet users trade ideas and information and build on both, thus increasing the wealth of knowledge for everyone, today and in the future. The openness of the Internet was also seen as a key feature to ensure its stability and security. Many submissions pointed out that the Internet made it possible for more people than ever before to communicate and therefore to express themselves (i.e. to hold, receive and impart information and ideas regardless of frontiers) as clearly and as quickly at such a low cost. Access to knowledge and empowering people with information and knowledge that is available on the Internet was described as a critical objective of an inclusive Information Society and to continued economic and social development. There was a widespread acceptance across the contributions that because the Internet was designed for efficiency and not control, it has enabled millions of people all over the world to educate themselves, express their views, and participate in democracy to an extent never before possible. Moreover, there was also widespread recognition of the fact that the distributed nature of the Internet, whereby control is placed at the ends, or in the hands of users, rather than at a centralized point, is a key architectural feature of the Internet that has ensured that freedom of expression and the free flow of information. Hence there was a consensus around the importance of openness in fostering processes of development. There was a general understanding that one of the most important set of rules governing online behaviour is the body of law dealing with intellectual property rights (IPR) in cyberspace. Because of the unique digital nature of the Internet – copies of data are necessarily made to engage in just about any online activity – almost all uses of the Internet automatically trigger intellectual property rules. However, there was no common understanding on how these rules should be shaped to protect the openness of the Internet and the free flow of information. For some, such as the IP Justice, Electronic Frontier Foundation, Janet Hawtin-Reid, the real concern was that the direction of current policy development with regard to IPR and technological innovation, such as with regard to digital rights management (DRM) and technology protection measures (TPM), were capable of undermining the free flow of information and the openness of the Internet. However, others held the view that these rights were essential for protecting the rights of creators and stimulating innovation. The need to maintain an open Internet was also seen as a prerequisite to sustainable development. Several contributions, such as WSIS Civil Society, Special Libraries Association's (SLA), focused on the role of free flow of information as a mechanism for sustaining development and inhibiting the 'brain drain' from poorer to richer countries. Critical to these types of arguments is the view that openness of the Internet is about looking at ways to ensure a fairer distribution of scientific knowledge between countries. Such flows of information are axiomatic to the innovation process and support the development of small and large businesses in developing countries. Specific proposals include metadata standardisation, a freely available Digital Object Identifier (DOI) system, P2P networks as a possible solution to publish scientific information, the creation of a World Language Diversity Network and semantic Web gTLDs. The importance of open and online education resources was highlighted by a number of contributors. The challenges here are not only in defining and fostering open educational resources online but also ensuring that such resources are developed in line with the WSIS principles and the Millennium Development Goals (MDGs). These arguments were reinforced by others who highlighted guiding principles for the free flow of information, namely: public access to works created by and funded by public authorities; to ensure the smooth migration of content into new formats for purposes of preservation; lending and copying those materials that still have a copyright but are not under commercial use; measures to encourage individual research and study by allowing copying of protected material/content by individuals for personal use (research and study) and measures to harmonize copyright legislation.

⁵⁷ See Lambrinidis, S., (2008), Member of EU Parliament, Rapporteur, Report with a proposal for a European Parliament recommendation to the Council on strengthening security and fundamental freedoms on the Internet, (2008/2160(INI)), available at URL: <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A6-2009-0103&language=EN#title5> [last check, Sept. 15, 2009].

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Music information: towards a converging view of physical, digital and temporal resources

Michael Fingerhut, *Institut de recherche et coordination acoustique/musique (IRCAM)*

Resources = documents + events

The ever-widening scope of digitization of all kinds of documents — printed and as well as manuscripts —, and of their increased online availability, whether born digital or digitized, due to ever larger storage space and faster networks, has already had a perceptible influence on once well-defined organizational boundaries between libraries and archives, as exemplified by the merging of the National Library of Canada and the National Archives of Canada in 2004 into one institution, Library and Archives Canada. Earlier in the 20th century, audiovisual archival documents also made their organized entrance into national libraries: the French Phonothèque nationale became part of the French National Library in 1977, while the British Institution of Recorded Sound became part of the British Library in 1983.

To paraphrase Gertrude Stein, a document is a document is a document, all the more so when it becomes a digital file, a series of bits without any distinction in physical form. What matters are its content and its context. This is the case, for instance, for archives of concerts, which may comprise not only sound recordings but also videos (of the performance), various kinds of ephemera (e.g., program notes providing information about the venue, the performers and the musical works in much more detail than the metadata of the recordings), music scores, etc.

But there is an additional context which such documents don't usually provide or make explicit: the temporal dimension. A concert, viewed as an event, may be part of a concert series, of a musical season, itself part of the cumulative artistic history of an institution.⁵⁸ The visualization of relationships between events also provides meaning to the archived traces of these events and allows one to study the cultural history of an institution. This is why, in our view of what "music information" is, we consider events as first-order concepts on the same footing as documents, and speak of resources to refer to either.

In this paper, we will show how such resources are handled within an organization — IRCAM⁵⁹ — and shared among several organizations.

Resource production and consumption at IRCAM

The main operational departments of IRCAM have been producers and consumers of such resources (see Fig. 1 where production is indicated in blue and consumption in red):

- IRCAM's director (who is also its artistic director) plans the musical season (= produces events) of IRCAM, which includes concerts throughout the year and a festival, *Agora*, in June. These concerts may include works from the repertoire, works commissioned from composers, and works composed by students of the IRCAM *Cursus* (one- or two-year long course for composers). In order to do so, he may make use of (= consume) assets held by the Multimedia Library, such as musical scores or recordings of works. The Communications Unit subsequently produces various paper brochures (for the whole season, for a particular concert series, for a single concert).

⁵⁸ We will briefly speak of other contexts, see Timeline below.

⁵⁹ Acronym of "Institut de recherche et coordination acoustique/musique". IRCAM is a non-profit research center dedicated to music expression (composition, performance) and scientific research, founded by composer and conductor Pierre Boulez in the 1970s under the aegis of the French Ministry of Culture and in collaboration with the Centre Pompidou (the French National Center for Arts and Culture in Paris).

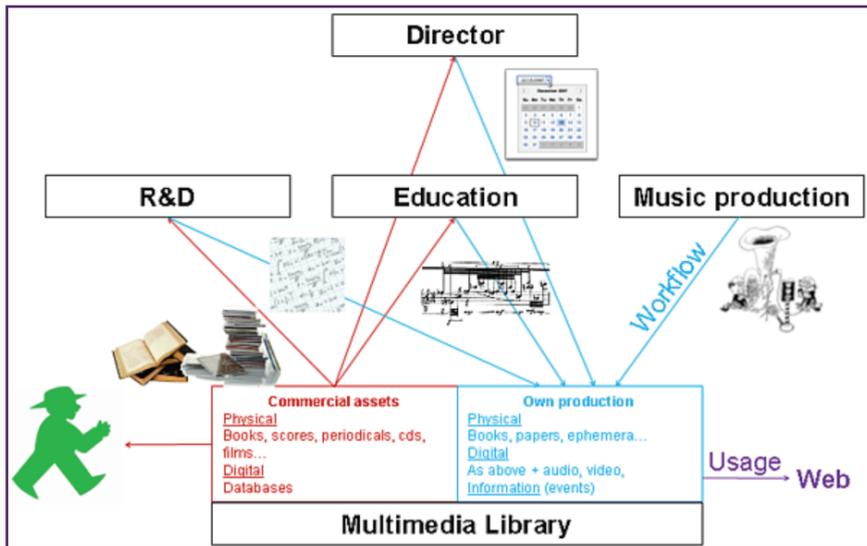


Figure 1. Music resources at IRCAM.

- Students in the Education department compose, as their project at the end of the second year, a work (= they produce a score) which will be performed at one of the season's concerts.
- The Music Production department records the events as they occur (= producer of sound archives).
- The Research and Development department, whose members work in close conjunction with composers, is constituted of a large body of researchers who regularly publish (= produce) papers for conferences and scientific periodicals, whole books or chapters thereof.

The Multimedia Library acts both as a traditional library (acquiring, cataloguing and circulating commercial assets which it provides on demand onsite to the personnel and to any outside patron) and as the archive (preservation and distribution) of IRCAM's scientific and musical heritage in physical and digital forms.

The physical assets (both commercial — books, scores, periodicals, commercial records... and non-commercial — program notes, brochures, etc.) are available onsite (the commercial ones can also be borrowed), as are the digital assets (databases, archive records and ephemera, papers, etc.). The latter may be accessed online depending on the corresponding rights (e.g., up to three-minute long excerpts for sound archives). They are referenced by distinct systems which differ in their specific functions (e.g., lending books for the library software system; search-by-instrumentation in the database of contemporary music composers and their works; auto-referencing, uploading and publishing content for the scientific papers system; preservation and transformations of audio archival content for various types of online access, etc.).

The Engineering Bureau, a unit of the Multimedia Library, has developed most of these subsystems, as well as a one-stop search engine for all the resources they reference. The rest of this paper will describe first Archipro, a specific content management system aimed at implementing the workflow concerning the IRCAM event-related resources (the other ones being handled through well-known types of catalogs and databases), and then the Gateway for contemporary music resources.

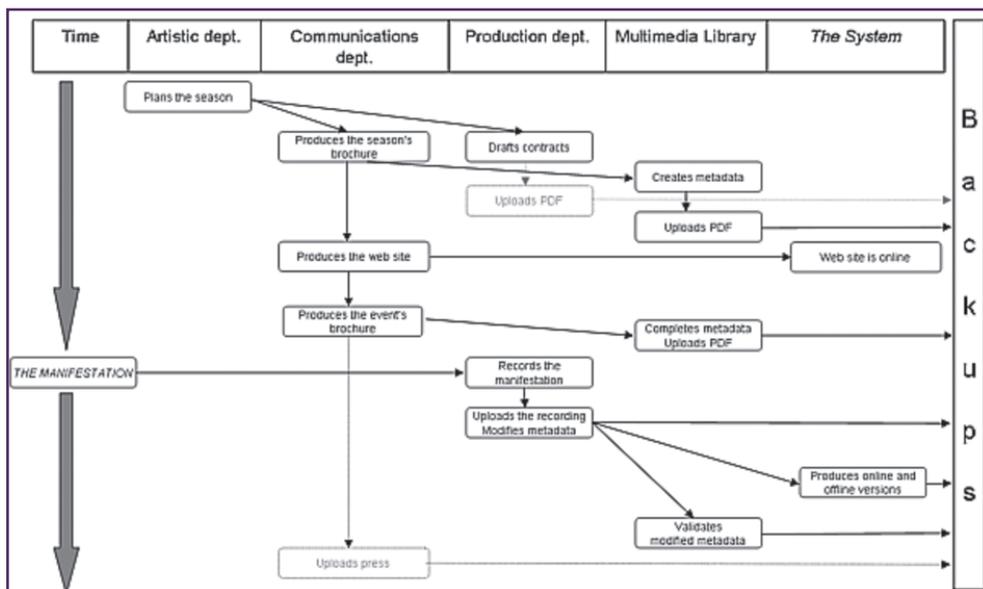


Figure 2. Workflow of IRCAM's documents related to its events.

Handling events of the past and their traces

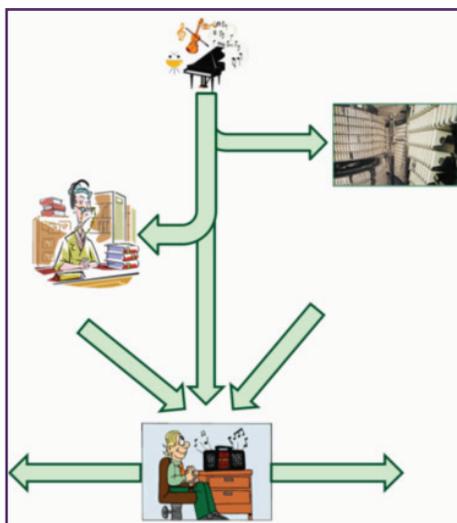


Figure 3. From concert to archive to online

The Multimedia Library has had to handle the digitized recordings of IRCAM's concerts as of 1995, and, later, the corresponding program notes. The sound files were initially recorded on hybrid compact discs⁶⁰ and physically transferred from one department to another to be uploaded in the Multimedia Library information system. The advent of faster networks and larger online storage spurred the development of an increasingly interconnected and automated system.

⁶⁰ Discs whose tracks, to the exclusion of the first one, are readable by a traditional CD player. The first track included a computer-readable text file containing metadata describing each of the subsequent tracks (composer, title, date, venue, performers...). Their life span has shown to be quite high: ca. 99% are still readable 15 years after they were burnt.

Archiproduct, which was developed in-house as of 2006, implements the workflow described in Figure 2 which includes:

- Entry of information about events and their optional modification in time;
- Uploading documents (season's brochure, program notes...) and attaching them to the metadata entered in the previous step;
- Uploading recordings of the event (sound files, and soon video as well) and attaching them to the appropriate metadata.

This system then automatically takes care of storing these resources (metadata and data) in long-term storage for preservation purposes, as well as of deriving one or more versions for online delivery (see Formats, below).

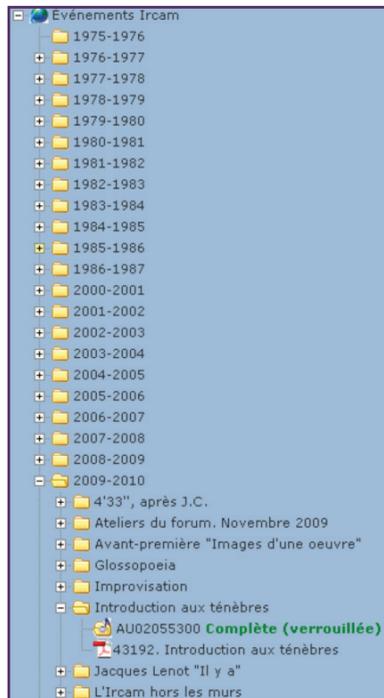


Figure 4. Event tree and attached archives

Additionally, it provides not only standard search, display and retrieve features, but also a structured view of the events along the time axis from the inception of IRCAM to this day: it allows one to browse this tree⁶¹ (Figure 4) and see the artistic (and scientific) structure of the seasons down to a single event and to its traces (recordings, program notes, etc.).

Resource modelization

Internally, Archiproduct implements the following basic entities (which can be thought of as classes):

1. **Events:** identifiable (named, distinctive) time periods. The periods may be disjoint or not, span a year or be just part of a specific day. Examples: a music season (typically spans 10 months), a festival, a concert series, a single concert;
2. **People:** typically, composers, conductors, performers, technicians;

⁶¹ This is actually a directed graph, as an event may be part of two larger events (e.g., a concert in a concert series, which is also part of a festival).

3. Corporate entities: typically, for orchestras, ensembles, etc.;
4. Venues: in which the event is performed;
5. Documents: text, audio, video;
6. Works: typically, the works performed in an event.

In the case where a single event is repeated (for example: a specific concert to be played on several dates), each occurrence is named a **manifestation**.⁶² Each part of a manifestation may be a (musical) work or a talk, a panel, etc. An ad hoc thesaurus, based on the analysis of all the IRCAM past events, was developed to allow for their qualifications (see Figure 5).

While all manifestations of the same event are planned to be identical (and hence share the same program note, which will be attached to the — inner — node corresponding to the event rather than to each of its manifestations, which are leaves of the tree, see Figure 6), they are not necessarily so. The order in which works are played on one date may be inverted, people may be substituted, etc. Hence Archiproduct implements an inheritance mechanism, by which the metadata of a manifestation is that of its parent event, unless it is overridden in one or more fields.

There are three kinds of potential relations between the above entities:

1. **Is part of:** e.g., a concert is part of a festival which in turn is part of a season.
2. **Is a trace of:** used to relate documents to events.
3. **Role:** a named relation between a person or a corporate entity and an event or part thereof. Example: Person₁ is a conductor in Event₁, Person₂ is the solo flautist in a (performance of) Work₂ in Event₂.

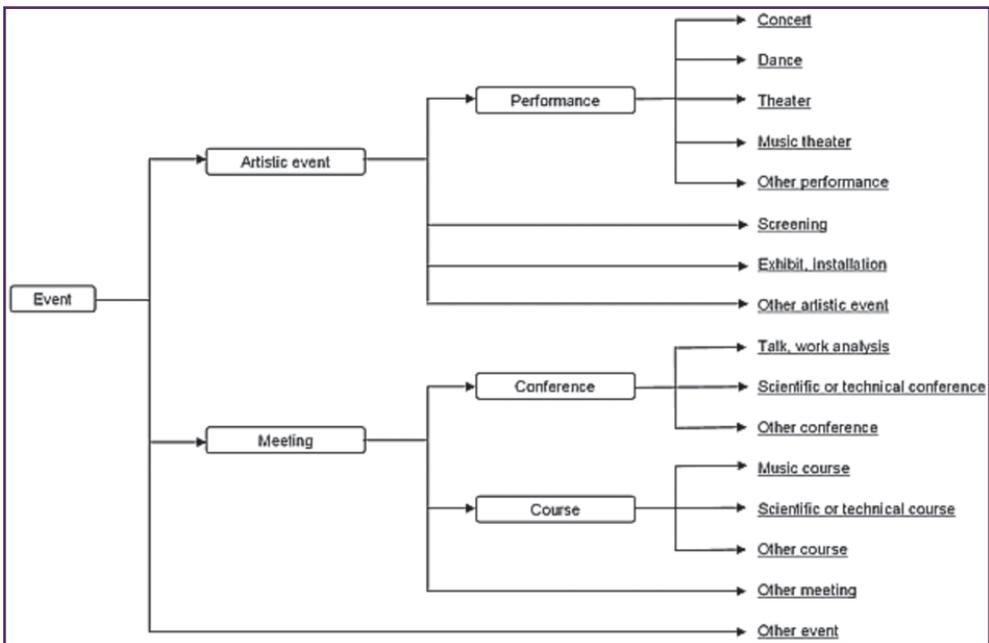


Figure 5. Typology of the components of manifestations

62 Not to be confused with FRBR's expressions-manifestations-items.

Formats

- For preservation purposes, sound data is preserved in WAV or AIFF uncompressed format (at the provided sampling rate), non-digitally native text as TIFF and high-resolution PDF, digitally-native text as provided. Metadata for all these contents is in METS.⁶³
- For onsite delivery, full contents are provided. Audio is compressed in MPEG 1 Layer 2 @ 384 kb/s.
- For free Internet access, excerpts of sound archives up to 3 minutes long⁶⁴ in MP3 @ 192 kb/s with embedded metadata are streamed. PDF is provided in lower resolution with an embedded watermark.

The compressions, excerpt or downgrading production and metadata and watermark embeddings are automatically performed by Archiprod after the source file has been uploaded.

The corresponding formats for video contents are currently being studied.

Common access to scattered resources

As already mentioned, the documentary resources of IRCAM are handled by distinct systems. In addition to the library system, to Archiprod and to the Articles database, IRCAM has been regularly updating and enriching a database containing information about contemporary composers and their works;⁶⁵ the calendar of *future* events is also a potentially accessible database, and a few others are under development.

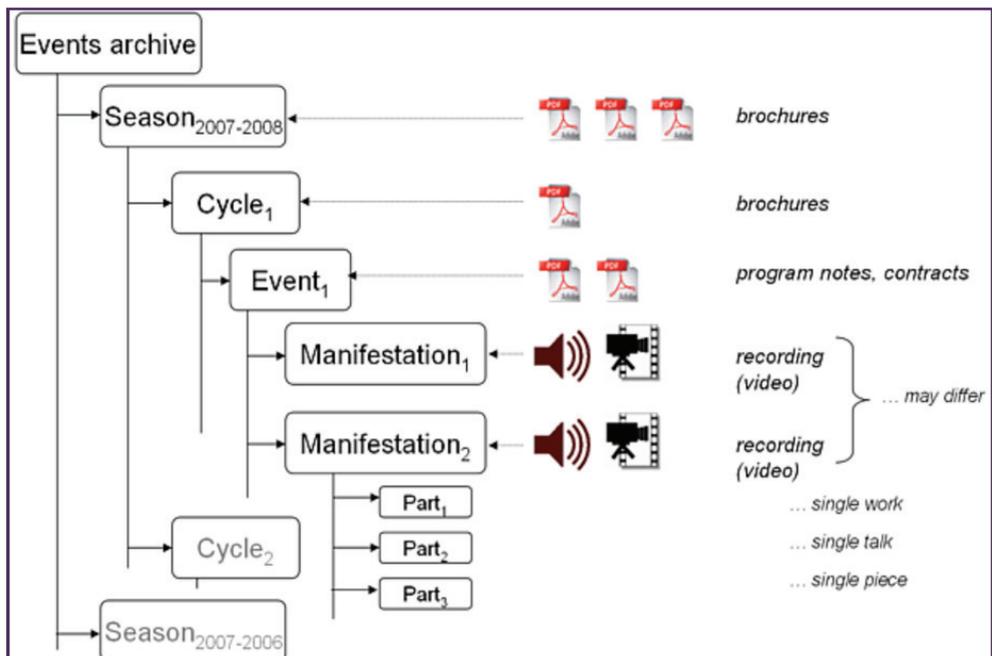


Figure 6. Event tree and attached documents.

⁶³ Metadata Encoding and Transmission Standard, see <http://www.loc.gov/standards/mets/>.

⁶⁴ Or 25% of the recording, whichever is shorter. This is a requirement coming from the appropriate collective rights management organizations.

⁶⁵ See <http://brahms.ircam.fr/>.

Other organizations in France also hold interesting and sometimes unique collections and archives of contemporary music documents and organize events (concerts, talks, etc.) in this domain. These include the French contemporary music information center,⁶⁶ centers for music composition,⁶⁷ music libraries, conservatoires, music ensembles and others. Some of the smaller ones, do not have online catalogs or inventories of their holdings, or, if they do, are under-referenced in the main search engines.

The bilingual Gateway to contemporary music resources in France⁶⁸ aims at increasing the visibility of these resources, facilitating their localization and, more generally, helping to demystify contemporary music: it is a single-stop search engine allowing anyone on the internet to search for or browse resources related to contemporary music held by 28 (at the end of 2009) such bodies (see Figure 7), in one or more of their databases. It currently holds over 170,000 records referencing documents (books, periodicals, scores, commercial and archival sound recordings, movies, program notes, databases, etc.) held by these partners and events (concerts, festivals, conferences, lectures, courses, etc.) they organize or publicize.

For those documents that are available onsite only⁶⁹ (where they can't be digitized or provided on the Internet either for technical or for legal reasons), the site provides the information about the holding institution. But over 12,000 excerpts of sound recordings are freely available through the site,⁷⁰ as well as many program notes and other ephemera, biographies, etc.

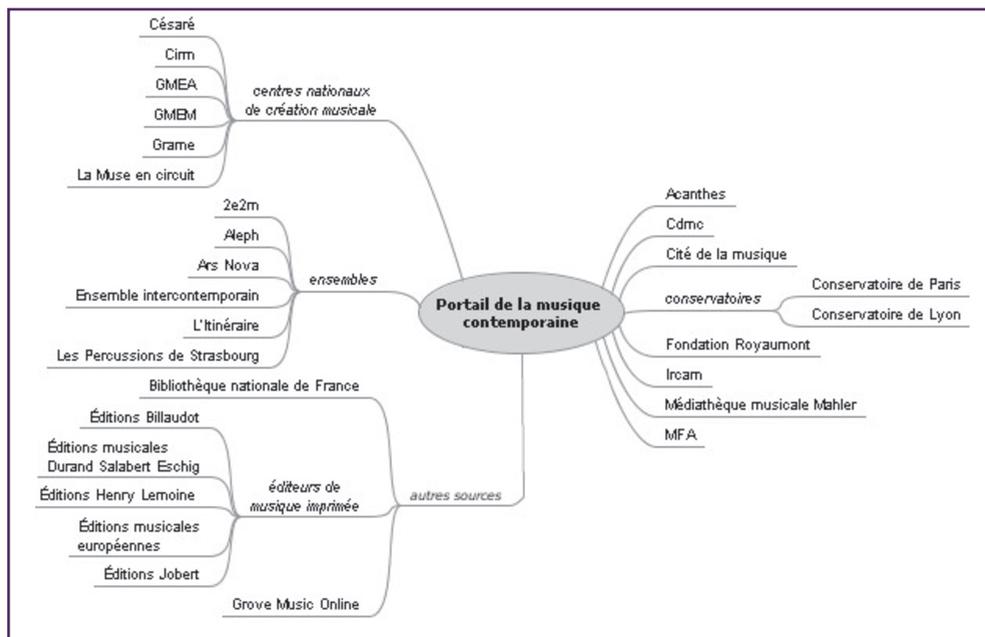


Figure 7. Partners of the Gateway of contemporary music

Additionally, it has a built-in lexicon (see Browsing contents below) explaining the main terms of contemporary music and relating them to available relevant contents.

⁶⁶ CDMC, see <http://www.cdmc.asso.fr/>. It acts as the administrative management of the Gateway for contemporary music resources.

⁶⁷ "Centres nationaux de creation musicale", which are not-for-profit organizations.

⁶⁸ See <http://www.musiquecontemporaine.fr/>.

⁶⁹ Or for interlibrary loan, if available.

⁷⁰ And not from the site: the contents are provided by the holding partner (or by a hosting service set up for this purpose by the project if the partner doesn't have the appropriate computer infrastructure to do so). See below.

Modeling and collecting information into the Gateway

The Gateway is built on simple principles:

1. It does not hold the digital data⁷¹ (i.e., sound recording, PDF text files, etc.), but only metadata about contents and events. Search and browse features are performed on this metadata as indexed in the Gateway's database.
2. It collects the metadata from the partners' databases using the OAI⁷² protocol for metadata harvesting (red arrows in Figure 8): when a new record enters one of their databases, it will be reflected in the Gateway's database as soon as it has "harvested" that database.
3. All the partners have thus to make available exchange records, i.e., "images" of their original records (which may be in any format, represented by distinct colors in Figure 8) to be harvested by the Gateway, subject to two conditions:
 - a. All the exchange records must be structured in XML and formatted in a common way (as defined by the project, see below; in blue in Figure 8), regardless of how they are formatted in their underlying databases. This will allow the Gateway to index and display them uniformly regardless of their origin.
 - b. Each such collection of images (called "repositories", in OAI) must contain records about contemporary music only, or provide the means for the Gateway to harvest only that part (called a "set") which corresponds to contemporary music.
4. When digital data (such as a sound recording or a text file) is referenced by a record in a partner's database, this reference will be preserved in the Gateway's image of the record. The user will then be able to access the content (which is provided by the partner, not by the Gateway) directly from the Gateway's record, without having to go to the original record.

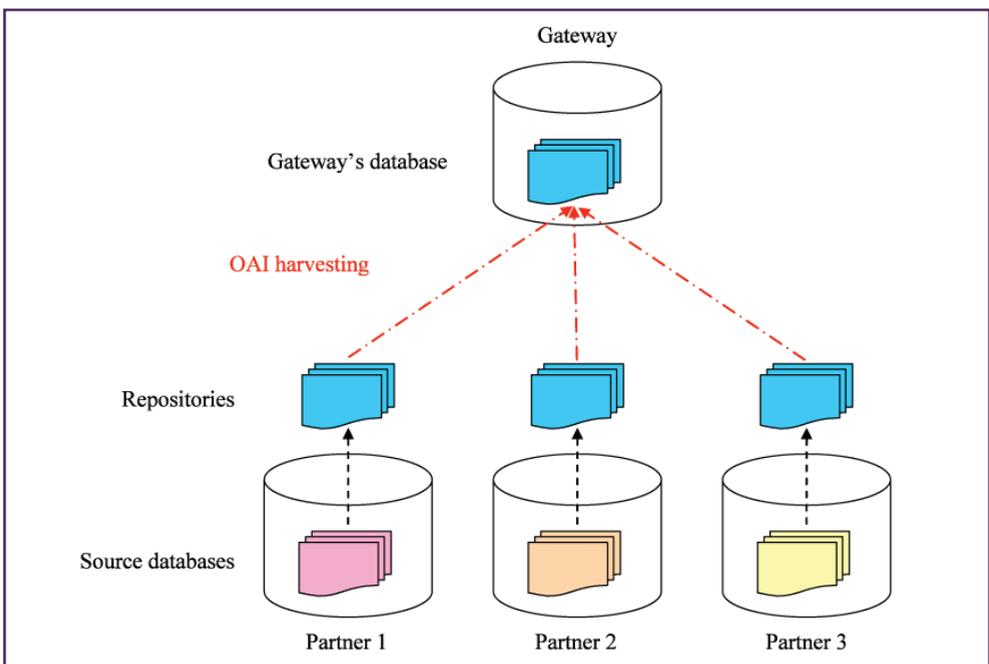
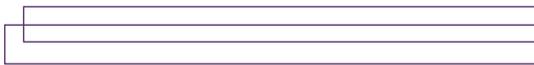


Figure 8. OAI Harvesting

⁷¹ This project however has set up a hosting service for partner organizations which can't host the metadata and/or data for Internet access.

⁷² Open Archives Initiative, see <http://www.openarchives.org/>.



The underlying model⁷³ for the exchange records is derived from MODS,⁷⁴ which has the following clear advantages over simpler, linear models:

1. It allows one to keep associations between different entities, e.g., people and roles.
2. It can easily express hierarchy of structure to any level, e.g., collections and items, compact discs and tracks, meta-events and events. It can do so within a unique record without having necessarily to resort to links to external records.
3. It is extensible, a feature which was taken advantage of in order to differentiate access to content depending on the location of the user (full contents on the premises of the partner holding the document, excerpt elsewhere, e.g.), to describe music instrumentation of scores, etc. In particular, the <role> field was extended to include all possible musical instruments, thereby allowing for the specification of the instrument each performer plays in a sound recording.
4. It allows for a finer description of types of resources through three independent controlled fields rather than provide a single, catchall “type” field in order to do so as simpler formats do:
 - a. <typeOfResource> is used to describe how the contents of a document are “encoded”: text, still or moving image, sound recording, software, map, etc. The Gateway has kept the original MODS terms for this field, and added three: event, which allows for the inclusion of metadata about events in the Gateway; people and corporate, which allows the Gateway to make these entities “first order” elements in the Gateway, in other words provide information about them in the metadata.
 - b. <form> is used for the description of the media of the resource: manuscript, printed document, compact disc, etc, and also includes terms to describe the “form” of an event (concert, conference, exhibit, etc.).
 - c. <genre> describes the nature of the contents of the resource, e.g., biography, program note, etc., and, for events, such “genres” as master class, talk, course, etc.

Adding an OAI access point to a database is a straightforward task in and of itself: there is freely available software which allows one to do so.⁷⁵ The possibly difficult task is the careful mapping of the source records to their MODS images (black arrows in Figure 8), which includes ensuring the target controlled fields (such as those mentioned above) in the exchange records use the vocabulary from the Gateway’s model and not from the source databases.

A by-product of the addition of an OAI mechanism to a database is that it allows it to be harvested by any other gateway (and which may select contents other than those the Gateway harvests using the set mechanism). This is, for instance, the case of the French National Library, whose OAI repository includes many sets. This Gateway harvests only the one claiming to contain the records describing contemporary music audiovisual documents.

Searching for resources

The Gateway provides two fairly common ways to search into its database:

1. Express search, a single box in which one or more words may be specified with optional Booleans and wildcards. But in order to allow for a better selection of potentially relevant types of resources at this stage without having first to retrieve results of a general query and then filter them down, check buttons have been added, optionally allowing the user to select one of several types of documents, and to require only those records which reference online contents. The proposed types are not disjoint: a biography or a program note is a text, a training session

⁷³ See full specification here: <http://www2.musiquecontemporaine.fr/doc/index.php/Accueil#Documentation>.

⁷⁴ Metadata Object Description Schema, see <http://www.loc.gov/standards/mods/>.

⁷⁵ Many of the partners in this project (as well as other OAI repositories on the Internet) have been using the PHPOAI2 Data Provider, see <http://physnet.uni-oldenburg.de/oai/>.

- (or a course) is an event; nor do they cover all types of resources available through the Gateway. These were felt to be the categories most likely to be of interest to people searching in the Gateway.
- Detailed search along several indexes (such as author, title, subject, etc.). A general form is provided as well as three more specific ones: for documents; for events (allowing one to select different ranges in the future, or see only past events); for addresses of people and organizations.

EXPRESS SEARCH online

text
 score
 audio
 video
 biography
 event
 training
 program note

N°	Origine	Type	Nom	Titre	Date ↑	Accès
1	bnf		Kele, Judit	Metallics / Judit Kele, réal. ; Yan Maresz, comp. ;	2009	
2	ircam		ROUSSEL, Guillaume	2008-2009. Atelier du Forum. novembre 2008: F	2008	
3	ircam		MARESZ, Yan	2007-2008. Agora 2008. Atelier du Forum. Juin :	2008	
4	cité		MARESZ, Yan	Orchestre Philharmonique de Radio France: Fe	2008	
5	ircam		STOCKHAUSEN, Karlheinz	2007-2008. Académie Ircam. Concert du 12/04:	2008	
6	ircam		IRCAM-CENTRE POMPIDOU	Saison 2008-2009: Carnets d'études : percussi	2008	
7	acanthes		MARESZ, Yan	Orchestration et nouvelles technologies	2007	
8	acanthes		MARESZ, Yan	Orchestration and new technologies	2007	
9	ircam		BÉROS, Cyril	2006-2007. Agora 2007. Journées professionnt	2007	
10	ircam		MADLENER, Franck	2006-2007. Agora 2007. Technologies du sonoi	2007	
11	ircam			Festival Ars Musica. Maresz, Manlovani, Cendo	2007	

Figure 9. List of results of a query

The list of results (see Figure 9) can be sorted and/or filtered further down along several facets (subtypes, physical location, online only, etc.). If online content is available for any record in the list, an icon allows the user to access it without the need to open the record. It will provide the link to the appropriate version of the content (e.g., for a sound recording, to the full version if the user is in the premises of the content holder, or to an excerpt). A crossed-out round icon indicates there is a full-length sound recording, but it is not accessible to the user who launched the query (as he is not on the premises of the holding institution); a green loudspeaker, when clicked upon, will open an embedded player allowing the user to listen to the recording.⁷⁶

Clicking on the blue text will open the Gateway view of the record describing the resource (see top of Figure 10) and its physical location. If an audio resource is referenced, a player can also be opened from within this record: this is important, as every single such record is also independently accessible from search engines and other sites. The kind of player is different according to whether it plays excerpts on the internet (top of Figure 10) or full recordings (bottom of Figure 10, with access to related program notes). The Gateway record also provides a link to the original record it was derived from (in the corresponding partner's catalog or database) which may hold more information.

⁷⁶ Audio is streamed as per the requirement of the rights holding companies.

Browsing contents: concept map, timeline, cloud, radio

In addition to a browse-by-provider mechanism, the Gateway provides several ways to access specific contents.

One of the starting points is a lexicon⁷⁷ which discusses general and specific concepts related to contemporary music, such as aleatoric, minimalist, post-modern or spectral music, musique concrète, performance and happening; noise, color, real-time, spatialization, etc. Each entry is a rich text providing links to the appropriate references (and contents) available in the Gateway. Additionally, an interactive concept map⁷⁸ (see Figure 11) based on the structure of the lexicon, may be interactively navigated from general concept to more specific and then to instances, by folding and unfolding inner nodes which are linked to entries in the lexicon, to online biographies of composers and to lists of their works which are referenced in the Gateway.

An interactive timeline⁷⁹ displays the composers for whom biographies are available online. It can be browsed along the time axis and zoomed in and out. Each thumbnail displays name, dates and photo if available, and when clicked links to the biography.



A tag cloud (actually, a sphere which rotates at a rate which is dependent on the position of the user's cursor) displays the “top” 150 composers (more would have been unreadable) of the Gateway. The relative size of each name is proportional to the number of entries (mostly: scores and recordings) in the Gateway related to this name. Upon clicking on a name, this list of entries is displayed.



⁷⁷ See <http://www.musiquecontemporaine.fr/doc/index.php/Lexique>.

⁷⁸ See <http://www.musiquecontemporaine.fr/doc/index.php/Cartographie>.

⁷⁹ See [http://www.musiquecontemporaine.fr/doc/index.php/Compositeurs_\(frise_chronologique\)](http://www.musiquecontemporaine.fr/doc/index.php/Compositeurs_(frise_chronologique)).

An internet radio⁸⁰ randomly plays the sound clips (music and spoken word) which are available through the Gateway for internet access. The current volume of contents allows for 25 days of non-stop broadcasting without repetition. Depending on the user's player, information about what is being played (composer and title, or speaker) will be displayed, as it is embedded in the streamed contents.



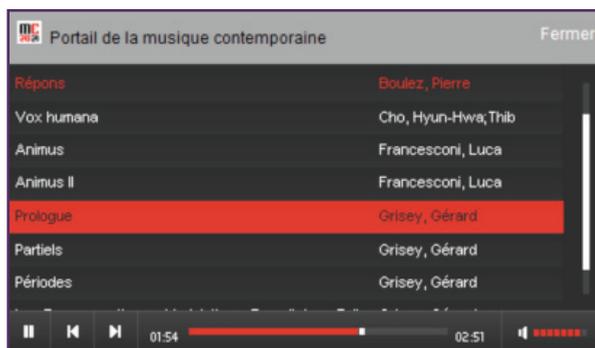
This radio can also be programmed to play specifically crafted programs with preselected files, either from those already available through the Gateway or others specially recorded for the purpose.

This radio is referenced in the Shoutcast list of stations.

Future events can be browsed through a chronological list which is displayed on the home page of the Gateway (and, as mentioned above, searched for through a specialized form).

Access through third parties: external playlists, Wikipedia, Europeana...

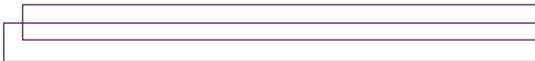
In the spirit of such popular platforms as Deezer, Grooveshark or Jiwa,⁸¹ a playlist editor allows one to select audio contents from the Gateway, to place them in any order, and to produce a playlist. The Gateway will return a widget which, when embedded in an arbitrary web page, will produce a floating player. The contents will be streamed from the Gateway. Registered users⁸² may create any number of playlists and edit them at any later time. A deleted playlist does not cease to exist (so as to avoid broken links on the internet) but is moved to the administrator's account.



⁸⁰ See <http://radio.musiquecontemporaine.fr/>. It uses the Shoutcast free software (see <http://shoutcast.com/>)

⁸¹ See <http://www.deezer.com/>, <http://www.grooveshark.com/> and <http://www.jiwa.fm/>.

⁸² Currently: only partners of the project.



ircam 2021 MUSIQUE CONTEMPORAINE

ircam - multimédia > **notice originale**

2004-2005. Résonances 2004. Concert Ensemble Intercontemporain

Type audio Genre(s) oeuvre(s) musicale(s) Forme(s) document numérique

Accès en ligne [Extraits d'archives en MP3](#)

Accès sur site [Version intégrale](#)

Cette ressource est disponible chez l'organisme suivant : [Ircam - Centre Pompidou](#)

Titre	2004-2005. Résonances 2004. Concert Ensemble Intercontemporain
Publication	13 octobre 2004
Parties	<ol style="list-style-type: none">1 ...Einklang freier Wesen... / Haas, Georg Friedrich (compositeur)2 Ganesha / Schoeller, Philippe (compositeur)3 Droben schmettert ein greller Stein / Jarrell, Michael (compositeur)4 Monodie / Haas, Georg Friedrich (compositeur)
Note(s)	Ensemble Intercontemporain . Cerutti, Michel (percussion) . Stochi, Frédéric (contrebasse) . Nagy, Zsolt (chef d'orchestre) . Nouno, Gilbert (réalisateur informatique musicale) Lieu: Centre Georges Pompidou, Grande Salle

Envoyer la notice

Identifiant OAI oai.ircam.fr/multimedia/AU02012600

Date de la notice 2010-03-16 01:00:00

Identifiant portail [1383761](#)

Contact [Nous écrire](#)

ircam
Centre Pompidou

Georg Friedrich Haas : ...Einklang freier Wesen...

Philippe Schoeller : Ganesha

Michael Jarrell : Droben schmettert ein greller Stein

Georg Friedrich Haas : Monodie

The screenshot shows an audio player window with a control panel on the left and a program note on the right. The control panel includes a play/pause button, a progress bar, and a volume control. The program note is for Georg Friedrich Haas's "...Einklang freier Wesen..." (1994-1996). The note is in French and discusses the work's structure and the composer's intentions. The player interface also shows the title, track, and composer information.

Georg Friedrich Haas
«...Einklang freier Wesen...» (1994-1996)

Effectif
Soprano
Ténor
Basse
Violon
Violoncelle
Contrebasse

Donné
11 chanteurs

Éditeur
Universal Edition

Les titres sont extraits du roman *Hyperion* de Friedrich Hölderlin.

«...Einklang freier Wesen...» est une œuvre pour voix et instruments à cordes. Elle est composée de trois parties : «...Einklang freier Wesen...», «Droben schmettert ein greller Stein...» et «Monodie...». Cette œuvre est une réécriture de la partie de voix du roman *Hyperion* de Friedrich Hölderlin.

Georg Friedrich Haas
Titulaire de l'habilitation par longue thèse au CNRS.

Figure 10. Audio players. Top: internet view. Bottom: on-site view (with program note)

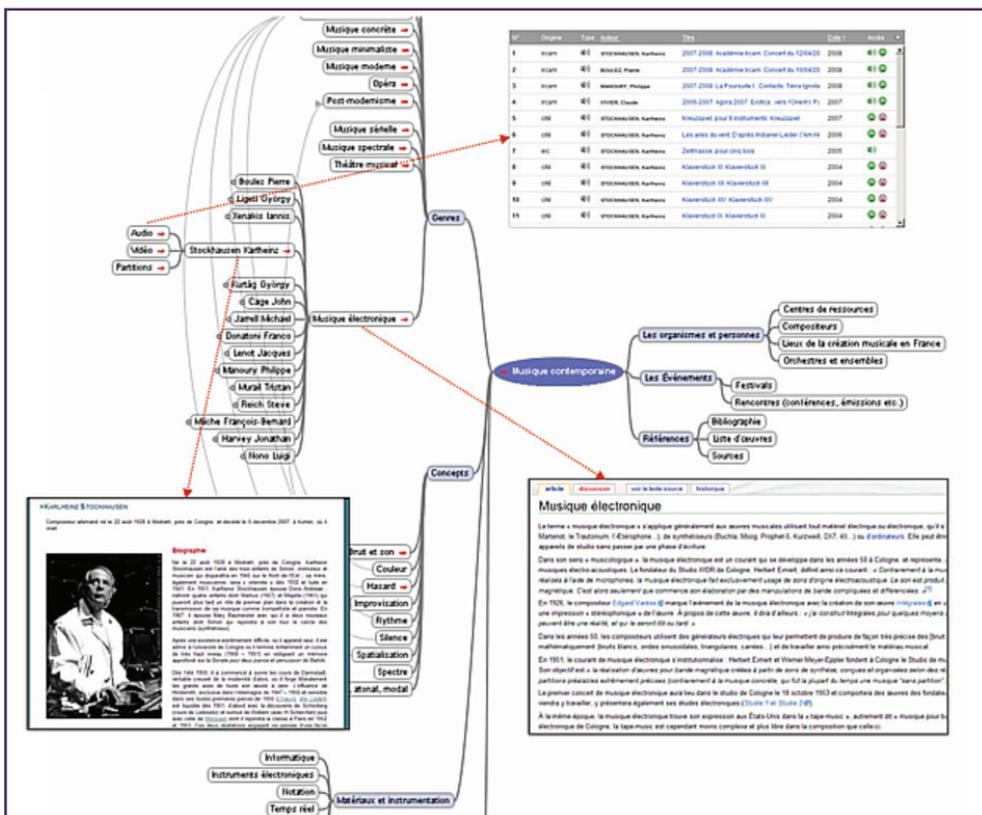


Figure 11. Concept map and links to lexicon, to biographies and to online contents

Like it or not, Wikipedia is a main reference on the internet. Consequently, links were added to contemporary composers' pages in French, English and Italian (and to some in Spanish), allowing the reader to access all audio clips of their works available through the Gateway. As a result, an almost immediate increase of 15% in the numbers of visits to the Gateway was noticed coming from Wikipedia, as well as a four-fold rate of indexation by Google.

The Gateway has implemented its own OAI repositories. Europeana⁸³ currently harvests those of its records which reference digital contents. For this reason, the Gateway is considered as an *aggregator* (i.e., provider of metadata it has harvested, rather than of local metadata) for Europeana and is a member of its Aggregator Work Group. It is similarly harvested by the French Moteur Collections,⁸⁴ which is a search engine for cultural contents available from French cultural sites.

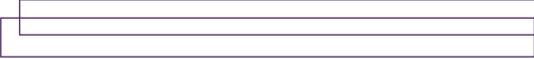
Conclusion

Some indications on the interest for the Gateway come from two distinct directions:

1. As can be seen in Figure 10, every record allows the user to write to the Gateway. These messages are read and answered by a person from the organization from which this record was derived. Messages from many countries with relevant queries of all sorts come in daily.

⁸³ See <http://www.europeana.eu/>.

⁸⁴ See http://www.culture.fr/fr/sections/collections/moteur_collections.

- 
2. The creation of many playlists (see Access through third parties above) from the Gateway sound clips.

Full convergence of all the above-mentioned resources has not been fully achieved yet (hence the “towards” in the title of this paper). In particular, the convergence of future vs. past events and the corresponding digital documents has not yet been accomplished. This convergence exists in some of the partners’ databases (e.g. Archiproduct, as shown above) but not in all, hence the need to split an incoming record for an archive into one having the type “event” and the other having the type “sound recording” and providing the proper link between the two. This is currently being studied. Its implementation will in turn allow for the integration in the Gateway of the event browsing mechanisms of Archiproduct.

The Archiproduct project is an IRCAM Engineering Bureau project (design and implementation); it was first launched in early 2007.

The Gateway for contemporary music resources is a multi-year project, partially funded (2007-2009) by the French Ministry of Culture and Communications in the course of their yearly calls for digitization projects⁸⁵ and Sacem, a French company collecting payments for the use of authors’ (and composers’) rights. The Gateway opened in 2007 (9 months after the project was launched) with 6 partners. New partners and small and major features were added in 2008 and 2009 (such as hosting metadata and data, playlist editor, etc.).

⁸⁵ In addition to the development of the Gateway, it provided some funds for the digitization of partners’ archives.

Semantic BRICKS for performing arts archives and dissemination

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Introduction

Until recently, cultural temples in Flanders had little strategy to archive and disseminate their productions. Yet, the local government wants the productions to be archived as cultural heritage, schools want material bundles for educational purposes, and other (foreign) institutions want production clips for promotional or research aims. The research project PokuMOn [1], deals with these problems and requirements of online distribution and archiving of multimedia productions of performing arts and (classical) music. In this article, we tackle the following issues: i) the institutions want an easy to use, robust, de-centralized archive; ii) the institutions want to bundle and exchange their assets; iii) the institutions want to use a common metadata schema combined with their own schemas; and iv) the institutions want their (meta)data enriched and interlinked.

The solution proposed in this article elaborates on the distributed semantic open-source BRICKS archiving and distribution architecture [2], as ease of use, robustness, independence of central authorities, low-cost, and flexibility in offered services are crucial within the cultural community. This platform allows the institutions to configure, extend, and manage their own digital depot to their needs. In order to store and exchange all the information on their productions a new layered metadata schema is developed on top of the BRICKS framework. It is an OWL DL [3], schema consisting of two layers: Dublin Core [4], and Provenance [5]. The Dublin Core layer describes the digital objects in a general way as a greatest common divisor. All the fields of Dublin Core are optional and repeatable. These characteristics allow for easy mapping to and adoption of the proposed metadata schema. It forms a common interoperability and discovery layer on top of the descriptions that are already distributed by the institutions. The second layer indicates the provenance of the Dublin Core descriptions. In most cases, the institutions have their own metadata schema which is mapped to Dublin Core. The provenance layer indicates the identifier of the original metadata description and the namespace of the original metadata schema. This information allows linking to the original descriptions, which are in most cases richer in information. To aggregate the digital objects in bundles (a/o for educational purposes) the BRICKS framework is extended with an OAI-ORE [6] web service. It describes aggregations of Web resources in a semantic way via dereferencable URI's. Furthermore, we enrich the metadata semantically following the Linked Open Data principle [7]. In our case, we apply linguistic processing on the plain text contained in some elements of the metadata such as title, contributor, subject, and description. The linguistic processing consists in extracting named entities such as persons, organizations, companies, brands, locations, and events using the OpenCalais infrastructure [8]. Once the named entities have been extracted, we map them to formalized knowledge on the Web available in GeoNames [9], for the locations, or in DBpedia [10], for the persons, organizations, and events, and feed this new knowledge back into the system. This way BRICKS is semantically adapted and extended to offer an end-to-end solution to the institutions and third parties (schools, broadcasters, etc) that can search and harvest all data via web services.

As such, this article shows how all media of performing arts productions can be archived, bundled and disseminated using distributed Semantic Web technologies. In the end, all is demonstrated within an end-to-end Proof-Of-Concept showing the feasibility of the approach in Flanders' cultural temples establishing a durable cooperation between all actors involved. Finally, we put forward some best practices, caveats, and lessons learned.

BRICKS Overview

After an initial platform evaluation [11] the distributed semantic open-source repository BRICKS was chosen as development platform. It is the outcome of the European project Building Resources for Integrated Cultural Knowledge Services (BRICKS [2]). The aim of the BRICKS project was to design an open user- and service-oriented infrastructure to share knowledge and resources in the cultural heritage domain.

The BRICKS architecture is by default decentralized. Therefore every performing arts institution can deploy its own instance of BRICKS, called a BNode. These BNodes communicate among each other and use available resources for content and metadata management. Every BNode knows only a subset of other BNodes in the system. If a BNode wants to reach another BNode that is unknown to it, it will forward the request to some of its known neighbouring BNodes that will deliver the request to the final destination. Such an approach avoids having central hubs whose failure or overload could stop the whole system. Another strong advantage of this architecture is that centralized administration costs for additional personnel and money can be avoided. That is why BRICKS was chosen as development platform.

A BNode can be seen as a collection of services that are required to manage its presence in the system and to provide services for the rest of the community. A BNode consists of three types of components: fundamental, core, and basic BRICKS components. The fundamental components are essential and needed on every BNode. The core components provide core system functionalities to the users, i.e., a minimal set of services that enable the users to use the system. The basic components are optional, and do not have to be present on all the BNodes. Most of the services are standard Web services described by WSDL documents. Since the BNode architecture is service-based, a BNode installation can be spread over several machines. In this case the fundamental services have to be present on every machine, while core and basic components could be present on only some of the machines. Figure 1 gives a schematic overview of the architecture of BRICKS. This way, BRICKS is a very heterogeneous, adaptable system without the need for a central body to maintain the system, which makes BRICKS a cost-effective solution.

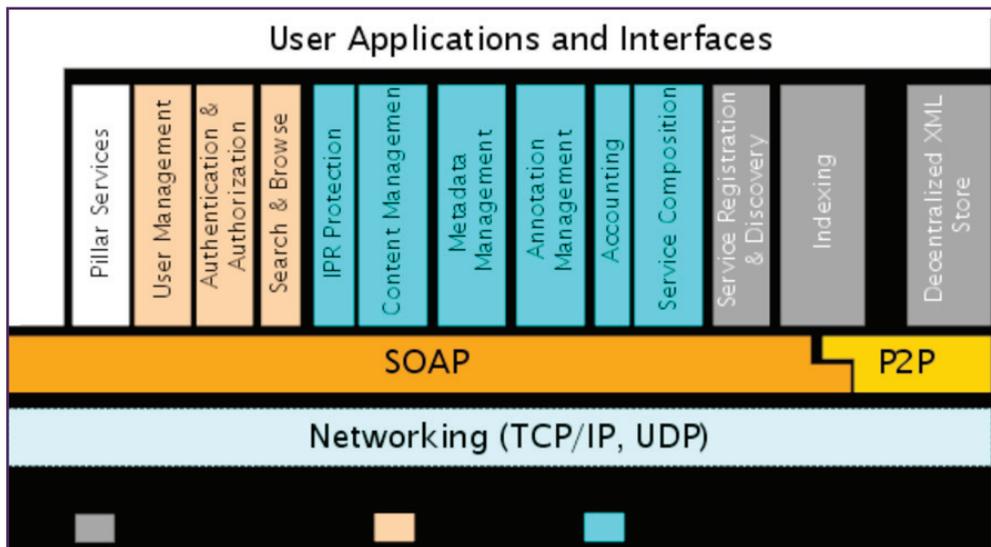


Figure 1: Overview BRICKS Architecture

Layered Metadata Schema

Introduction

The major problem we are facing is to bridge the incompatibility of the different metadata schemes used all over the arts sector in Flanders. Our proposed layered metadata schema will be used for the descriptive metadata in the project PokuMOn and is implemented in the BRICKS repository. This model not only leverages the exchange of data between the performing arts institutions in Flanders, but also the possible dissemination to the general public. The model had to be applicable in the whole performing arts sector in Flanders (and preferably beyond). In other words it had to be general enough. Many of the institutions already have descriptions of their objects. Those descriptions are described using many different metadata schemas. So those schemas that are already in use in the performing arts sector in Flanders should be able to be mapped to this proposed schema.

Requirements

The schema has to deliver all the necessary elements to the user so s/he can find information on the object of interest. When the user has found the information, s/he has to be able to link to a more detailed description of that object. In order to fulfil these requirements the model is split into two parts, a description part and a provenance part.

The first part, or common layer, describes the object. This description has to be general enough to be applicable on all the objects in use, but on the other hand it has to deliver the elements so the user can find what s/he is searching for. This part consists of an interoperability layer, a common layer above all the metadata schemas that are already in use in the field. This part then automatically offers the tools to query all those descriptions. In other words it has to be able to answer basic questions like who, what, where and when.

The second part or lower layer contains the information needed to link to a more detailed description, mostly to the complete record the first part is mapped from. This part has to reflect at least the namespace of the schema the original record is described with, a URI of the repository the record comes from and the identifier of the record in that repository.

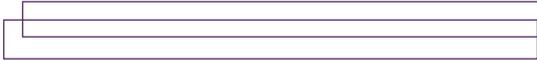
Design

OWL DL

For the definition of the new metadata schema we used W3C's Semantic Web technology [12], more specifically the OWL ontology language [3]. The expressiveness of OWL allows us to create fine-grained property definitions by splitting the definition of properties into 'attributes' and 'relations'. Attributes (corresponding to the OWL notion of a datatype property) can take typed literals as value whereas relations (corresponding to the notion of an object property) can link to other resources like content items or concepts taken from an ontology. The sublanguage is OWL DL, not OWL FULL. OWL FULL gives the most expressiveness, but does not guarantee the support of reasoning software, while OWL DL is a little less expressive, but it is guaranteed to be completely supported by the RDF [13] reasoners. The BRICKS framework, which will make use of this schema, also requires that the schemas are described in OWL DL.

Description

The records are described in Dublin Core [4]. It is the most common metadata schema in use and it is general enough to describe all the objects of the Flemish performing arts sector. It is the largest common divider of all the metadata schemas that are used in the performing arts sector in Flanders. On top of that, all the fields of the Dublin Core model are optional and repeatable. This makes it possible to map nearly all the metadata schemas to Dublin Core. This makes the framework also OAI compliant [5], because the offering of Dublin Core descriptions is a requirement for OAI compliance of the data provider. For the implementation of the schema, all properties of Dublin Core were modelled as datatype properties, which are all optional and repeatable. This part is described by [14].



Provenance

As mentioned before, this lower layer should deliver at least three things: the metadata namespace of the originating record, the URI of the repository it comes from and the identifier of that originating record in that repository. This layer is based on a schema that is used by the OAI-PMH protocol, [5], indicating the provenance of a record. This schema is described in XML schema, so the schema has to be 'ontologized' in an OWL DL schema, which can be found at [15].

Upper Ontology

Finally, there needs to be an upper ontology that imports the two other ontologies and combines them into one ontology. This way each of the imported ontologies, the Dublin Core description (the common layer), and the Provenance description (the lower layer), can be altered independently. This is described by [16].

Implementation

DC-Description

Dublin Core consists of just fifteen properties:

- Title: A name given to the resource
- Creator: An entity primarily responsible for making the content of the resource
- Subject: The topic of the content of the resource
- Description: A description of the content of the resource
- Publisher: An entity responsible for making the resource available
- Contributor: An entity responsible for making contributions to the content of the resource
- Date: A date associated with an event in the life cycle of the resource
- Type: The nature or genre of the content of the resource
- Format: The physical or digital manifestation of the resource
- Identifier: An unambiguous reference to the resource within a given context
- Source: A reference to a resource from which the present resource is derived
- Language: A language of the intellectual content of the resource
- Relation: A reference to a related resource
- Coverage: The extent or scope of the content of the resource
- Rights: Information about rights held in and over the resource.

This ontology defines a class, DC, on which all these properties are applicable. As already mentioned, the properties are defined as datatype properties. The domain of these datatype properties is the defined class DC and the range of the datatype properties is a string. This makes the Dublin Core description unqualified.

Provenance

This layer is based on a schema that is used by the OAI-PMH protocol. The schema defines a provenance container consisting of a sequence of `originDescription` elements that identify the provenance of the metadata record. Each `originDescription` contains the following information:

- `baseURL`: The base URL of the originating repository from which the metadata record was harvested
- `identifier`: The unique identifier of the item in the originating repository from which the metadata record was disseminated
- `datestamp`: The datestamp of the metadata record disseminated by the originating repository
- `metadataNamespace`: The XML namespace URI of the metadata format of the record harvested from the originating repository
- `originDescription`: An optional `originDescription` block which was obtained when the metadata record was harvested. A set of nested `originDescription` blocks describe the provenance over a sequence of harvests.

Each `originDescription` must also have the following two attributes:

- `harvestDate`: The response date of the OAI-PMH response that resulted in the record being harvested from the originating repository
- `altered`: a Boolean value which must be true if the harvested record was altered before being disseminated again.

For the OWL DL description of this schema, a class is made up, `provenanceType`. An object property is defined on this class. The range of this object property is the class `originDescriptionType`. This object property has a minimum cardinality of one. This means that an instance of `provenanceType` holds at least one instance of `originDescriptionType`. This models the sequence of `originDescription` elements as described by the XML schema of the provenance.

The class `originDescriptionType` has six datatype properties: `baseURL`, `identifier` and `metadataNamespace`, which all have a URI as range, `datestamp` and `harvestDate`, which have a string as range, and finally `altered`, which has a Boolean as range. All these six datatype properties are required and have a cardinality of one.

The class `originDescriptionType` has one object property, `originDescription`, which relates an instance of `originDescriptionType` to another instance of `originDescriptionType`. This property is optional, so it has a maximum cardinality of one.

Upper Ontology

This ontology imports the two other ontologies and combines them. For this a class `Metadata` is defined. This class has two object properties, `dcDescription` and `provenance`. They have as range respectively the imported class `DC` and the imported class `provenanceType`. This way the two ontologies are combined in a new ontology. The schema and OWL DL description can be found at [16].

OAI-ORE

Introduction

Besides archiving audio, video, photo, and text, the repository has to be able to store aggregations of these objects. The performing arts institutions disseminate, beside their performances, introductions to performances, interviews with artists, programme brochures, reviews, etc. These aggregations also have to be stored, disseminated, and exchanged. For this, we developed an ontology based on the Open Archives Initiative Object Reuse and Exchange (OAI-ORE [6]).

Today, many information systems, like content management systems, support the storage and identification of aggregations, and the access to the aggregations and aggregated objects. In most systems these objects vary in semantic type, e.g., article, book, video, dataset, etc, and in metadata file format, e.g., PDF, XML, MP3, etc. These objects can also be stored on different network locations, i.e., aggregated objects can be stored locally or externally. Information systems store, identify, and deliver access to these compound objects in an architecture-specific manner. Unfortunately, the way these information systems disseminate their compound objects is far from perfect and without any broadly accepted standard. In many cases, a lot of the advanced functionalities get lost when publishing the compound objects to the Web. Mostly, the publication is aimed at the end-users and at agents, e.g., web crawlers. The structure of the object is often embedded in splash pages, user interface widgets, etc. This approach makes the structure of the compound object unclear for machine-based applications like browsers, web crawlers, etc. Consider the example of a scanned book, where all the pages get an HTTP URI. A web crawler can come across one of these pages and find links to the other pages of the book, to the chapter containing that page or to the book. A web crawler cannot distinguish between these links. For the web crawler these are untyped links or links that do contain information, but this information remains unreadable to the web crawler. So, the order of the pages gets lost, etc.

OAI-ORE Specification

The OAI-ORE standard tackles this problem by developing a standardized, interoperable and machine-readable mechanism that can express the information of compound objects. The standard makes sure that the logical boundaries of the aggregated objects and their mutual relations remain intact when publishing the compound object to the Web. To achieve this, OAI-ORE makes use of resource maps, which are in fact RDF descriptions of the compound objects. These resource maps are identified by a URI, which contains a set of RDF declarations. These declarations instantiate an aggregation as a resource with a URI, and list the aggregated resources, their mutual relations and the web context of the aggregation. Actually, these resource maps are named graphs. These graphs are RDF graphs, sets of triples, extended with a name, URI, for the graph. The named graph is not the RDF graph itself, but a representation of the set triples encoded in Atom or RDF/XML, as depicted in figure 2. To talk about aggregations on the Web, they have to have a URI. The ORE model demands that a resource map describes just one aggregation. An aggregation, on the other hand, can have multiple resource maps, each with its own representation. Clients and applications need to determine the URI of the resource map from the URI of the aggregation, so they could refer to that aggregation. This can happen in two ways: one way is to append a fragment identifier to the URI of the resource map; another solution is offered by cool URIs, e.g., by appending the '.rdf' extension to the URI of that aggregation.

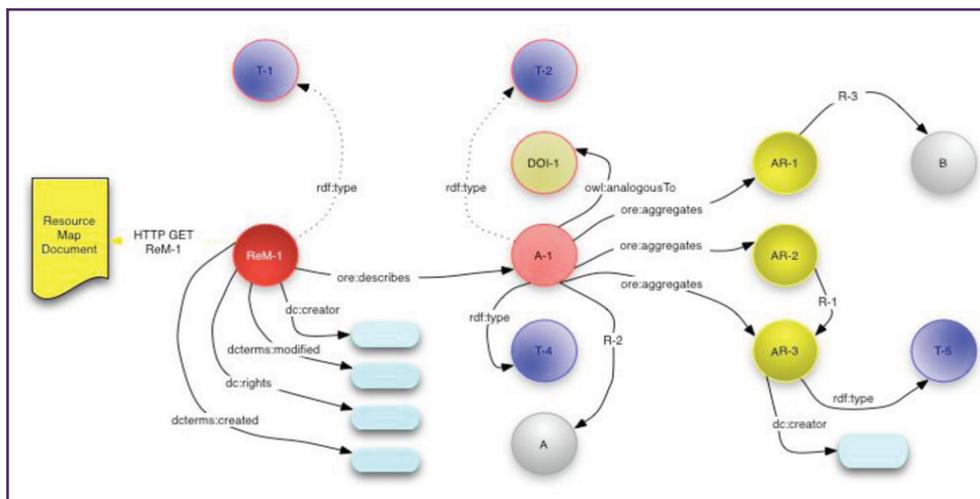


Figure 2: Schematic Representation of an OAI-ORE Aggregation

Semantic OAI-ORE Schema Implementation

The RDF schema for the OAI-ORE model consists of two classes: ResourceMap and Aggregation. The class ResourceMap has three mandatory properties: `rdf:type`, indicating that the resource map is of the type `ore:ResourceMap`; `ore:describes`, referring to the (URI of the) aggregation; and `dc:creator`, referring to the authoring authority. Other optional properties of the ResourceMap class are: `dcterms:modified`, indicating the modification time of the resource map; `dc:rights`, describing the rights pertaining; and `dc:created`, for the original creation time of the resource map. The class Aggregation has only one mandatory property: `rdf:type`, indicating the resource is of the type Aggregation. Another optional property for this class is: `ore:aggregates`, referring to the aggregated resources.

Shortcomings of BRICKS

BRICKS has no problems storing the resource maps, but cannot handle the cool URIs. This problem is solved by publishing the records from the JENA triple store [17] from BRICKS as Linked Open Data [7], as will be fully described hereafter. Publishing the records as Linked Open Data offers the opportunity to use cool URIs to redirect the client (web crawlers, HTTP browsers, RDF browsers) to the appropriate representation. This way, clients that come across the HTTP URI of an aggregation can be redirected to a representation they understand, preserving the typed links between the aggregated resources. So, storing the resource maps and publishing the resource maps as linked data makes the repository OAI-ORE compliant [6]. This allows the BRICKS repository to manage, exchange, and share aggregates of resources, e.g., a video of a performance, accompanied by a program brochure and a transcription of the performance, conforming to the OAI-ORE standard.

Linked Open Data

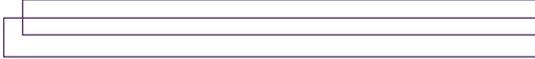
Introduction

Sir Tim Berners-Lee first introduced the term Linked Open Data in 2006 [7]. Linked Open Data lets people share structured data on the Web as easily as they share documents today. It refers to a style of publishing and interlinking structured data on the Web. Linked Open Data lets you use RDF data models to publish the structured data on the web and uses RDF links to interlink data from different datasets. This makes the Web one giant database, the Web of Data.

Linked Open Data Basics

Linked Open Data stipulates four basic principles. The first principle is that we first have to identify the items of interest in our domain. Those items are the resources, which will be described in the data. The next principle is that those resources have to be identified by HTTP URIs and avoid schemes such as URNs [18] and DOIs [19]. The third principle is to provide useful information when accessing an HTTP URI. The fourth rule is to provide links to the outside world, i.e. to connect the data into the Web of Data.

In practice, this means that every resource described by an RDF schema has to be identified by an HTTP URI, e.g., <http://dbpedia.org/resource/Berlin>. Every resource should also have two representations: an XHTML and an RDF representation. Every representation also has to be identified by an HTTP URI, e.g., <http://dbpedia.org/page/Berlin> for the XHTML representation, and <http://dbpedia.org/data/Berlin> for the RDF representation. When coming across the HTTP URI of a resource, the Linked Open Data server determines which representation should be served, based on information in the accept header of the user's client, and redirects the client to the appropriate representation using 303 redirect and content negotiation.



Linked Open Data vs. OAI-ORE

Publishing resources as Linked Open Data conforms to the way OAI-ORE offers to publish aggregations. OAI-ORE demands that aggregations have to be identified by a URI, and have to be described using an RDF schema, i.e., a resource map, which also has a URI. When clients consume the URI of that aggregation, they should be able to automatically detect the URI of the resource map with the appropriate representation for the client. This principle conforms to the way Linked Open Data is published.

Linked Open Data Implementation

For publishing the records from a triple store as Linked Open Data, the open-source tool Pubby [20] is used. Pubby is actually a Linked Data frontend for SPARQL endpoints. Such a SPARQL endpoint is a webservice that can handle SPARQL queries. These SPARQL queries can be seen as semantic SQL statements. BRICKS does not provide such a SPARQL endpoint. That is why the triple store in the BRICKS framework was replaced by the open-source OpenLink Virtuoso triple store [21]. This triple store offers by default a SPARQL endpoint. By configuring Pubby for the SPARQL endpoint, provided by Virtuoso triple store, the records stored in the triple store are published as Linked Open Data. This means, providing HTTP URLs for all the records served by the SPARQL endpoint, providing a simple HTML interface showing the data available about each resource, and taking care of the 303 redirects and content negotiation.

Metadata Enrichment

Finally, the stored records, constructed via our metadata schema and published as Linked Open Data, are extended with links to information from datasets like GeoNames [9], and DBpedia [10]. This way, the records are enriched with information from external datasets, weaving that extra information into the Web of Data.

For interlinking the data automatically, the choice was made to provide extra information on the title of the resource, the persons, organizations, events, and the places involved. In practice this means for the persons, organizations, and events iterating for every Dublin Core description of the records and querying the DBpedia dataset for the values of the datatype properties: dc:creator, dc:contributor, dc:publisher, dc:subject. For the places information the values of the datatype property dc:coverage of the Dublin Core descriptions are queried against the GeoNames dataset. The results, returned from these queries, are added to the Dublin Core description via the object property: rdfs:seeAlso.

The descriptions of the resource (values from the dc:description datatype property from the Dublin Core description) are also examined. These strings, describing the resource, are investigated for persons, organizations, companies, brands, locations, and events. For this we rely on the OpenCalais webservice [8], which is able to investigate strings and return certain concepts mentioned in the description. The results for the persons, organizations, or events concept are forwarded to query the DBpedia dataset. The results for the places concepts are forwarded to query the GeoNames dataset.

By applying our metadata enrichment algorithms, the records are enriched with links to external dataset. This puts the records on the Web of Data and enriches the record with extra information.

Conclusion

This article shows how performing arts institutions can disseminate their content using semantic web technologies, like RDF, OWL, and Linked Open Data. The Semantic Web is an evolving extension of the World Wide Web in which the semantics of information and services on the web is defined, making it possible for the web to understand and satisfy the requests of people and machines to use the web content. To benefit the search and discovery

of the records, these records have to be described by a uniform metadata model. This model has to be applicable for a variety of data: text, audio, video, and aggregations of them. For this, three semantic models were designed and implemented: a Dublin Core description, describing the resource in a very generic way, a provenance description, referencing the original record, which can give a more detailed description of the resource than the Dublin Core description, and an OAI-ORE model to describe aggregations. This way, the performing arts institutions can share and exchange their (aggregations of) information, avoiding a lot of interoperability issues. By publishing the records in a Linked Open Data way, the server can redirect clients (people or machines) to the appropriate representation, XHTML for people and RDF for machines, which is compliant to the way OAI-ORE publishes aggregations. By enriching the data with links to information coming from e.g. DBpedia and GeoNames, the records are weaved into the Web of Data, making the Web of Data one huge database.

This is a new approach for disseminating records coming from the performing arts sector. Mobilising the sector to adapt this approach is not a trivial task, although the awareness comes from the sector itself. That is why VTI, Flemish Theatre Institute, as a coordinating body for the performing arts institutions in Flanders, was chosen to implement this approach firstly and to offer this approach as a service to the other institutions in the performing arts sector. This way, the sector can be more easily mobilised and encouraged to adopt this way of disseminating records from the performing arts sector in Flanders.

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Opening the archive — online access and rights management

Ingrid Finnane, National Library of Australia

Two recent projects at the National Library of Australia have allowed us to increase accessibility of sound recordings while protecting the rights of participants in the recording. The audio management and delivery project resulted in an online delivery system for audio linked to time-coded summaries, and new workflows for managing deliverable content (digitized audio and XML summaries and transcripts). At this stage, content is only delivered online when the rights holders have agreed that access should be open for research, personal copies and public use. The rights management project developed a system to record various types of rights information from multiple sources in one place. It includes automatic calculation of copyright status based on information in catalogue records, information about agreements between the library and rights holders, and information about access permissions granted to an individual or organization by a rights holder. This paper will explain technical aspects of our digital collections management system and delivery system that allow us to provide access to open content while protecting restricted content. It will discuss how these systems could be used together with a rights management system to provide easier access to restricted content for authorised users.

A closed stack

The National Library of Australia (the Library) has a significant collection of sound recordings, consisting of oral history interviews, stories, speeches, musical and sound environment recordings. The collection is well described and over 50% has been digitised for preservation,⁸⁶ but until recently the Library did not have a way to provide immediate access to digital copies of recordings. The existing process for accessing recordings is as follows:

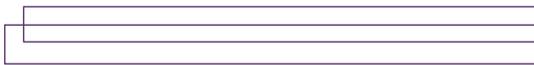
1. search in online catalogue⁸⁷
2. find a sound recording
3. login to catalogue with library membership details in order to place a request
4.
 - a) if in the library, request to listen to the recording onsite
 - b) if not in the library, enter a request for a copy to be sent through the Copies Direct service⁸⁸
5. library staff process the request including checking access rights
6.
 - a) a copy is delivered to the reading room for you to listen onsite
 - b) a copy is sent to you on CD or USB flash drive, with a printed transcript if requested.

Compared to the possibility of delivering digital copies of recordings through a web delivery service, this process of individual requests is time consuming for both library users and staff. Considering that the library owns copyright in most of the recordings, we saw an opportunity to provide more immediate and direct access to parts of the collection, while preserving the moral rights of people involved in the recordings and specific access and copying conditions set by the interviewee. This would benefit researchers around Australia and internationally who are not able to visit the Library in Canberra, or would need to travel significant distances to do so. Online delivery would make access faster and simpler even for onsite researchers, who would only need to click on a link to listen to the recording, instead of submitting a request and waiting for the listening copy in a reading room. It would also reduce the need for staff to process requests for open access material that had been selected for online delivery.

⁸⁶ Oral History and Folklore digitisation - progress so far <http://www.nla.gov.au/digicoll/audioprogress.html>

⁸⁷ National Library of Australia Catalogue <http://catalogue.nla.gov.au/>

⁸⁸ Copies Direct <http://www.nla.gov.au/copiesdirect/>



The Library had recently started producing time-coded TEI XML transcripts⁸⁹ of interviews through an external provider.⁹⁰ In theory, this gave us the ability to link text into time-points in the audio recording and assist researchers to navigate through interviews that could be several hours long, but we did not have a delivery system that supported this. Another potential use of full-text transcripts was indexing to enable easier discovery of the content through Trove.⁹¹ It seemed logical that easier discovery and access without needing to place a request would make the collection more visible and accessible to casual researchers, as well as those who were already aware of the collection.

Simple, fast, online access to the collection sounded like a great idea. So, what was stopping us putting it all up on the web for anyone to listen to?

The problems identified at the beginning of the audio delivery project were:

1. structural problems — resolving relationships between catalogue records (representing intellectual works) and records representing the digital objects;
2. absence of a delivery system that supported time-coded XML summaries and transcripts;
3. time-coded transcripts were produced by an external provider, but we needed a way to create time-coded XML summaries internally;
4. checking access rights to content and other legal risks.

Two sources of metadata

The born-digital and digitised sound recordings are managed through a digital repository system called the Digital Collections Manager (DCM), developed at the Library in 2002.⁹² Information about the sound recording collection, which had been managed in an independent database, was migrated into DCM in 2004-2005. The way the recordings were described in the Sounds Database and in DCM after migration was based on their arrangement on physical carriers (a reel or side of a tape) or digital equivalents (a file representing a single recording session). Often recording sessions are grouped together in DCM under a parent or collection level record, for example several interviews with different interviewees recorded on the same tape, or a collection of interviews by the same interviewer or on a particular topic. Creating a record for each physical item, side or file is an entirely appropriate approach when the aim of the collection management system is preservation and storage control.

The same sound recordings were described in the Library's catalogue, but divided into intellectual works, for example an interview with a subject or a recording of folk music that may involve one or several recording sessions. The relationship between the intellectual work described in the catalogue and the recording session or parent record in the DCM may be a one-to-one relationship at a parent or child record level, or could be one catalogue record to several DCM records. Creating a record for the intellectual work is an appropriate, standards based approach when the intention is discovery of the work.

Delivery online requires that the item be discovered as an intellectual work, and that the discrete components be provided in a logically structured order and relationship. Unfortunately, due to variations in cataloguing practices and recording practices over time, there was no way to reliably match records in the two systems automatically.

The solution we developed was to automatically create a new 'virtual record' within the Digital Collections Manager to represent each intellectual work in the catalogue, then allow staff to link the matching recording session or multiple sessions to this record. This made it

89 Text Encoding Initiative (TEI) Guidelines <http://www.tei-c.org/Guidelines/>

90 Transcripts are produced by VisionBytes in a TEI template supplied by the Library. <http://www.visionbytes.com/index.htm>

91 Trove discovery service <http://trove.nla.gov.au/>

92 Digital Collections Manager Functional Specifications <http://www.nla.gov.au/dsp/doms/dcm.html>

possible for us to develop a software service that generates a METS document⁹³ to describe the intellectual work, which automatically pulls information about sessions that belong to that work from the DCM database.

Building a delivery system

At the time of beginning the audio delivery project, we could not find any examples of existing delivery systems that would support delivery of summaries and transcripts with links to time-points in sound recordings. The Library had existing delivery systems for digital images⁹⁴ and a service to resolve persistent identifiers used to manage the digital objects.⁹⁵ The project developed a new audio delivery system that made use of the existing software infrastructure for resolving persistent identifiers, and added a new delivery interface and software services.

The audio delivery system uses a METS document that describes the sound recording sessions and summary to determine what files to deliver for a particular catalogue record. We developed a METS profile specifically for the purpose of delivering sound files with summaries and transcripts.⁹⁶

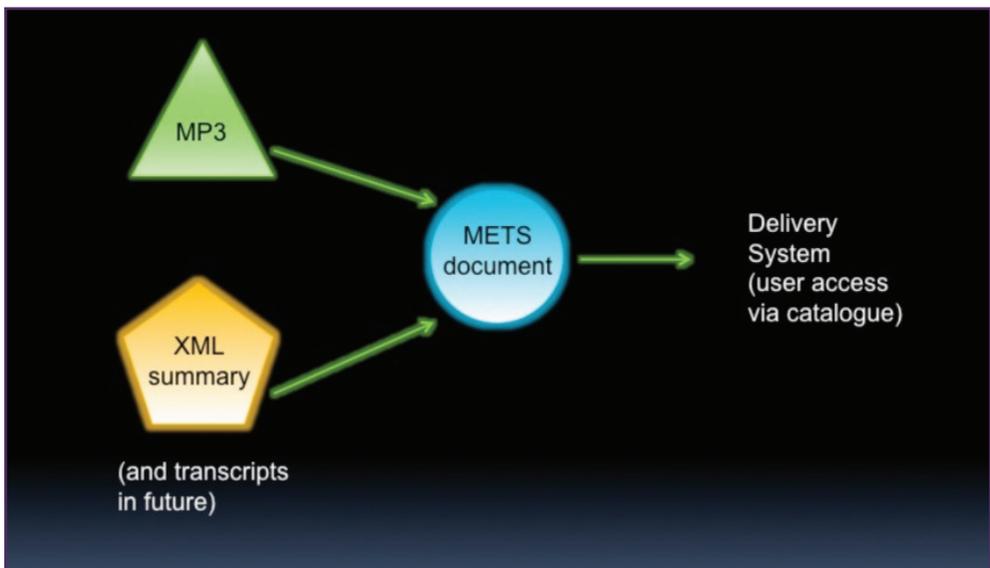


Figure 1. The METS document defines the files to be delivered and their structure in relation to each other.

The system delivers streaming MP3 files through a Flash player object⁹⁷ using a Wowza streaming server.⁹⁸ When a summary is available, it is displayed on the same webpage and JavaScript is used to link the time-codes in the XML document to time-points in the MP3 files. This means that a user of the delivery system can click on a section of the summary and jump to that point in the streaming MP3. The sound files and summary are also available for download, to accommodate access over slower internet connections that do not support streaming audio.

⁹³ Metadata Encoding and Transmission Standard (METS) provides a flexible schema for describing digital library objects: <http://www.loc.gov/standards/mets/mets-home.html>

⁹⁴ Digital Collections at the National Library of Australia <http://www.nla.gov.au/digicoll/index.html>

⁹⁵ See Persistent Identifier scheme for digital collections at the National Library of Australia <http://www.nla.gov.au/initiatives/nlapi.html>

⁹⁶ This is not yet a registered METS profile, but more information and an example are available here: <https://wiki.nla.gov.au/display/LABS/Australian+Sound+Recording+METS+Profile>

⁹⁷ SWFObject <http://code.google.com/p/swfobject/>

⁹⁸ Wowza Media Server <http://www.wowzamedia.com/index.html>

DigitalCollections
Oral History

NATIONAL LIBRARY OF AUSTRALIA

Timed Summary | Bibliographic Record | Download

Mem Fox interviewed by Rob Linn
Fox, Mem, 1946-2005
[View catalogue record](#)
nla.oh-vn3603882
(4 sound files)

00:00:00 Introduction

00:00:52 Mem recounts her memories of her parents, Wilfrid and Nancy and her appreciation of them. Wilfrid was a pacifist who met Nancy at a Student Christian Movement (SCM) gathering. Wilfrid's charisma and ability as an educator was well known. His work in Zbabwe between 1946 and 1992. Wilfrid's mother, Amy Morgan Brock, described as 'faisly' and one who went outside the accepted social order. Amy's work in Montessorri method teaching recalled. Returns to her father's great practical skills and his many interests, including his great faith. His teaching begins at Scotch College, Adelaide and his studies at the University of Adelaide. His service in the RAAF, despite his pacifism, and work as an Education Officer in the Second World War.

00:08:55 Mem's mother Nancy was travelling secretary of the SCM and moving around Australia in the 1930s. She was at Sydney University and majored in Anthropology, studying under Margaret Mead. Nancy also met Christobel Fankhurst and encouraged a certain feminism. Relationship to the Methodist stream and George Whitfield from Nancy's family. Mem talks of her passion for public speaking and how that is something that runs in the maternal side of her family.

Session 1 of 4
Mem Fox interviewed by Rob Linn 59:26

Session 2 of 4
Mem Fox interviewed by Rob Linn 60:26

Session 3 of 4
Mem Fox interviewed by Rob Linn 21:48

Session 4 of 4
Mem Fox interviewed by Rob Linn 35:36

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Search

Back to top

Site page: <http://nla.gov.au/nla.oh-vn3603882>

Figure 2. Audio delivery system — an example of multiple sessions with summary. <http://nla.gov.au/nla.oh-vn3603882>

The master audio files for born-digital and digitised sound recordings were already managed through the Digital Collections Manager. The audio delivery project provided additional software services and processes for bulk upload of MP3 files derived from Broadcast Wave File (BWF) master files using Dobbin audio processing software,⁹⁹ as well as TEI XML transcripts and summaries.

DigitalCollections
Oral History

Timed Summary | Bibliographic Record | Download

Files available for download:

File Name	Format	Size	Action
Summary	text/xml	29.0KIB	Download
Session 1 of 4			
48kbs	audio/mpeg	20.0MIB	Download
128kbs	audio/mpeg	54.0MIB	Download
256kbs	audio/mpeg	109.0MIB	Download
Session 2 of 4			
48kbs	audio/mpeg	20.0MIB	Download
128kbs	audio/mpeg	55.0MIB	Download
256kbs	audio/mpeg	110.0MIB	Download

Figure 3. Audio delivery system — example of summary and audio files available for download.

⁹⁹ DOBBIN features <http://www.cube-tec.de/dobbin/features.php>

Creating summaries

As part of the National Library of Australia's oral history program, interviewers usually write summaries of the interviews following the recording session. Until recently, these were written and submitted to the Library as Microsoft Word documents, with tables showing start and end times for summary segments, a description of the segment, and keywords. To be used in the audio delivery system, these summaries would need to be converted to a structured time-coded format.

During the audio delivery project we developed a software tool for converting the existing Word document summaries to TEI XML documents. However, because of the unstructured nature of the Word documents and potential variations within a template, this conversion process had limited success. We also developed an alternative web-based tool for creating TEI XML summaries, which enabled validation of the content as it was entered.

Start time	Summary	Keywords	
00:00:00	Introduction		 
00:02:50	Talks about her parents and childhood.	Sydney	 
00:04:36			 

Figure 4. Oral History Summary tool — editing time-coded summary for export as TEI XML document.

This process of creating time-coded summaries in XML through the web tool has now become part of standard practice for new interviews. The Library is also employing contractors to summarize existing interviews selected for online delivery that did not have summaries in electronic form.

Access rights and risks

Most of the content in the Library's sound recordings collection is commissioned by the Library and copyright is owned by the Library or shared between the Library and the interviewee. However, there are other rights issues that affect access to a recording. At the time of recording, the Library asks interviewees to speak openly, knowing that the Library will only give access to the recording as agreed by the interviewee. After the interviewer clarifies that the interviewee understands their rights with respect to allowing or restricting access and copying, the interviewee signs a form stating their instructions to the Library. This form shows whether the interviewee gives permission for access to the interview, copying

for research use and copying for public use (e.g. broadcast or quoting in publication). More recent rights agreement forms ask specifically whether the interviewee gives permission for access through Library websites.

RIGHTS AGREEMENT

MATERIAL COVERED BY THIS AGREEMENT

TRC Number: _____

Interviewee name: _____

Interviewer name: _____

Place of interview: _____

Date of interview: _____

5. May the Library permit unrestricted access to and use of the Material?

The Library usually allows members of the public to

- access material (= view it or makes notes about it or listen to it), and to
- use material (= copy it or publish it or use it in public ways)

Yes > Go to 10.

No > Go to next question

6. May the Library allow people to access and make notes about the Material on the Library's premises or while on loan in other libraries:

(a) Yes

(b) Yes, but only if the Library has received my specific permission on each occasion

(c) Yes, but only after the following date or event

(e.g. '2015' or 'after my death')

Figure 5. Extract from rights agreement form.

The access and copying conditions agreed to by the interviewee (or speaker or performers, if not an interviewee) are recorded in the catalogue record for the sound recording. Unfortunately the free-text fields in catalogue records allow many variations of the access statements, and the statements are not in a sufficiently structured form to allow automatic determination of whether access is permitted. This means that a significant amount of staff time is required to identify recordings that may be published on the web according to the agreement with the interviewee.

An additional problem with publishing previously unpublished sound recordings on the web is the risk of legal action for defamation. If an interviewee has made a statement that could be regarded as defamatory, the Library could be the subject of legal action as the publisher of the material. Even if the interviewee has agreed to make the content public, the Library may decide to restrict the material if there is a high risk of defamatory content.

The current approval process for publishing sound recordings through the audio delivery system involves manually assembling lists of open access recordings, then reviewing the list to make risk management decisions about publishing the content. Although the curatorial review process will continue to be necessary whenever we are releasing previously unpublished material, there is potential for improving efficiency of finding open access recordings.

Rights management

The Library had identified a requirement to build a rights management system to manage information about our agreements with people who have rights in special collections materials held by the Library. In some cases rights holders agree that material can be open for access, open for copying for research or study purposes and open for publishing or public use. However, a significant portion of the oral history and folklore collection has conditions on access or copying. For example, the interviewee may permit access only after their lifetime, or permit access but restrict copying and public use.

The rights management system developed in 2009¹⁰⁰ allows staff to enter agreements made with rights holders in a structured form, and link the agreement details to the rights holder and works they hold rights in. The permissions granted by rights holders are broken down into different types, so that library staff can clearly see whether access to a collection or work is open or restricted, and whether the Library is permitted to publish the material on websites.

A. Material Covered by Agreement

B. Rights Holders and Contact Details

C. Roles and Relationships

D. Instructions for Access and Use

8. May the Library make the full Interview accessible through its website, provided that the Library requires the end user to agree to the online End User Licence conditions which limits uses and defines responsibilities? [Answer](#)

9. May the Library provide copies of the Material for use in performances, transmissions, broadcasts, publications, films and in other public ways, including uses in online media? [Answer](#)

Permissions Add Permission

Holder	Type	Policy	Purpose	Details	Note	Trigger
Everyone	Access	Open		access allowed on the Library's premises or while on loan in other libraries		
Everyone	Copying	Open		copying allowed for research, study or personal use		
Everyone	Publishing/Public use	Open		publishing and public use by people and organisations other than the Library allowed		

E. Agreement Details

Figure 6. Entering a rights agreement in Sprightly (rights management system).

At this stage, the rights management system is used to record new agreements about rights holders as they are made. Another project is required to enter information from approximately 9000 existing agreement forms covering the oral history collection material. Once this information is recorded in the system, it will become possible to generate reports on all works matching a specific type of permission, such as “the Library is permitted to publish on its own websites”. When risk management decisions are made about releasing or restricting unpublished recordings, it is possible to record these decisions in the rights management system, so that the information can be used when reviewing access at a later date.

100 Rights management system information and open source code: <https://code.nla.gov.au/redmine/wiki/rms-go>

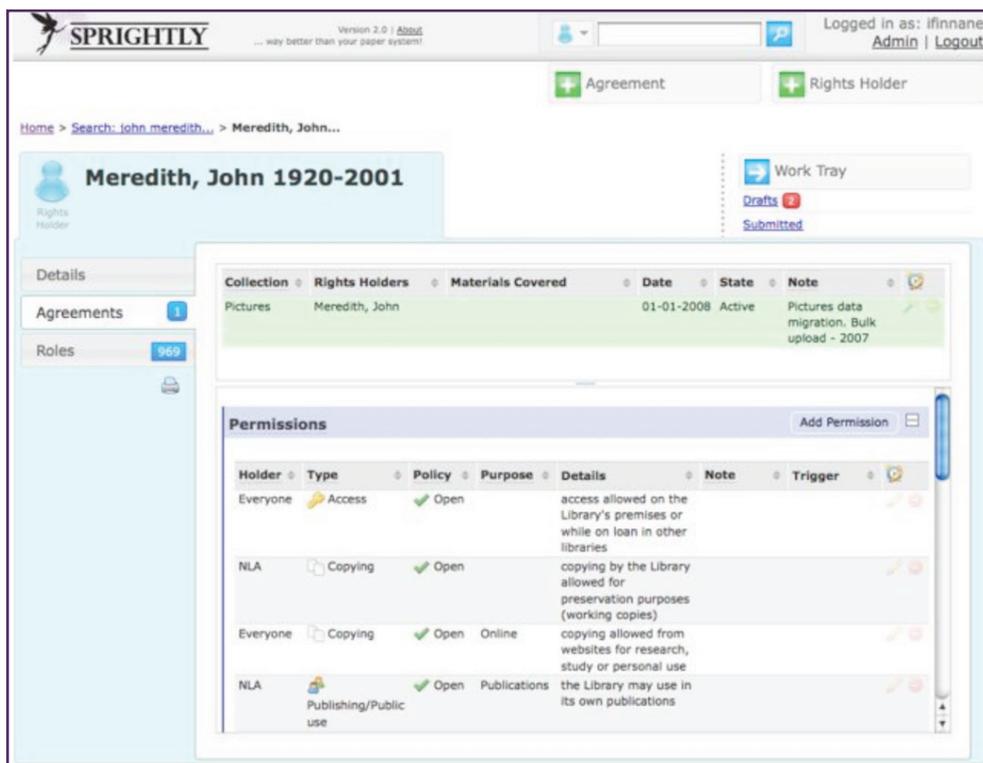


Figure 7. Viewing rights agreement details in Sprightly.

The future

Currently, MP3 derivative files for delivery are created as a routine process and batch uploaded to the Digital Collections Manager repository. Interviewers and other contractors create summaries through the online summary tool and TEI XML copies are uploaded to the repository. All oral history content is restricted by default and only accessible by Library staff, until oral history staff release the content for online delivery by changing the restriction level through the DCM. When the content is unrestricted, it is automatically available in the audio delivery system, and a link to the persistent identifier is added to the catalogue record so the recording is discoverable.

The decision to release content is made by the Curator of Oral History and Folklore after considering the legal risks described earlier. Staff prepare lists of content for potential delivery online by searching the DCM and library catalogue and checking access condition statements. This is a time consuming process and so far approximately 750 recordings have been approved for release.

In future it may be possible to use structured information in the rights management system to automate access to more digital content, for example digital images with clearly defined permissions. The requirement to make decisions about releasing previously unpublished content means that access to oral history recordings will not be automated in this way. However, reports in the rights management system will clearly indicate which of the thousands of digital sound recordings may be published online according to the interviewees' agreements with the Library. When combined with the ability to record curatorial decisions about access in the system, these reports will facilitate the process of releasing much more content for immediate online access through the audio delivery system.

Armonique: a framework for Web audio archiving, searching, and metadata extraction

Bill Manaris, J.R. Armstrong, Thomas Zalonis, *Computer Science Department, College of Charleston* and Dwight Krehbiel, *Psychology Department, Bethel College*¹⁰¹

Abstract

Armonique is a Web2 framework for the management of audio material, including searching, archiving, and metadata extraction. It allows users to navigate large audio collections based solely on the similarity of the audio content itself, as opposed to metadata generated from human beings (e.g., musicologists and listener preferences). This framework allows new material to be added easily into an existing archive as it automatically extracts metadata. This is accomplished through hundreds of metrics based on power laws. Results from experiments with human subjects indicate that power-law metrics correlate with aspects of human emotion and aesthetics. The main advantages of this approach are that (a) it requires no human pre-processing, and (b) it allows discovery of similar songs that musicologists may miss (e.g., cross-style) or that are rarely listened to (i.e., no listener ratings). These results are by no means complete, but they suggest a powerful, automated alternative (or complement) to existing practices involving humans.

1. Introduction

The cultural legacy of our society is being captured and increasingly preserved in digital transcriptions of audio, text, images, and video. Organizations ranging from national archives, to libraries, to museums, to Internet repositories all have to deal with massive amounts of digital material. This digital growth demands innovative ways of processing archival data; it also requires usable management tools, which can help users navigate through large data collections to discover items of interest.

This paper (originally given at the 40th IASA conference in Athens, Greece) reports on results from many years of research in artificial intelligence, cognitive neuroscience, computer science, and psychology of music. We have developed hundreds of metrics involving the extraction of power-law features from MIDI and MP3 audio, which capture statistical proportions of music-theoretic and other attributes (e.g., Pitch, Duration, Pitch Distance, Duration Distance, Melodic Intervals, Harmonic Intervals, Melodic Bigrams, etc.). These metrics have been incorporated into Armonique, a Web2 framework for the management of audio material, including searching, archiving, and metadata extraction.

Armonique (<http://armonique.org>) allows users to navigate large audio collections based solely on the similarity of the audio content itself. The majority of online music similarity engines (50+) are based on context/meta-data (i.e., social networking, or users' listening habits). This includes systems such as iTunes Genius, Last.fm, and Pandora, which involve either musicologists listening and carefully tagging every new song across numerous dimensions (e.g., Pandora), or collaborative filtering techniques based on user preferences and ratings (e.g., Genius). The main advantages of our approach are that (a) it requires no human pre-processing, and (b) it allows discovery of similar songs that musicologists may miss (e.g., cross-style) or that are rarely listened to (i.e., no listener ratings). We have also developed an iPhone client application, called Armonique Lite, which uses the Armonique engine as its server.

Results from various experiments, some with human subjects, indicate that our approach models essential aspects of music aesthetics. This research is potentially transformative to the Internet music economy and functionality.

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Section 2 discusses the history of and some issues related to quantifying music aesthetics. Section 3 introduces Zipf's law and related power laws. Section 4 provides an overview of our power-law metrics for music. Section 5 describes automated classification tasks used to validate these metrics. Sections 6 and 7 present the Armonique search engine and its iPhone client. Section 8 presents results from psychological experiments with human subjects assessing how well Armonique's similarity model corresponds with human music aesthetics. Conclusion, acknowledgements, and references follow.

2. How can numbers describe aesthetics?

Webster's defines *aesthetics* as "the study or theory of beauty and of the psychological responses to it; specif., the branch of philosophy dealing with art, its creative sources, its forms, and its effects" (Guralnik 1980). Aesthetics originates from the Greek "αἰσθησις – αισθάνομαι", which means to *perceive, feel, sense* (all three notions combined). These notions span the artifact (external), the emotional response (internal), and the sensory organs (interface between external and internal). Over the centuries, use of the term has become less philosophical (i.e., the *nature* of beauty, art, and taste), and more functional (the analysis, synthesis, and evaluation of *artifacts*), perhaps reflecting our society's evolution. Schoenberg, among others, promoted this transition in his 1911 "Theory of Harmony" (Dahlhaus 1982, pp. 1-3).



Figure 1. J.S. Bach and the Canon Triplex a 6 Voc. by E.G. Haussmann (1746)

What is the nature of beauty? Where can we find beauty in music? Is it culturally independent (objective) or does it rely on cultural conditioning (subjective)? These are old questions, which are unavoidably raised in the context of this work.

Kahlil Gibran asks: "Where shall you seek beauty, and how shall you find her unless she herself be your way and your guide? And how shall you speak of her except she be the weaver of your speech?" (1973, pp. 74). Gibran's perspective raises the intriguing possibility that any potential answers about quantifying aspects of music aesthetics will inevitably also reflect related aspects of human physiology/psychology.

To begin, let's consider two musical pieces, *Song1* and *Song2*, i.e., <http://tiny.cc/song1> and <http://tiny.cc/song2>. (It is recommended that you listen to them before reading on. Also, see figure 1 for a hint about their origin.) Assuming you find the pieces at least aesthetically agreeable, then what aspects of these pieces make you feel this way?

This, actually, is a very old exploration. It begins at least 2,500 years ago with the Pythagoreans, who were the first to connect numbers with aesthetics. Aristotle states that “the Pythagoreans were the first to take up mathematics, and ... thought its principles were the principles of all things” (1992, pp. 70-71). They observed that strings exhibit harmonic proportions, i.e., they resonate at integer ratios of their length (i.e., 1/1, 1/2, 1/3, 1/4, 1/5, etc.). They also observed that these proportions are aesthetically pleasing to the human ear. Accordingly, they developed musical modes based on these ratios, which formed the basis of our modern-era musical scales.

Aristotle supported the Pythagorean view that “[the interplay] between opposites is the beginning of all beings” (1992, pp. 72-73). Plato, Euclid and others provided a more precise description of this interplay in the form of proportional analogies (e.g., “A is to B as C is to D”). The apex of this exploration may have been the discovery of the golden mean, or 1.61803399... This special proportion, which humans find aesthetically very pleasing, is found in natural or human-made artifacts (Beer 2008; Calter 2008, pp. 46-57; Hemenway 2005, pp. 91-132; Livio 2002; May 1996; Pickover 1991, pp. 203-205). It is also found in the human body (e.g., the bones of our hands, the cochlea in our ears, etc.). The golden ratio reflects a place of balance in the structural interplay of opposites.

Considering again our Song1 and Song2, what makes a musical piece aesthetically appealing? Given the Aristotelian/Pythagorean view of opposites, perhaps it is the interplay between silence (rests) and sound (notes). Also, it is the interplay among different sound frequencies occurring concurrently (harmony) and sequentially (melody). Of course, some forms of interplay are more aesthetically pleasing than others. Music theory, which originated with the Pythagorean modes, was developed precisely to codify the aesthetics of this interplay (e.g., scales and modes, chords and inversions, cadences, counterpoint, etc.).

Arnheim (1971) discusses another kind of interplay — between chaos and monotony — which creates aesthetically pleasing artifacts. In other words, if the proportions are too chaotic or unpredictable, the artifact will be difficult to comprehend or appreciate (e.g., 12-tone or aleatory music). At the other extreme, if the proportions are too monotonous or too predictable, the artifact will be uninteresting or boring.

This theory was experimentally validated by Voss and Clarke (1975, 1978). Music was generated through a computer program, which used various random-number generators to control the pitch and duration of successive notes. One piece was created with chaotic (aka *white-noise*) statistical proportions, a piece with monotonous (aka *brown-noise*) statistical proportions, and a piece with statistical proportions between chaos and monotony (aka *pink noise* or *1/f proportions*). As predicted by Arnheim, they observed that the *1/f* music was much more pleasing to most listeners. The chaotic music was “too random,” whereas the brown-noise music was “too correlated.” They concluded, “the sophistication of this *1/f* music (which was ‘just right’) extends far beyond what one might expect from such a simple algorithm, suggesting that *1/f* noise (perhaps that in nerve membranes?) may have an essential role in the creative process” (1975, p.318). It should be noted that the harmonic proportions observed by the Pythagoreans on strings (i.e., 1/1, 1/2, 1/3, 1/4, 1/5, etc.) are statistically equivalent to *1/f* proportions.

In our case, both Song1 and Song2 exhibit near *1/f* proportions in terms of notes (pitches, durations), melodic intervals, harmonic intervals, etc. Song2 is J.S. Bach’s “Invention #13 in A minor” (BWV784). Song1 was “composed” by a computer program, called NEvMuse, which recombined Song2 notes, while aiming to preserve its *1/f* proportions. One goal of this experiment was to demonstrate the relationship between music aesthetics and proportions (Manaris, et al. 2007). For comparison, also consider Song3 (i.e., <http://tiny.cc/song3>), which was created to “counterbalance” the original’s *1/f* proportions by aiming towards chaotic (white-noise) proportions.

Schroeder (1990) explains that the basilar membrane found in the cochlea of the human ear is attuned to sounds with *1/f* proportions. Since the cochlea is a logarithmic spiral

(see figures 2 and 3), such sounds stimulate “a constant density of the acoustic nerve endings that report sounds to the brain” (ibid. p. 122). Logarithmic spirals exhibit golden ratio proportions (see figure 3). This demonstrates a physiological connection between $1/f$ proportions and the golden ratio, and both to music aesthetics.



Figure 2. Cochlea in human ear (courtesy of Widex APS)

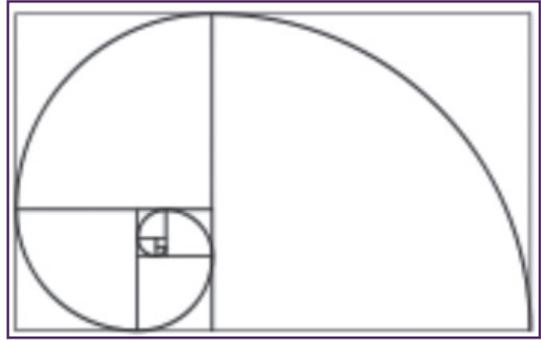


Figure 3. A logarithmic spiral (sides of consecutive boxes approximate the golden ratio)

3. Zipf's Law and Power Laws

George Kingsley Zipf (1902-1950) was a linguistics professor at Harvard University. His seminal book, “Human Behavior and the Principle of Least Effort”, contained results from various fields demonstrating the presence of $1/f$ (harmonic) proportions in natural and human-made phenomena (Zipf 1949). Zipf was the first one (with the possible exception of Johannes Kepler and his 1619 “Harmonices Mundi” work) to hypothesize that there is a universal principle at play, and to propose a mathematical formula to describe it.

Informally, Zipf's law describes phenomena where certain types of events are frequent, whereas other types of events are rare. For example, in English, short words (e.g., “a”, “the”) are very frequent, whereas long words (e.g., “anthropomorphologically”) are quite rare. If we compare a word's frequency of occurrence with its statistical rank, we notice an inverse relationship: successive word counts are roughly proportional to $1/1$, $1/2$, $1/3$, $1/4$, $1/5$, and so on (Bogomolny 2010). In other words, books contain the **same** type of harmonic proportions as those observed by the Pythagoreans on strings 2,500 years ago.

Zipf generalized this observation to other types of harmonic proportions (ibid., pp.130-131). This is captured by the *Generalized Harmonic Series* equation:

$$F \cdot S_n = \frac{F}{1^p} + \frac{F}{2^p} + \frac{F}{3^p} + \dots + \frac{F}{n^p}$$

where F is a constant, n is a positive integer, and p may range from 0 to infinity, with 1 corresponding to Zipf's law.

This equation may be best understood by plotting the data (e.g., see figure 4). This produces a near straight line whose slope corresponds to the exponent p above. The slope may range from 0 to negative infinity, with -1.0 denoting Zipf's ideal (aka *pink-noise*, harmonic, or $1/f$ proportions). A slope near 0 indicates a random probability of occurrence (i.e., chaotic or *white-noise* proportions). A slope of -2.0 denotes *brown-noise* proportions. A slope tending towards negative infinity indicates a very monotonous phenomenon, e.g., a musical piece consisting mostly of one note (aka *black-noise* proportions).

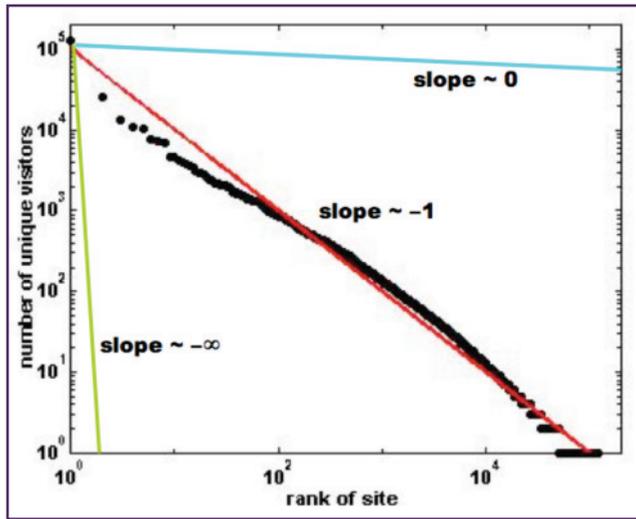


Figure 4. Number of unique website visits (y-axis) ordered by website’s statistical rank (x-axis) on log scale [9]

In physics, white-noise, pink-noise, brown-noise, and black-noise proportions are known as *power laws*. Zipf (pink-noise) proportions have been discovered in a wide range of human and naturally occurring phenomena, including music, city sizes, peoples’ incomes, subroutine calls, earthquake magnitudes, thickness of sediment depositions, clouds, trees, extinctions of species, traffic jams, visits to websites, and opening chess moves (Blasius, B. & Tönjes 2009; Mandelbrot 1977; Schroeder 1991; Voss & Clarke 1975, 1978; Zipf 1949).

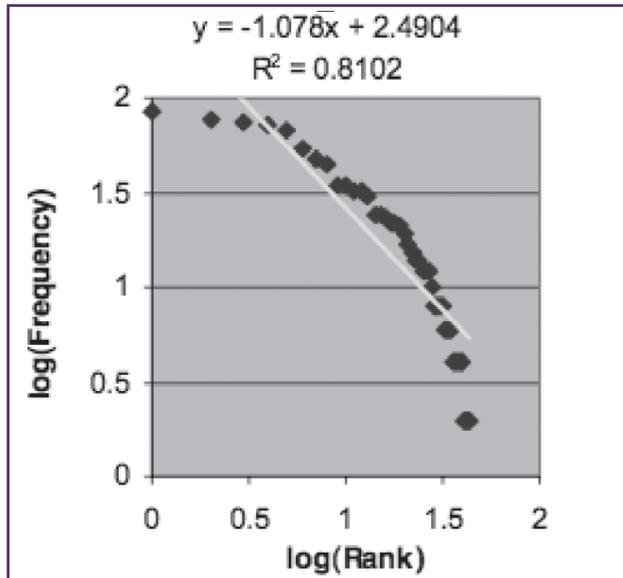


Figure 5. Pitch proportions for J.S. Bach’s Overture No. 3 in D, “2. Air on the G string” (BWV1068)

4. Music and Zipf's law

Zipf reports results from four musical pieces: Mozart's *Bassoon Concerto in Bb*, Chopin's *Etude in F minor, Op. 25, No. 2*, Irving Berlin's *Doing What Comes Naturally*, and Jerome Kern's *Who* (1949, pp. 336-7). Since Zipf and his students did not have access to computers, they manually counted notes in music scores. They focused on notes and distances between repeated notes. In both cases, they demonstrated that the above songs exhibit *l/f* proportions similar to the ones observed in natural language.

With the use of a computer and the proper algorithms, this arduous effort may be performed in a few seconds. We have developed hundreds of metrics based on Zipf's law. These metrics capture proportions of music-theoretical and other attributes, such as pitch, duration, melodic intervals, chords, and various proportions of timbre in the frequency domain.

For example, using a note (pitch) metric, J.S. Bach's *Air on The G String* exhibits a slope of -1.08 and an R^2 of 0.81 (see figure 5). Again, a slope near -1 indicates a Zipf distribution. The R^2 value indicates how well the data points fit the trendline — it may range from 0 (no fit) to 1 (perfect fit). Anything above 0.7 is considered a good fit. We have studied thousands of musical pieces from the public music culture. Our results indicate that most socially-sanctioned music, across styles, exhibits near Zipfian distributions across various attributes (e.g., (Manaris et al. 2005)). Moreover, deviations from ideal Zipfian proportions tend to correlate with composer and style, as we discuss in the next section.

Our approach allows us to generate thousands of measurements from a single musical piece. However, we have discovered that 250 or so metrics are sufficient for estimating music similarity.

5. Automated classification tasks

Our experiments demonstrate that extracting a large number of power-law metrics serves as a statistical "signature" mechanism, which can help to identify musical pieces and even to automatically classify them in terms of composer or style. We have trained numerous artificial neural networks (ANNs) on hundreds of values derived from applying our metrics to many music corpora. These ANNs were trained to perform various classification tasks in order to assess our metrics. These tasks included:

- Composer classification: (J.S. Bach, Beethoven, Chopin, Debussy, Purcell, D. Scarlatti) with 93.6% - 95% accuracy (Machado et al. 2004);
- Style identification: (Medieval, Renaissance, Baroque, Classical, Romantic, Modern, Jazz, Country, Rock) with 71.5% - 96.6% accuracy (Manaris et al. 2008);
- Popularity (pleasantness?) prediction: We used a corpus of 14,695 classical pieces from the Classical Music Archives and a web access log for one month (1,034,355 downloads). Using this log, we extracted from the corpus the 1,000 most-popular (most downloaded) pieces and the 1,000 least-popular (least-downloaded) pieces. Trained on a subset of the data, the ANN managed to classify pieces into the proper category (popular vs. non-popular) with 90.7% accuracy (Roos & Manaris 2007).

6. Armonique — a music similarity engine

Several applications have been developed to expose a much greater audience to this innovative approach for searching music collections based on aesthetic similarity. One of these is the server application that powers the Armonique website.

For example, see the latest Armonique portal to the Magnatune corpus of 6,045 songs (available at <http://armonique.org>). These songs span Ambient, Classical (Baroque, Renaissance, Medieval, Contemporary, Minimalism), Electronica, Jazz and Blues, Metal & Punk Rock, New Age, Rock and Pop, and World (Indian, Celtic, Arabic, Tango, Eastern-European, Native-American) music, and are available under a Creative Commons License.

The design of this site follows a minimalist approach that is consistent with existing popular search engines (see figure 6). This approach was chosen to maximize usability through familiarity even for new visitors. When a user first visits the site, it is populated with a set of random songs for the user to explore. The user can then select a song and request songs similar to it. This generates a playlist sorted in descending order of similarity with regards to the original song.

The majority of online music similarity engines (50+) are based on *context/meta-data* (i.e., social networking, or users' listening habits). This includes systems such as iTunes Genius, Last.fm, and Pandora, which involve either musicologists listening and carefully tagging every new song across numerous dimensions (e.g., Pandora), or capturing listening preferences and ratings of users, also known as collaborative filtering (e.g., Genius). To the best of our knowledge, there are only two *content-based* music similarity engines in full implementation, i.e., Mufin (<http://mufin.com>), and ours. Both techniques are related in that they measure musical information entropy along many dimensions. Mufin uses 40+ metrics related to MP3 compression (that company owns the MP3 patent).

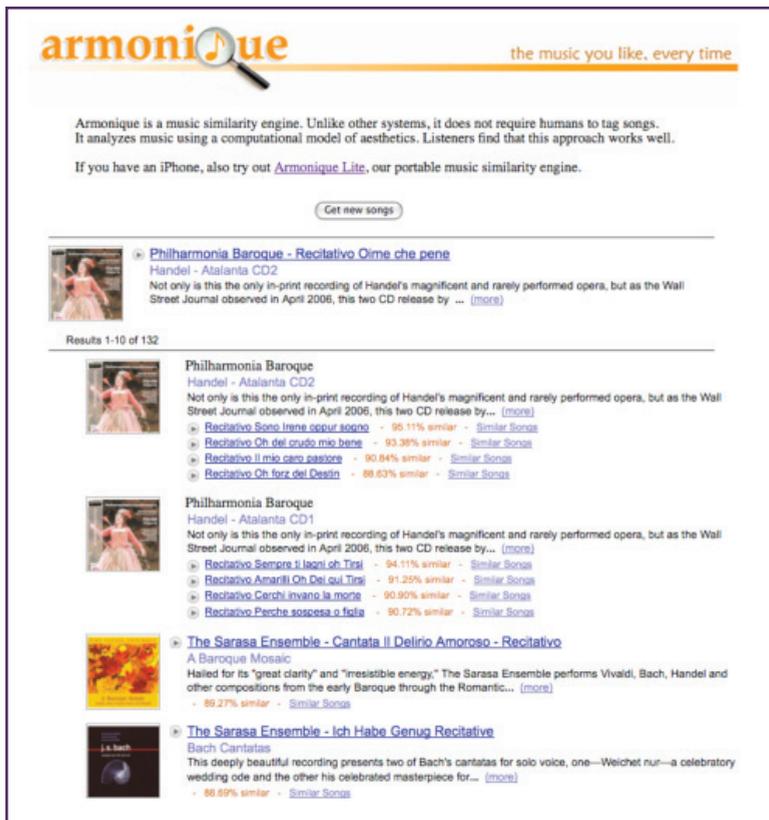


Figure 6. The Armonique search engine's user interface

Our approach uses 250+ metrics based on power laws, which have been shown to correlate with aspects of human aesthetics (see section 8). Through these metrics, we are able to automatically create our own metadata (e.g., artist, style, or timbre data) by analyzing the song content and finding patterns within the music. Since this extraction does not require interaction by humans (musicologists or listeners) it is capable of scaling with rapidly increasing data sets.

We plan to deploy Armonique to larger music collections. In preparation for this step, we implemented the Armonique server application with performance in mind. The search method currently in use employs a binary reduction technique to minimize the time required to complete a search request. This search method has been found to provide very accurate search results at a fraction of the time or computational expense of a more traditional approach.

The main advantages of using Armonique with large music collections are that (a) it requires no human pre-processing, and (b) it allows users to discover songs of interest that are rarely listened to and are hard to find otherwise. This framework may be used in a variety of music information retrieval (MIR) applications, including music recommenders and Internet radio applications (as discussed in the next section).

7. Armonique Lite — an iPhone music discovery app

We have developed *Armonique Lite*, a free iPhone application for exploring online music archives (available through the Apple AppStore). The application submits queries to the Armonique server and reads the server's responses. This keeps the burden of performing the search computations with the server, rather than a less powerful mobile device. Through efficient use of cache techniques, the server can handle thousands of simultaneous requests.



Figure 7. The Armonique iPhone user interface

Armonique Lite provides a number of additional features not supported by the current version of the Armonique website. These features include state preservation between user sessions; a history of the most recently played songs; and the ability to store a list of favorite songs. In addition, the Armonique Lite application presents search results in a much more interactive, intuitive way, allowing the user to scroll through and interact with the album art for each song in the search results. Future versions of the website could be expanded to support user accounts, which would allow many of these features to be available on the web application.

Relying on the server application for the bulk of search processing, although born of necessity, allows for a variety of other implementations. We are also working on a client for the Android platform.

8. Assessment with human listeners

We have conducted several experiments with human subjects. Our main goal was to evaluate Armonique's similarity model in comparison to human aesthetic judgments. Due to space limitations, we only summarize the major findings (more detailed reports are forthcoming).

Methodology: We asked participants to listen to musical pieces that Armonique considers similar. For comparison, we also asked participants to listen to pieces that Armonique considers dissimilar. All experiments involved five to seven pieces. The pieces were presented to each participant in random order.

For each experiment, we measured various psychological and physiological responses. In particular, we asked participants to judge (on a 1 to 10 scale) how *similar* each Armonique-recommended piece was to the original one. Then, we asked participants to rate (a) how *pleasant* and (b) how *active* all pieces were (original and Armonique-recommended), using a standard instrument known as the Self-Assessment Manikin (Bradley and Lang, 1994). In some experiments, we asked participants to rate (a) how much they *liked* and (b) how *familiar* they were with the pieces. Finally, in some experiments, we recorded *heart rate*, *skin conductance*, and up to 32 channels of *brain electrical activity* (EEG). These were recorded before, during, and after each piece.

Psychological results: In terms of psychological measurements, our findings are clear and unequivocal: Human listeners agree with Armonique's similarity recommendations.

In one large-scale experiment, 40 participants listened to a piece chosen by the experimenters, three *similar* pieces recommended by Armonique, and three *dissimilar* pieces recommended by Armonique. Participants strongly agreed with Armonique's recommendations, i.e., their ratings exhibited large and reliable differences between similar and dissimilar pieces.

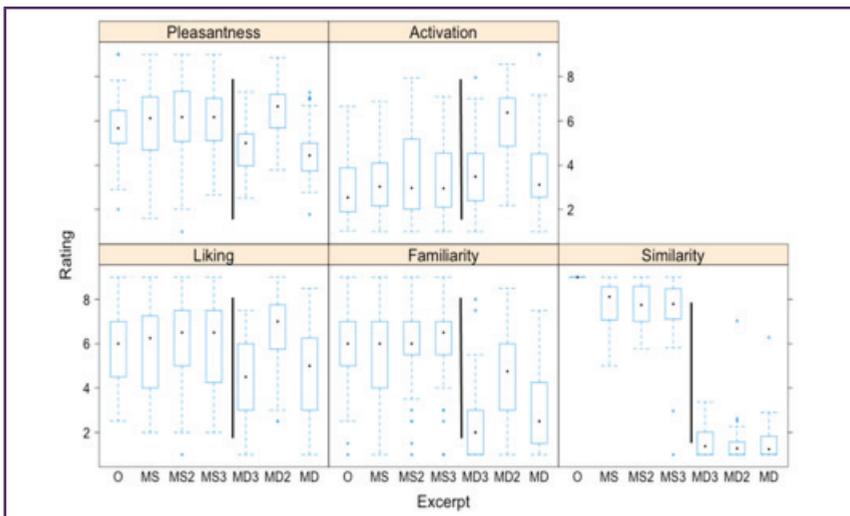


Figure 8. Responses (self-ratings) from 40 subjects to music recommended by Armonique (O = original piece; MS, MS2, MS3 = 1st, 2nd, 3rd most similar piece; MD3, MD2, MD = 3rd, 2nd, 1st most dissimilar piece)

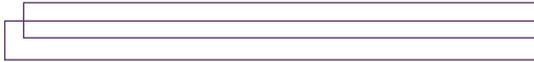


Figure 8 (right panel) shows the 40 participants' *similarity* ratings for these pieces (O, the original piece, denotes perfect similarity; MS, MS2, MS3 are the similar pieces; MD, MD2, MD3 are the dissimilar pieces). These box plots summarize ratings (numeric responses) across all 40 participants. The black dot in each box indicates the median response for that piece. Each box indicates the spread of the ratings for that piece (i.e., it encloses 50% of the values around the median). The dotted lines (whiskers), beyond each end of the box, extend to the value that is a maximum of 1.5 times the box length. Finally, the blue dots beyond the whiskers indicate outlier values.

In other experiments, we had each participant select their own original piece, or identify a musical style from which we selected a piece. Then, we had Armonique recommend similar and dissimilar pieces. Overall, listeners agreed with Armonique, i.e., *similarity* ratings exhibited substantial differences between similar and dissimilar pieces. However, these differences were less pronounced (compared to figure 8).

In terms of *liking* and *pleasantness* measurements, in the large-scale experiment, all 40 participants gave high ratings to pieces that Armonique considered similar (see figure 8, left panels). In other words, if a listener likes a piece, Armonique may recommend other pieces that the listener likes.

It should be noted that listeners also gave high *liking* and *pleasantness* ratings to the MD2 piece (2nd most dissimilar). Since listeners did consider MD2 to be dissimilar (see figure 8, right panel), this suggests that *liking* and *pleasantness* are more general dimensions than *similarity*. In other words, a listener may like various dissimilar pieces (e.g., baroque, jazz, and ambient pieces).

Across several experiments, however, ratings for *liking* and *pleasantness* tended to differentiate similar from dissimilar pieces. Ratings for *activation* did not.

Physiological results: Physiological dimensions (i.e., *heart rate*, *skin conductance*, and *EEG*) differentiated similar from dissimilar responses in some experiments. For instance, asymmetry of cortical activity between brain hemispheres (derived from EEG (Allen, Coan, and Nazarian, 2004)) was reliably greater for similar pieces than for dissimilar ones. However, this difference was only found in the large-scale experiment where 40 participants listened to the same music.

Another dimension, *heart rate* responses, differentiated similar from dissimilar music in some experiments. Specifically, when listening to similar pieces, participants exhibited higher heart rates.

Discussion: We have found correspondences between Armonique's computational aesthetic model and human psychological & physiological responses, across several experiments. Given the multiple dimensions of human response involved (as described above), this suggests that power-law metrics (as incorporated in Armonique's model) may capture essential aspects of human aesthetics. This is a significant finding as it corroborates Voss & Clarke's results on the aesthetic relevance of Zipf's and related power laws (1975, 1978). This computational aesthetic model is obviously not complete, as some degree of individualized response is also present.

We would encourage the reader to assess Armonique's similarity model independently (via the web, <http://armonique.org>, or the Armonique Lite iPhone application). This is the exact same model used in "composing" Song1 as a variation of Song2 (see section 2).

9. Conclusion

We present Armonique, a content-based music similarity engine, which utilizes a computational model of aesthetics. This engine applies years of research in the development and evaluation of power law metrics related to music aesthetics. This model has been specifically validated

through various psychological experiments with human listeners. We also present Armonique Lite, an iPhone music discovery application. Currently, Armonique has been deployed on two music corpora — the Classical Music Archives corpus (14,659 pieces) and the Magnatune corpus (6,045) pieces.

We hope this article will attract interest to our approach and allow us to deploy Armonique to larger-scale audio archives.

Acknowledgements

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Overview of the ARC and The Muslim Music Crash Course (MMCC)

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This paper touches on three topics: What the ARC is and how we built it; our recent alliances with Columbia University, the National Library of Singapore and Gracenote; and our first global cataloging project that will focus on recordings from the greater Islamic world.

What is the ARC?

The Archive of Contemporary Music is now in its 24th year of operation and now includes well over two million recordings. ARC collects two copies of every version of all commercial releases. We do not digitize or migrate material. Popular music for us is anything that is not classical era western art music, meaning we do not collect material composed from the Revolutionary to the Civil War. Technically we begin the collection with the advent of microgroove recordings in the 1940s, coinciding with the invention of the teenager and the introduction of the 33rpm 12" LP and 45rpm 7" single.

ARC began in 1985 when I could not find an institution willing to accept my personal collection of nearly 50,000 discs. This was mostly punk, hip-hop and reggae material. At the time, we were told, by every institution we approached, that this ISN'T music worth saving.

I had accumulated this material as a radio and club DJ. I released Laurie Anderson's first single, 'O Superman', on my own small label, One Ten Records — this became a #2 hit in the UK — and had co-directed Laurie's stage show for 6 years. In the early 1980s I had also authored *Volume, The international Discography of the New Wave* (Omnibus Pr, 1983), a 700-page book that was the first comprehensive look at this material.

So, with some like-minded friends I recruited a Board of well-known musicians, secured initial funding, got donations from record companies and private collectors, letters of support from the heads of all the major record companies (when there were such things), and began the ARC in a small loft in lower Manhattan.

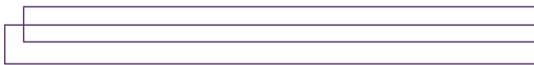
Currently ARC occupies 15,000 square feet of space in 3 locations and houses over 1/2 million LPs, 300,000 CDs, 750,000 twelve inch dance and club singles, 350,000 seven inch singles, several thousand paper records and flexidiscs, and nearly 3 million press kits, posters and photos. We don't collect 78s, but, accidentally, have about 15,000. We have cataloged more than half of the CDs, a third of the LPs, and nearly all of the seven inch singles. There are also 25,000 music books, 60,000 videos and over 100,000 music magazines.

We catalog using off the shelf software, but have designed it so that it can easily flow into MARC, or any other Sputnik era cataloging system, if needs be. Somewhat unique to our library is that the cataloging is not only on the song level, but now 15% of catalogued recordings include information on publishers, authors and rights organizations. Few libraries or archives do this.

More unique perhaps, is that ARC has done all this without any government or institutional support or grants of any kind. We've managed to survive through:

- membership
- research fees
- our semi-annual sales where we get rid of third copies
- the generous donations of our individuals and our Boards.

Our high profile Board of Advisors is made up of musicians and entertainment industry people we admired — a key element in ARC's survival. It began with legendary producer John Hammond. Our current Board includes some really great people — songwriters Leiber and Stoller; film directors Jonathan Demme and Martin Scorsese; artists/producers Jellybean Benitez and Nile Rodgers; and performing artists David Bowie, Youssou N'Dour, Lou Reed,



Keith Richards, Todd Rundgren, Fred Schneider and Paul Simon. Sadly in the past months two members, Jerry Wexler and Ellie Greenwich have died. New board people will be announced soon, and we hope to add an entire band to the list of supporters for the first time.¹⁰²

Beyond funding, the Board's members generate publicity and help build our collections. They assist in creating "special collections" based on their interests. To date the most developed is the Keith Richards Blues Collection numbering some 10,000 recordings. It was Keith who purchased a rare Robert Johnson 78 for the ARC, "Me and The Devil Blues", one of only 10 known copies. We are also working on a Haitian collection with Jonathan Demme.

All materials are donated and we have no acquisitions budget. Our approach is very personal, and we have sought out and developed ongoing relationships within the music industry and with collectors. We can't emphasize enough how our accessibility has led to our growth. If someone calls we pick up the phone and talk to them.

Beyond cataloging, the most common day-to-day activity at the ARC is research for the music industry. Mostly we track down publishing information, reconstruct unavailable audio, provide fact-checking, consult on films and provide scans of record covers. Thousands of high resolution scans of covers are provided annually to record labels for reissue projects and to magazines, aggregators and book publishers for illustrations. ARC provided scans for the opening exhibit at the Jazz Hall of Fame at the AOL Time Warner Building in conjunction with the Lincoln Center, and provided over 1000 scans for the new Grammy Hall of Fame in Los Angeles.

Partnership with Columbia University

After 20 years of building the collection, three years ago I began seeking partnerships that would make the collection available to more users. It made no sense to have such a large collection and allow such limited access. The result is a partnership with Columbia University to enrich and enhance course study, to integrate our resources into arts programming and other educational and scholarly activities.

One of the deciding factors for Columbia to take us on was the range and breadth of the ARC's collections and the support databases we have created. The deciding factor for us was the promise of stability and permanence that the University could provide.

With Columbia, ARC will post our online catalog beginning with ½ million recordings and inaugurate our first international project, the Muslim Music Crash Course (see below).

Expansion into new locations

At the time we were speaking with Columbia, we also began talks with the National Library in Singapore about creating ARCCasia. We were originally approached to work on a rock music collection for their Libraries, but shifted the focus to the music of the region based on the incredible variety of ethnicities that make up this city-state. In this way we hope to create a world-class collection, mirrored in both locations, of music from South India, Madagascar, China, Indonesia, Malaysia, Laos, Thailand, Burma, Cambodia, Vietnam, Korea, Japan and the Philippines. Again, this is a project that has developed over many years, and is only possible because we were lucky enough to find good people, and the right people, in Singapore. These partners include the National Heritage Board, the National Arts Council, COMPASS (the Composers and Authors Association of Singapore), the National Archives of Singapore, and the National Library Board.

ARCCasia is scheduled to begin in mid-2010, and will be housed in the Performing Arts Library, called the Library @ Esplanade, a prime site situated on the bay. The existing library already features an exhibition space, a performing stage, practice and screening rooms, offices and materials storage areas.

¹⁰² Since the paper was delivered in Athens in 2009, ARC has added Michael Feinstein, a leading performer and advocate of the American Songbook, to our Board of Advisors.

By placing an ARC in different locations we hope to collect music that would be impossible to obtain locally.

We are also seeking to create an ARCEu, and we think this is a possibility. While Singapore is primarily interested in digital material, the EU site will house all of our physical second copies. ARC's initial contribution to this second location will be a little under 100,000 discs.

Collaboration with Gracenote

In order to make sense and use of all this material, ARC has created and maintains an important group of intellectual assets and databases. Partnering with Columbia will present some challenges as we integrate systems, but our primary concern is universal access, with web-available cataloging that works more like Amazon and Google, massive lists easily downloadable, while retaining the detail associated with high cataloging standards. Expertise and funding to create our online cataloging is being provided by Gracenote, the company that supplies the metadata for i-Tunes and hundreds of other companies marketing music playback devices.

Another important two-year project completed this year, and now up and running, is the New York Musicians Index and Archive, or NYMIA. This is a database of all musicians and music related businesses operating in New York State. This database now contains over 47,000 entries, with information on musicians, labels, aggregators, music publishers, managers, venues, distributors, retailers, instrument repairers and rights organizations. The most important aspect is that once a search is made, the most useful data — the business description and contact information — is available on the first page, avoiding a series of clicks or mis-directions. This allows users to make a phone call, visit the web site or send an e-mail from the front page. We are working hard with Gracenote to develop this one click/one page model for our online catalog database.

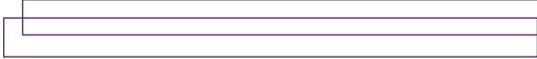
The Muslim Music Crash Course (MMCC) — target date 12 April 2011

ARC is combining the resources of a large university, and a corporate sponsor, to launch our first major project, The Muslim Music Crash Course, or MMCC. This is a worldwide, one-day, two-part event, scheduled to take place on 12 April 2011. The first event is a live online attempt to identify and catalog as many recordings of Muslim music, from any and all sources, around the world, in one day. The second, is a series of live concerts to celebrate the diversity, beauty and cultural importance of Muslim music. In addition, Columbia University will host a seminar the day of the event, as will the Middle Eastern Research Center in Amman, Jordan.

This is a joint project of the ARC, the Middle Eastern Research Center in Amman, Jordan, the Arts Initiative at Columbia University, Columbia's Middle East and Islamic Study Center, the Columbia University Libraries, Gracenote, who is building the website and database, and the Internet Archive, who will supply the bandwidth. ARC's most recent Board member, Youssou N'dour, will act as spokesperson for the project and perform a live concert.

The "crash course" idea stems from the 'tech-ins' of the 1960s, where knowledgeable guides would help students better understand complex issues, through a series of focused discussions and encounters, all in one day. We envision 100 students, technicians and volunteers at their computers in one room, and 100,000 people online. ARC people will try to interpret the electronic 'datamess' that we expect — and make sure all the information can flow into a common pool.

Preplanning and promotion [which was the main purpose of B. George's presentation at the IASA conference in Athens] involves enlisting the services of major collections and collectors from around the world. The aim is to inspire them to search their collections, be it library, archive, closet or basement, to pull or catalog or tag relevant recordings. The project blog, at <http://arcmmcc.wordpress.com/>, lists a variety of suggestions for participation.



The goal of the MMCC is to grow ARC's collection of 2500 relevant recordings, let more people know and learn about the music, and create a permanent knowledge base with internet access — all to celebrate the diversity, beauty and cultural importance of Muslim music.

Using and testing the MMCC database will be our beta for launching the full online catalog of all of our holdings. This is The International Discography, or Internet Discography (iD) — a freely available reference site catalog of our two million sound recordings.¹⁰³

Conclusion

There is a wonderful short story by Emanuel Bound-zeki Dongala called “Jazz and Palm Wine”. In it, the earth is invaded from Outer Space and the advance ships land in Zaire [sic]. Aliens conquer the world. Spacemen explore the various cultures and societies on this planet and decide, quite rightly, that the only things of value are palm wine, a West African intoxicant, and Jazz. The tipsy, hip and benign rulers make Sun Ra the president of the United States and John Coltrane the Pope. “A Love Supreme” replaces the “Gloria” in the liturgy.

We view the past through the artifacts that survive, and future societies (even spacemen?) will reshape the past, creating their own version of our culture(s). So the ARChive collects and preserves everything that's issued, hoping to define 'what happened' in terms broader than those usually described by selectiveness or availability. Taste, quality, marketing, Halls of Fame, sales figures, stars and value are as alien to us as they are, well, to Aliens. The ARChive's job, all of our jobs, is to make sure “A Love Supreme” will be there when it's needed.

¹⁰³ The economy has slowed down the Singapore opening, but the Gracernote projects, including mounting our catalog, are moving full speed ahead. The catalog should be up and searchable in June 2010. Visit the website for updates: www.arcmusic.org

Archiving Traditional Cultures: Intellectual Property Implications

Brigitte Vézina,^{104*} World Intellectual Property Organization

Paper based on a presentation given at a Panel on “Ethics and Archival Practice”, 40th IASA Annual Conference, Athens, Greece, September 23, 2009

I. Introduction

Archives, along with other cultural institutions, play an invaluable role in preserving and providing access to elements of the cultural heritage of indigenous peoples and traditional communities. Yet these preservation and promotion activities may sometimes conflict with the intellectual property (IP) rights and interests of indigenous peoples and traditional communities in their traditional cultural expressions (TCEs). Careful management of these IP rights and interests by cultural institutions, including sound and audiovisual archives, may help resolve some of the existing tensions and may pave the way for a better understanding of the responsibilities that emerge when dealing with collections of TCEs.

This article first offers some background information on the World Intellectual Property Organization (WIPO) and its program on TCEs. It then examines the challenges that TCE-holding cultural institutions may face and how the management of IP rights can contribute to overcoming such challenges. Lastly, it looks into the activities of WIPO in the very specific area of traditional cultures, indigenous peoples and IP.

What is the World Intellectual Property Organization?

WIPO is a specialized agency of the United Nations.¹⁰⁵ It is dedicated to developing a balanced and accessible international IP system, which rewards creativity, stimulates innovation and contributes to economic development while safeguarding the public interest.

WIPO's Traditional Knowledge Division

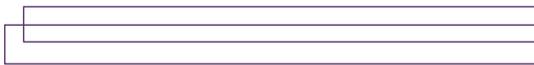
WIPO first began examining the relationship between IP and the protection, promotion and preservation of TCEs several decades ago. As early as 1967, the Berne Convention for the Protection of Literary and Artistic Works (1886), last revised in 1971, was amended to provide a mechanism for the international protection of unpublished and anonymous works (Article 15.4), thereby providing international protection for TCEs. Today, the Traditional Knowledge Division of WIPO handles issues concerning the protection of traditional knowledge (TK) and TCEs against misappropriation and misuse, and the IP aspects of access to and benefit-sharing in genetic resources.¹⁰⁶

WIPO facilitates the negotiation of legal instruments for the protection of TK and TCEs, and carries out capacity-building activities. In particular, WIPO commissions case-studies, provides legislative assistance, and carries out awareness-raising, education and training activities, such as workshops and seminars. WIPO also offers mediation and arbitration services in resolving disputes, including those that may arise in relation to the preservation of and access to archival materials. More information on WIPO's activities is presented in section 4, *infra*.

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¹⁰⁵ For more information about WIPO, see http://www.wipo.int/about-wipo/en/what_is_wipo.html. For a list of WIPO's Member States, see <http://www.wipo.int/members/en/>

¹⁰⁶ For many communities, TCEs, TK and associated genetic resources form part of a single integrated heritage. Yet, because TCEs raise some particular legal and policy questions in IP, they receive a distinct focus in many national and regional IP laws and in WIPO's work.



What is Intellectual Property?

IP refers to creations and innovations, i.e., the results of creative intellectual activity. Examples include inventions, designs, literary and artistic works, symbols, names, images, and performances.

IP regimes typically consist of laws that establish private property rights in order to grant control over access, use, misappropriation and exploitation, particularly commercial exploitation, and to provide incentives for further creativity.

Copyright, for example, protects the products of creativity, in the form of original works, against certain uses such as reproduction, adaptation, public performance, broadcasting and other forms of communication to the public. It can also provide “moral” protection against demeaning or degrading use of a work (an issue that is often of concern in relation to TCEs) and ensures that proper attribution is given when a work is used.

What are Traditional Cultural Expressions?

TCEs are any form in which traditional culture and knowledge are expressed, appear or are manifested.¹⁰⁷ Examples include tales, poetry, signs and symbols, songs, dances, plays, performances, rituals, drawings, paintings, jewelry, designs, handicrafts, musical instruments, architectural forms, and many others.

TCEs are the products of fluid creative intellectual activity. They are maintained, used or developed by a community or by individuals having the right or responsibility to do so in accordance with the customary law and practices of that community.

Handed down from one generation to another, they are characteristic of a community's heritage and reflect a community's history and values, as well as its cultural and social identity.

TCEs are both cultural and economic assets of the peoples and communities who are their creators, practitioners, and custodians. They are a precious resource, a viable income and help preserve a traditional lifestyle. They are, however, subject to misappropriation and misuse,¹⁰⁸ and calls for their protection have received attention at the international level.

What does it mean to “Protect” Traditional Cultural Expressions?

Clarity on what is meant by “protection” is primordial, because the needs and expectations of TCE holders and practitioners can in some cases be addressed more appropriately by measures for preservation and safeguarding rather than IP protection.

Preservation and Safeguarding

Notions of “preservation” and “safeguarding” generally refer to the identification, documentation, transmission, revitalization and promotion of cultural heritage in order to ensure its maintenance or viability.¹⁰⁹ The objective, in short, is to make sure that the TCEs do not disappear, become lost or degrade.

Intellectual Property Protection

Another form of protection is the application of laws to prevent unauthorized or inappropriate

¹⁰⁷ The economy has slowed down the Singapore opening, but the Gracenote projects, including mounting our cataloging, are moving full speed ahead. The catalog should be up and searchable in June 2010. Visit the website for updates: www.arcmusic.org

¹⁰⁸ For some examples of misappropriation, see the WIPO publication *Minding Culture: Case Studies on Intellectual Property and Traditional Cultural Expressions*, Study no1, available at <http://www.wipo.int/tk/en/studies/cultural/minding-culture/index.html>

¹⁰⁹ The preservation and safeguarding of cultural heritage and the promotion of cultural diversity are key objectives of several international conventions and programs as well as regional and national policies, practices and processes. UNESCO is the United Nations organization dealing most closely with these issues.

use of TCEs by third parties beyond the traditional circle. This form of protection focuses on the *use* of TCEs. This is the IP form of protection: recognition of the need to prevent misuses and misappropriations of TCEs e.g., their unauthorized copying, adaptation or use. WIPO's work is principally concerned with the "protection" of TCEs in the IP sense.

Within the IP framework, the protection of TCEs may help achieve many different objectives:

1. Economic and moral *control* over intangible creativity, to enable exploitation by TCE holders;
2. *Prevention* of inappropriate, unwanted use and commercialization by others (including use that falsely suggests a connection with a community, derogatory use, and use of sacred and secret TCEs);
3. *Remuneration* for third party uses; and
4. *Acknowledgement* of the source.

Although not able to provide "perfect" protection, the copyright system is particularly relevant. Indeed, contemporary adaptations or arrangements by current generations of old and pre-existing traditional materials can often be sufficiently original to qualify as protected copyright works. Moreover, related rights can provide protection for performances, recordings and contemporary interpretations of TCEs. In fact some countries already protect TCEs within their copyright law.¹¹⁰

Industrial property has also been used to protect TCEs — notably trademarks (such as collective marks), geographical indications, industrial designs, and the law of unfair competition. These regimes aim at the protection of established reputation, distinctiveness and goodwill, such as may be enjoyed by a traditional community in the production of handicrafts, artworks and other traditional products.

In a nutshell, existing IP systems may be useful for communities whose primary aims are to prevent the unauthorized use of their creative productions and to exploit their creative arts and contemporary adaptations of their TCEs in the marketplace.¹¹¹

However, IP laws, as they currently exist, are probably not sufficient to protect the underlying and pre-existing cultural heritage and traditional culture. WIPO's Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (the IGC) is currently looking into a *sui generis* protection mechanism for such pre-existing TCEs. The IGC's work is addressed in section 4, *infra*.

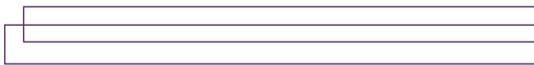
2. The issue: the intellectual property management of Traditional Cultural Expressions in archives

The collections of audiovisual and sound archives may include TCEs: invaluable records of ancient traditions and community histories that are integral to indigenous peoples' and traditional communities' identity and continuity. Preserving, granting access to, and permitting uses of these materials, although core functions of archives, may present a number of IP challenges. These challenges may arise with respect to conventional IP issues (principally copyright and related rights), but often go beyond and encompass questions of a more "ethical" nature.

In fact, indigenous and traditional communities have voiced concerns that the activities of TCE-holding cultural institutions sometimes do not take adequate account of their rights and interests. For instance, documenting and displaying a traditional song or a tribal symbol may make them vulnerable to misappropriation and misuse.

¹¹⁰ For example, the laws of Oman, Papua New Guinea, Tunisia and Ukraine, to name only a few. For a complete list (to the extent of our knowledge), see our compilation of laws and legislative measures at <http://www.wipo.int/tk/en/laws/folklore.html>.

¹¹¹ See generally, WIPO Consolidated Analysis of the Legal Protection of Traditional Cultural Expressions/Expressions of Folklore, Background Paper No. 1, available online at http://www.wipo.int/tk/en/publications/785e_tce_background.pdf.



An archive's mandate thus also comprises the preservation of the sensitivities and underlying rights of indigenous peoples and traditional communities. This may be tricky as the IP rights are often not owned by them.

Indeed, TCEs were often collected and documented by external researchers without obtaining the prior informed consent of the community. As a result, the IP rights related to these TCEs are often not owned by the community, but rather by the researchers who “made” the film, sound recording or photographs.¹¹² It is indeed the person documenting the TCE who gains copyright and/or related rights over the form in which it is recorded (e.g. a photograph, film or sound recording of a TCE).

As a consequence, the legal status of TCEs under IP law is often unclear. While they may be perceived as being in the public domain¹¹³ by conventional IP law, their documentation may give rise to new rights and thus provide them with some form of IP protection. For example, although a traditional song may be treated by IP law as in the public domain, recording that song creates new IP rights in the recording, which are held by the person making the recording, as mentioned above. IP may also vest in photographic and digitized images of collection items.

In reaction, indigenous peoples and traditional communities have a growing interest in being more directly involved in recording, presenting and representing their own cultures to the public at large.¹¹⁴ Today, they are asserting themselves not as the objects of study by others, but as legitimate right holders who should be actively in control of how they are represented.

Lastly, the TCEs in an archive's collections might contain sacred or confidential material and be subject to restricted use under customary laws. For these culturally significant TCEs, some uses allowed under IP regimes can be considered inappropriate by the community. Looking beyond IP may hence be necessary.

Digitization issues

Digital technologies and the Internet offer unprecedented opportunities for the promotion, preservation, revitalization, dissemination and protection of TCEs, thereby meeting the desire of communities to pass on their cultural heritage to succeeding generations. New technologies indeed offer a means to safeguard and restore TCEs, especially elements in danger of erosion and disappearance.

What is more, new IP rights are actually created in digital recordings, and by creating and exercising them, protection of TCEs can actually be enhanced. In the digital world, traditional music, designs and art can reach new audiences in niche markets for distinctive, diverse and “local” cultural goods and services, and, in so doing, promote economic and cultural development, and enhance cultural exchange.

However, the digitization, dissemination and circulation of TCEs can be in direct antithesis to the communities' perspectives about how access to their collections is to be provided. In some cases, safeguarding efforts through digitization have unwittingly led to the unauthorized disclosure or commercial exploitation of sensitive materials. In one particular case, in the 1990s, music from Ghana, Solomon Islands and African Pygmies was fused with techno-house dance rhythms. Large profits were made from sales of the record, with no returns

¹¹² See ANDERSON, Jane, Access and Control of Indigenous Knowledge in Libraries and Archives: Ownership and Future Use, (5-7 May 2007) (paper presented at the conference Correcting Course: Rebalancing Copyright for Libraries in the National and International Arena, Columbia University, New York, United States), available at http://correctingcourse.columbia.edu/paper_anderson.pdf (last visited 12 March, 2010).

¹¹³ See Archives and Museums: Balancing Protection and Preservation of Cultural Heritage, WIPO Magazine, September 2005, available online at http://www.wipo.int/wipo_magazine/en/2005/05/article_0010.html.

¹¹⁴ See HUDSON, Emily, Cultural Institutions, Law and Indigenous Knowledge: A Legal Primer on the Management of Australian Indigenous Collections, 2006, available at http://www.wipo.int/export/sites/www/tk/en/folklore/creative_heritage/docs/aiatsis_ipria.pdf (last visited 11 March 2010).

to traditional musicians and no attribution. The music producers had gotten access to the music from a cultural heritage archive where ethnomusicologists who had recorded the music had deposited the recordings.

Whether to use new technologies to participate in the information economy is tied to the overall cultural and economic goals of the communities themselves, which only they can decide upon. An archive should thus be wary when embarking on a digitization initiative.

3. Changing behaviors: a role for archives

In response to the abovementioned challenges, the role and function of cultural institutions such as audiovisual and sound archives are being re-evaluated, and the nature of their collections re-assessed. In particular, there is increasing awareness among communities, archives, and researchers that IP has to be managed appropriately and that this can form part of a deliberate strategy that works to enhance one's ethical and reputational success. Clarity and certainty on IP options could strengthen relationships between archives and communities.¹¹⁵

In order to better serve the interests of communities and suit the sensitive nature of TCEs, archives can turn into platforms for clarifying IP issues, focusing on changing modes of conduct through the development of best practices,¹¹⁶ such as IP-related protocols and policies relating to the safeguarding of, access to, ownership of and control over TCEs. While they differ from legal obligations, good practices can identify appropriate ways of using TCEs and of interacting with source communities.¹¹⁷ Such practical tools can encourage ethical conduct and collaborations based on good faith and mutual respect, thereby promoting creativity, community development, archival services, and scientific and educational opportunities.

4. WIPO's program and activities

The Creative Heritage Project

Transformations in the world of archives, as well as libraries and museums, have prompted the establishment of WIPO's Creative Heritage Project,¹¹⁸ which weaves links between the protection of TCEs and the important educational and social role of cultural institutions in general.

The Project is developing resources for the strategic management of IP rights and interests by collecting institutions, in particular, when recording, documenting, digitizing and disseminating TCEs. These aim to assist communities and cultural institutions to manage IP options so as to both preserve and protect TCEs.

Examples of such resources include, among others, surveys on practical experiences with IP in the archival practices of institutions and of indigenous and local communities;¹¹⁹ a searchable

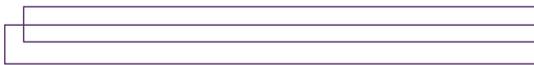
¹¹⁵ See WENDLAND, Wend, "Managing Intellectual Property Options when Documenting, Recording and Digitizing Intangible Cultural Heritage", in *Intangible Cultural Heritage and Intellectual Property—Communities, Cultural Diversity and Sustainable Development*, KONO, Toshiyuki, ed., Intersentia, 2009.

¹¹⁶ See WENDLAND, Wend, *Libraries, Intellectual Property and Traditional Cultural Expressions: Balancing Access and Control*, Keynote Address, American Library Association Conference on "Cultural Heritage and Living Culture: Defining the U.S. Library Position on Access and Protection of Traditional Cultural Expressions", Washington, D.C., November 12-14, 2008, <http://wo.ala.org/tce/wp-content/uploads/2008/10/wendland-keynote-american-library-association-final-nov-12-08.pdf>. See also ANDERSON, note 8.

¹¹⁷ See Australia Council for the Arts, *Performing Cultures: Protocols for Producing Indigenous Australian Performing Arts*, 2002, available at http://www.wipo.int/export/sites/www/tk/en/folklore/creative_heritage/docs/performing_cultures.pdf

¹¹⁸ WIPO, under the Creative Heritage Project, aims to assist communities and cultural institutions in managing IP options so as to both preserve cultural heritage and protect it against misappropriation and misuse. For more information about the Creative Heritage Project, please visit: <http://www.wipo.int/tk/en/folklore/culturalheritage/>.

¹¹⁹ Surveys have been conducted in North America, the South Pacific, Bulgaria, India and France. These surveys are available at <http://www.wipo.int/tk/en/folklore/culturalheritage/surveys.html>. Surveys conducted in Brazil and Argentina will be made available soon.



database of codes, policies and practices;¹²⁰ and a forthcoming publication on IP management for museums, archives and libraries.¹²¹ The publication identifies the IP questions that pertain to the management of access, ownership and control over collections comprising TCEs.

Archives interested in devising IP-related strategies in support of their safeguarding and educational uses could benefit from these resources. These could indeed assist in making decisions that balance the “public interest” goals of the institution alongside those of the relevant traditional custodians who also hold legitimate perspectives with respect to the collections.

It should be noted however, that it is not the aim of the Project to establish norms or guidelines which would constrain institutions in how they deal with these issues. The Project acts as a source of ideas and options for institutions that may have less experience in this complex and evolving area.

The Project is also offering training in documentation, recording and digitization of intangible cultural heritage for indigenous and local communities and staff of cultural institutions in developing countries.¹²² This WIPO program is carried out in partnership with the American Folklife Center/Library of Congress and the Center for Documentary Studies, in the United States of America. It provides training in documentary techniques and archival skills necessary for effective community-based cultural conservation, as well as IP training and a basic kit of audiovisual equipment provided by WIPO. A pilot project has been concluded with success with the Maasai community in Kenya.

The Intergovernmental Committee

The Creative Heritage Project is a practical complement to the negotiations on IP norms for the protection of TCEs taking place in several countries and internationally at the WIPO IGC.¹²³

The IGC is currently negotiating Draft Provisions¹²⁴ for the *sui generis* protection of TK and TCEs. These Draft Provisions draw upon a range of community, national and regional experiences, and have been developed over several years by and in consultation with Member States, indigenous peoples and traditional communities, civil society organizations and a range of other interested stakeholders.

The Draft Provisions illustrate some of the perspectives that are guiding work in this area, and suggest possible frameworks for the protection of TCEs against misappropriation and misuse. They are already being used as points of reference in a range of national, regional and international policy discussions and standard-setting processes.

In particular, they seek to respond to the needs of safeguarding and the specific IP aspects of registering and documenting TCEs. For example, one provision concerns the effect to which the measures for the protection of TCEs would not apply to the making of recordings and other reproductions of TCEs for purposes of their inclusion in an archive or inventory for non-commercial cultural heritage safeguarding purposes.¹²⁵

¹²⁰ The database may be accessed at http://www.wipo.int/tk/en/folklore/creative_heritage/index.html. One example of an initiative documented on the WIPO website is the Mukurtu Wumpurrarni-kari Archive in Australia. This archive was established by the Warumungu community to house photos, digital video clips, audio files and digital reproductions of cultural artifacts and documents. Access to the digital archive is defined by access parameters based on a set of Warumungu cultural protocols for the viewing and distribution of cultural knowledge. For more information about the archive, see <http://www.mukurtuarchive.org/> (last accessed 9 April, 2010).

¹²¹ The publication is expected to be published in mid 2010.

¹²² For more information about the training program, see <http://www.wipo.int/tk/en/folklore/culturalheritage/community-cult.html>

¹²³ For more information about the IGC, see: <http://www.wipo.int/tk/en/igc/>

¹²⁴ See Draft Provisions supra note 3

¹²⁵ See Draft Provisions, Article 5(a)(iii).

5. Conclusion

Archives lie at the junction between source communities and the public. They emerge as pivotal spaces within which fundamental questions about access, control, ownership and authorship in TCEs can be examined, negotiated and rebalanced. Archives may thus be in a position to play a key mediatory role in protecting TCEs, while also making it possible for people to use, re-use and re-create cultural heritage, which are all vital to its survival.¹²⁶

However, IP issues, which inevitably arise, require consideration and management. In this respect, guiding practices need to strike balances among the interests of creators, communities, cultural institutions and the public at large. They also need to take into account the role, contours and boundaries of the public domain. Such IP-related protocols, codes of conduct and guidelines could afterwards perhaps serve as a basis for informing wider policy debates and contribute to building international normative consensus on the protection of TCEs.¹²⁷ A WIPO forthcoming publication entitled “Intellectual Property and the Safeguarding of Traditional Cultures: Legal Issues and Practical Options for Museums, Libraries and Archives” will certainly be of use to all those at grips with such issues.

¹²⁶ See ANDERSON, *supra* note 8.

¹²⁷ See WIPO Consolidated Analysis, *supra* note 7.

The VIDI-Video semantic video search engine

Marco Bertini, Università di Firenze, Italy, Marco Rendina, Fondazione Rinascimento Digitale, Italy¹²⁸

Introduction

Video is becoming vital to society and economy. It plays a key role in information distribution and access, and it is also becoming the natural form of communication on the Internet and via mobile devices. The massive increase in digital audiovisual information will pose high demands on advanced storage and retrieval engines, and it is certain that consumers and professionals will need advanced storage and search technologies for the management of large-scale video assets.

Current search engines, however, mostly rely on keyword-based access that uses manually annotated metadata, and do not allow for content-based search of images or videos. At present, even state-of-the-art video search engines are able to annotate automatically only a limited set of semantic concepts, and retrieval is usually allowed using only a keyword-based approach based on a lexicon.

The VIDI-Video project, funded in the 6th Framework Program by the EU, has taken on the challenge of creating substantially enhanced semantic access to video. The project has aimed to integrate and develop state-of-the-art components from many technologies — such as machine learning, audio event detection, video processing, visual feature processing, knowledge modeling and management, interaction and visualization — into a fully implemented audiovisual search engine, combining large numbers of audiovisual concepts and exploiting the interclass similarities of these concepts, as well as using information from different sources: metadata, keyword annotations, audiovisual data, speech, and explicit knowledge.

The international consortium that has worked on the project presents excellent expertise and resources in all these technologies:

- the machine learning with active 1-class classifiers, to minimize the need for annotated examples, was lead by the University of Surrey (UK)
- video stream processing was lead by CERTH (Greece)
- audio event detection was lead by INESC-ID (Portugal)
- visual image processing was lead by the University of Amsterdam (Netherlands)
- interaction and knowledge management was lead by the University of Florence (Italy)
- software consolidation was lead by CVC (Spain)
- provision of data, and evaluation and dissemination was lead by Beeld & Geluid (Netherlands), and FRD (Italy), as application stakeholders.

VIDI-Video has boosted the performance of audiovisual searching by forming a thesaurus of more than 1,000 detectors for the corresponding semantic concepts in the audio, video or combined streams of data. This large thesaurus of detectors can be viewed as the core of a dictionary for video. The elements in such a thesaurus, individually or in combination, provide a semantic understanding of the audiovisual content. In order to reach this goal of semantic understanding, VIDI-Video has improved the state-of-the-art on machine learning techniques, visual and audio analysis techniques and interactive search methods.

The approach followed has been to let the system learn many, mostly weak, semantic detectors instead of modeling a few of them carefully. These detectors describe different aspects of the video content. In combination they create a rich basis for interactive access to the video library. The VIDI-Video system has achieved the highest performance in the

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most important object and concept recognition international contests (PASCAL VOC and TRECVID).

The outcome of the project is an audiovisual search engine, consisting of two parts: an automatic annotation part, that runs off-line and processes the videos, computing the audiovisual features, that then are fed to automatic classifiers that create the annotations. In this part there are components for video processing, visual analysis, audio analysis, and learning integrated feature detectors. The automatic annotation part of the system performs audio and video segmentation, speech recognition, speaker clustering and semantic concepts detection. And it can be further expanded, increasing the number of automatic concept detectors, training the system with positive and negative examples of audiovisual concepts.

The second part is the interactive part of the system, and it provides a video search engine for both technical and non-technical users. The interfaces can be run as standalone applications or as web-based search engines that exploit technologies such as ontologies, developed for the semantic web. The system also uses different interfaces to allow different query modalities: free-text, natural language, graphical composition of concepts using Boolean and temporal relations, and query by visual example.

In addition, the ontology structure is exploited to encode semantic relations between concepts, permitting, for example, expanding queries to synonyms and concept specializations.

All subsystems are delivered and available both as standalone and integrated into the complete annotation systems (Figure 1). The modularity and, at the same time, the standalone status of each system warrants developmental independence, and an efficient exploitation.

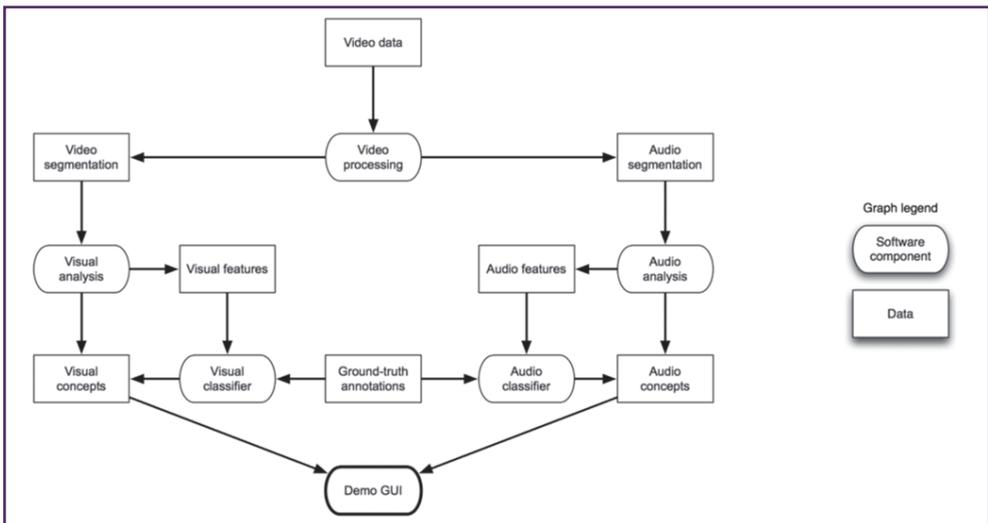


Figure 1. Overview of the system.

The search engine has been evaluated on news broadcast search, video surveillance data, and cultural heritage documentaries repositories. Field trials performed by professional archivists and media professionals have been conducted to evaluate the usability of the system.

The automatic annotation engine

The first step for the automatic annotation engine of VID-Video is the video shot segmentation. In this process the video shots are automatically detected, in order to extract key-frames that are then processed to extract the visual features used for concept detection. The shots are then automatically regrouped to create scenes that can be used for video skimming and summarization. The overall process is shown Figure 2.

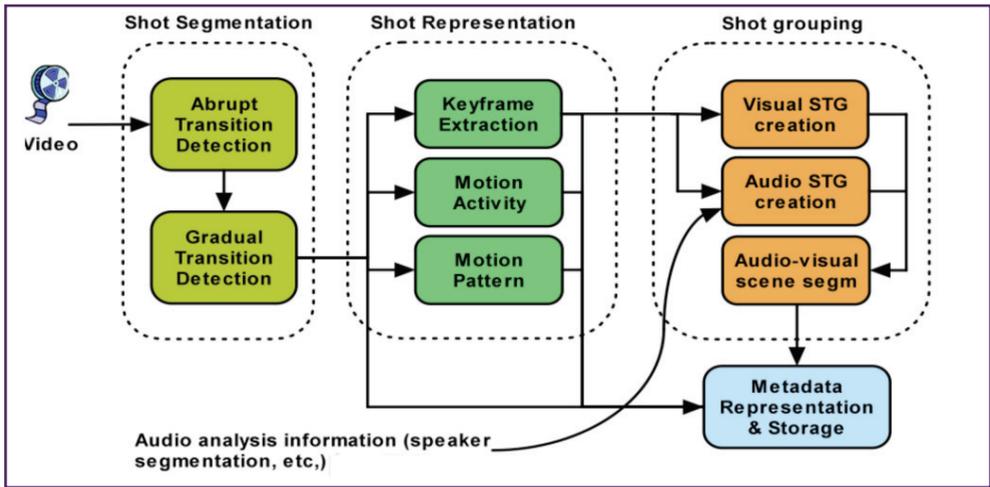


Figure 2. Video shot and scene detection process.

While the detection of abrupt transition, such as *cuts*, is relatively easy, the detection of the gradual transitions (*fades*, *cross dissolves*, etc.) is more complex and may be missed. Within VID-Video, a new gradual transition detection algorithm has been developed that uses novel individual criteria that exhibit less sensitivity to local or global motion. The algorithm combines criteria related to changes of color coherence and histograms, as well as luminance (and their multi-scale extensions) using a machine learning technique.

Apart from the advantage of a significantly improved performance, with respect to state-of-the-art, the method does not need any threshold selection, and thus can be applied without requiring users to tune it to their own video collection.

In addition, the creation of video summaries has been improved, fusing both audio and visual information.

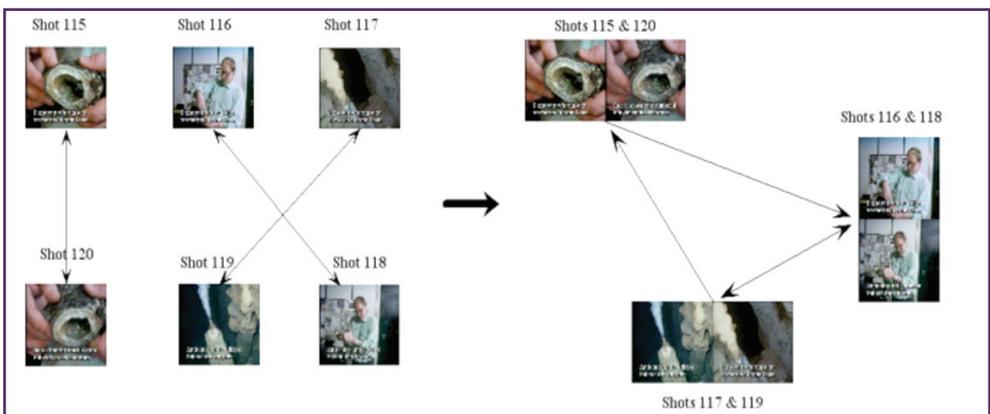


Figure 3. Example of creation of a video summary

The audio analysis component of VIDI-Video (Figure 4) is particularly sophisticated. Apart from the more “traditional” analysis — like automatic speech recognition (implemented for the English language), language identification (the project dealt with videos in different languages, so that it was useful to be able to classify Italian speech from Dutch speech) and topic classification (i.e. understanding the broad argument of a spoken discourse) — the project features a large number of audio event detectors. These detectors recognize audio events related to animals, human activities and tools. Analysis of the presence of human voices is used to infer the presence of dialogues, monologues, etc.

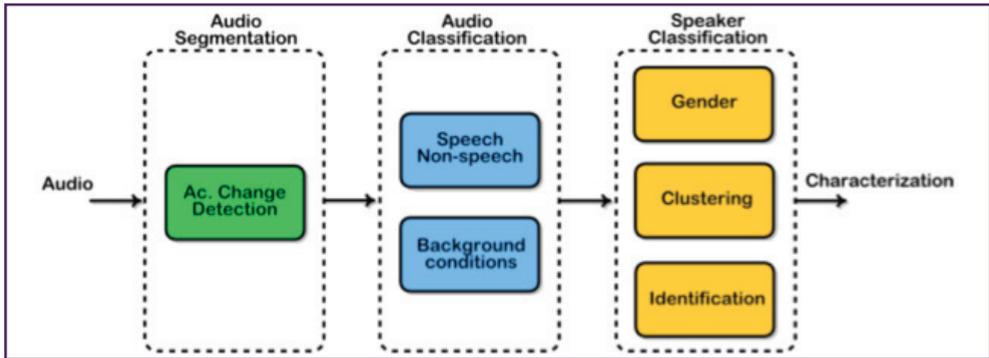


Figure 4. Audio analysis in VIDI-Video

Regarding machine learning techniques, the project has dealt with the development of techniques for learning elements of the thesaurus by combining multimodal features.

Among the main problems that had to be solved we can cite the different modalities and similarity measures, the high computation time and the fact that the training data had highly unbalanced concepts, where some concepts were very rare and others very common.

The solutions developed in VIDI-Video features methods for the fusion of different modalities and information channels, such as audio and visual data, and the development of methods to learn concepts represented by highly unbalanced data sets. Finally, the system is able to learn a large dictionary, such as the 1,000 detector thesaurus, that was the goal of the project. This latter characteristic is extremely important: learning all the independent binary classifiers (i.e. the tools used to recognize if an audiovisual concept is present in a video shot) may become computationally expensive.

At present the VIDI-Video tools are between 5 and 20 times faster than state-of-the-art methods. This has allowed for the increase of the training of the automatic concept detectors, obtaining the best performance in the International competition for visual concept detection PASCALVOC. The VIDI-Video project has also reached the highest ranking in the TRECVID video retrieval international competition in 2009, thanks to the state-of-the-art visual analysis techniques. A combination of visual content descriptors have been developed, that accounts for both color and luminance information, and that are robust with respect to video framing, lighting, various image distortions, scaling, etc. (Figure 5).

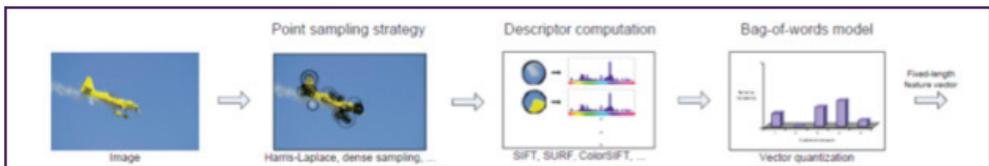


Figure 5. Visual feature extraction

Since this processing is computationally very expensive, a thorough analysis of the bottlenecks has been conducted and a GPU implementation that speeds the whole process by 17 times has been created.

The search engine

Two search engines that aim both at technical and non-technical users have been developed. One has been created as a standalone application, and has been designed for end users that require a fast retrieval process, as it is typical in the media asset management process of a news broadcaster.

The interface allows different query options:

- i. query by free text,
- ii. query by selecting predicates from a list (according to the annotations stored in the system).

The system also has different visual presentations of query results (Figure 6).

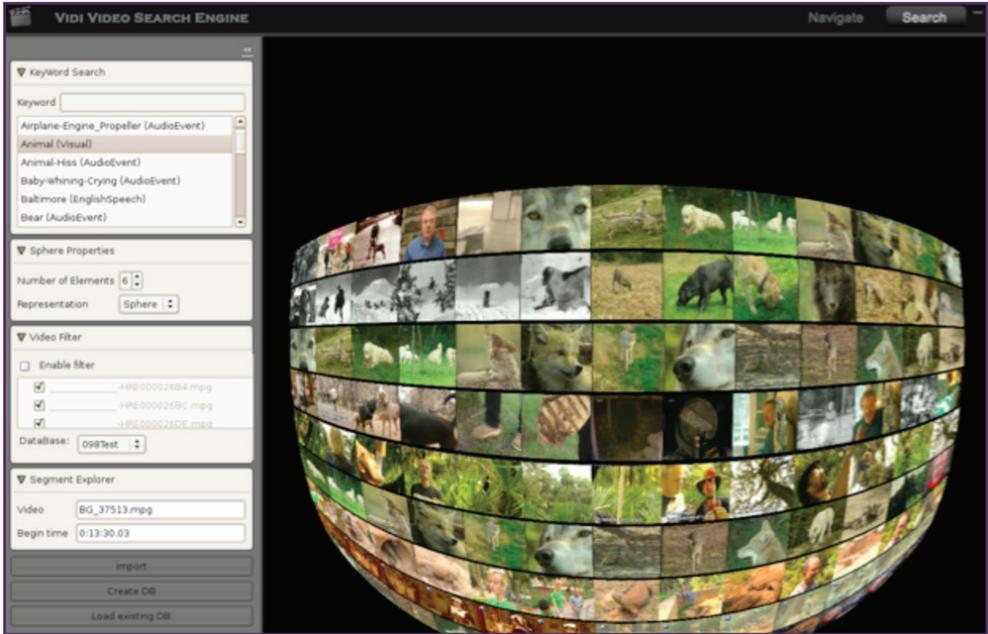


Figure 6. Screenshot of the standalone search engine

The second interface is a web video search engine that allows semantic retrieval by content for different domains (broadcast news, surveillance, cultural heritage documentaries) with query interaction and visualization.

The system permits different query modalities (free text, natural language, graphical composition of concepts using Boolean and temporal relations and query by visual example) and visualizations, resulting in an advanced tool for retrieval and exploration of video archives for both technical and non-technical users. In addition the use of ontologies permits the exploitation of semantic relations between concepts through reasoning. Finally, this web system, using the Rich Internet Application paradigm (RIA), does not require any installation and provides a responsive user interface.

This system is composed of three different interfaces: a GUI to build composite queries that may include Boolean/temporal operators and visual examples; a natural language interface for simpler queries with Boolean/temporal operators; and a free-text interface for Google-like searches. In all the interfaces it is possible to extend queries adding synonyms and concept specializations through ontology reasoning and the use of WordNet. Let's consider, for instance, a query "Find shots with animal": the concept specializations expansion through ontology structure permits the retrieval not only of shots annotated with *animal*, but also those annotated with its specializations (*dogs*, *cats*, etc.). In particular, WordNet query expansion, using synonyms, is required when using natural language and free-text queries, since it is not possible to force the user to formulate a query selecting terms from a lexicon, as it is done using the GUI interface.

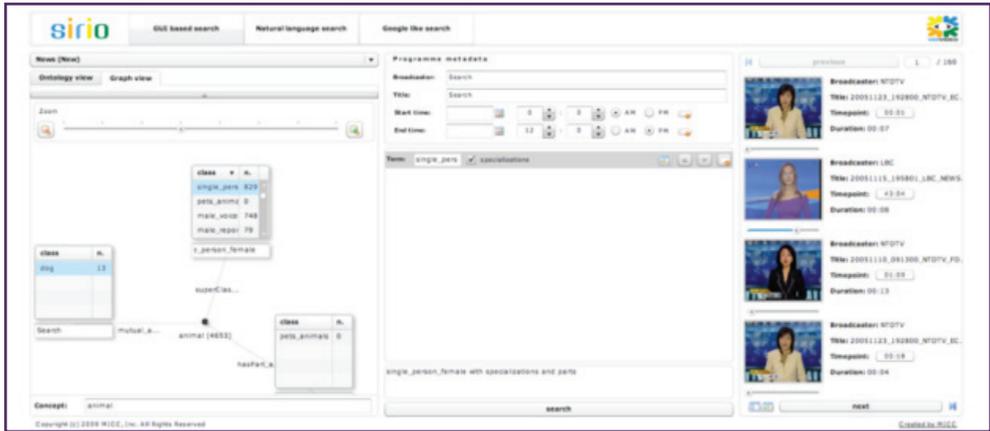


Figure 7. Screenshot of the search engine with a view of part of the ontology

The search engine uses an ontology that has been created automatically from a flat lexicon, using WordNet to create concept relations (*is_a*, *is_part_of* and *has_part*). Concepts, concepts relations, video annotations and visual concept prototypes are defined using the standard Web Ontology Language (OWL) so that the ontology can be easily reused and shared. Queries created in each interface are translated by the search engine into SPARQL, the W3C standard ontology query language.

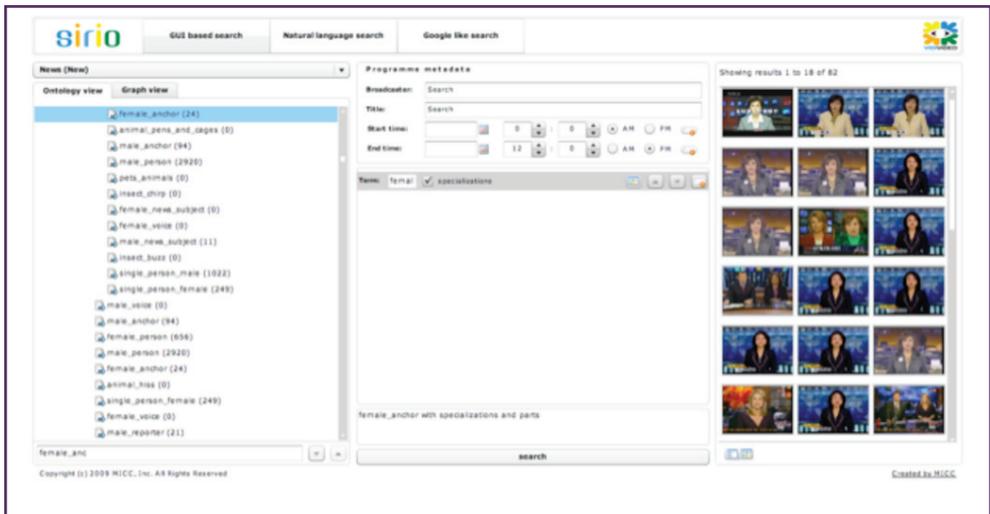


Figure 8. Screenshot of the search engine with a set of results related to the query “female anchor”

The system is based on the Rich Internet Application paradigm, using a client side Flash virtual machine, which can execute instructions on the client computer. RIAs can avoid the usual slow and synchronous loop for user interactions, typical of web-based environments that use only HTML widgets available to standard browsers. This allows for the implementation of a visual querying mechanism that exhibits a look and feel similar to the one of a desktop environment, with the fast response that is expected by users. With this solution, application installation is not required, since the system is updated on the server and can run anywhere regardless of what operating system is used.

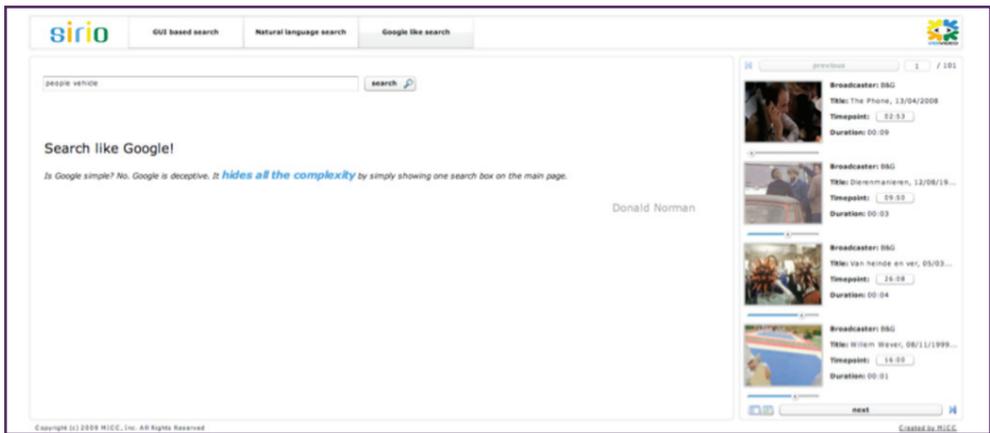


Figure 9. Screenshot of the Google-like query system: just a textbox and a button

The system backend is currently based on open source tools (i.e. Apache Tomcat and Red 5 video streaming server) or freely available commercial tools (Adobe Media Server has a free developer edition). The RTMP video streaming protocol is used.

The search engine has been developed in Java, and supports multiple ontologies and ontology reasoning services. The search results are in RSS 2.0 XML format with paging, so that they can be treated as RSS feeds.

Results of the query are shown in the interface, and the first frame of each video clip of the result set is shown. These frames are obtained from the video streaming server, and are shown within a small video player. Users can then play the video sequence and, if interested, zoom in on each result, displaying it in a larger player that provides more detail on the video metadata and allows better video browsing.

The user interface is written in Adobe Flex and Action Script 3. The GUI interface allows for the building of composite queries that also take metadata into account, as required by professional archivists; the natural language interface allows simple queries to be built with Boolean and temporal relations between concepts; the free-text interface provides the popular Google-like search.

All the modules of the system are connected using HTTP POST, XML and SOAP web services.

The web-based search engine has been tested in a series of field trials conducted by a group of 14 people coming from the broadcasting and media industry and cultural heritage institutions, in Italy (FRD) and in the Netherlands (B&G). The evaluation tests have been carried out in reference to ISO 9241, an industry standard guide on usability.

The overall experience was very positive and the system proved to be easy to use, despite the objective difficulty of interacting with a complex system, for which the users received only a very limited training.

Further information

Within the development of the VIDi-Video project the members of the consortium have produced a large number of scientific papers that describe the main advancements that have been developed. The consortium has also prepared a showcase demo, with videos showing the main functionalities of the system. All this information, as well as contact information, is available on the project web site: <http://www.vidivideo.eu>.

Digitisation of Research Sound Collections: Practical Application of IASA Guidelines in Small-Scale Digitisation Projects

Nadja Wallaszkovits, Vienna Phonogrammarchiv, Austrian Academy of Sciences

Paper presented at the IASA Conference 2008, Sydney, Australia

Introduction

Over the past 50 years research institutions in Eastern European countries have accumulated significant collections of linguistic, ethnomusicological and folkloristic audio material. These holdings represent unique sound and audiovisual documents of remarkable cultural value and will only survive if transferred into the digital domain in the mid-term. The Vienna Phonogrammarchiv has been involved in several such digitisation projects of research holdings, which have partly been funded from outside.

One of the starting points for the Phonogrammarchiv's engagement was the political change around 1990 in former Eastern Bloc states. Since the 1950s, research traditions in these countries had produced, as compared to research institutions in the West, an unusual amount of mainly audio documents in the fields of linguistics, ethnomusicology and cultural anthropology at large. The political changes were accompanied by severe changes in the administration and funding of heritage and research institutions, which partly put these collections at serious risk. In order to explore the situation, audiovisual archives have been systematically contacted and visited between 1992 and 1995.¹²⁹ An actual overview of the situation of audiovisual research collections and their preservation status can be found in the report published in the framework of TAPE (Training for Audiovisual Preservation in Europe) (Schüller, 2008). These contacts initiated a number of smaller and more substantial contacts, of which several ultimately lead to digitisation projects.

The collections supported by the Phonogrammarchiv concerning strategic planning and practical implementation of digitisation include the Institutul de Etnografie si Folklor "Constantin Brăiloiu" of the Rumanian Academy of Sciences, Bucharest (Rumania),¹³⁰ the Institute for Cultural Anthropology and Art Studies (formerly Institute for Folk Culture) of the Albanian Academy of Sciences, Tirana (Albania)¹³¹ and the Phonogrammarchiv St. Petersburg, Pushkinsky Dom, (Russia).¹³² In 2007 the Phonogrammarchiv of the Austrian Academy of Sciences was the UNESCO Jikji Prize winner. In the application for the prize, it had been stated that the prize money (donated by Cheongju City) would be used to contribute to safeguarding an audiovisual collection, preferably from a country with a developing economy. In the same year the José Maceda Collection of the University of the Philippines was inscribed by UNESCO on the International Register of the Memory of the World Programme. Familiar with the collection and its precarious situation from previous contacts, the Phonogrammarchiv thus decided to spend the prize money on the digitisation of this important corpus of ethnomusicological recordings.¹³³

Recent supporting projects of the Phonogrammarchiv include the digitisation of the sound archive collection of the National Archives and Library of Ethiopia, to be financed by UNESCO.

Similarities and common problems

In many cases the collections have been created by researchers privately or in cooperation with an institution, and have been held and stored outside audiovisual archives proper. At some point such documents were incorporated into the archival holdings of research

¹²⁹ This survey has been funded by the Austrian Ministry of Science and Research.

¹³⁰ Financed within the EU-funded project "ethnoArc". (2006-2008)

¹³¹ Financed by the Austrian Development Agency (ADA) 2005-2009.

¹³² Financed by two INTAS Projects and most recently by the Endangered Archives Program of the British Library

¹³³ For further information see http://www.phonogrammarchiv.at/wwwnew/jose_maceda_coll_e.htm and http://portal.unesco.org/ci/en/ev.php-URL_ID=16050&URL_DO=DO_TOPIC&URL_SECTION=201.html

institutes or other related archives. To date, a bundle of problems created by this situation have been identified:

- Usually the keeping institution is not an A/V archive in a narrow sense and therefore suffers from a lack of modern professional replay facilities and A/V media knowledge. In addition, such institutions suffer staff shortage, inadequate funds and sometimes management problems (such as awareness about the vulnerability of A/V media, mistrust of cooperation with other institutions with similar problems, etc.), as well as the lack of expertise and financial means to keep the analogue originals and subsequently the digital data alive.
- Typically these collections are “mixed media” holdings. The great diversity of archival holdings is on the one hand caused by such incorporations of external collections as described above, but sometimes also by a lack, or a change, of collection policy.
- In the majority of cases the holdings have been created with consumer equipment, often with multiple previous owners. The collections have been recorded and stored under irregular and/or irreproducible conditions. This generates a wide range of associated challenges concerning transfer and digitisation planning: usually the lack of (technical, but also other, e.g. content related) documentation (including information about recording formats and parameters, like speed, trackwidth, etc.) makes it difficult to accurately estimate the quantity of the holdings and time and expenses needed for digitisation. This easily results in miscalculation of digitisation efforts and costs. Format obsolescence is an additional problem, especially if proprietary (consumer) technology has been used for recording. The preservation status of the holdings can be critical and thus the time factor for transferring the collection can vary greatly.

Summarising all these factors, the collections are of unique contents, containing mostly field recordings which are incorporated in a research environment. The heterogeneous structure and the possibly critical preservation status usually require an individual manual transfer and adequate scientific documentation, but infrastructure, expertise and financial means are lacking. The challenge is to implement a manual high quality transfer at low cost and with high reliability, incorporating infrastructure and technical skills.

Preconditions

Such projects need a number of basic decisions to be made, so a detailed knowledge of the general situation of the institution and the collections to be digitised is necessary.

Basic requirements that make an individual in-house transfer effective are:

- A minimum size of the collection

If the collection is too small, cost efficiency is not given. In this case it is recommended to seek cooperation with institutions in similar situations. In practice it is problematic to accomplish such a joint venture due to lack of strong interregional management, mistrust and internal competitiveness. As an alternative, outsourcing could be a solution. Unfortunately it is problematic to find an adequate and trustworthy service provider at moderate cost, especially if the collection is not to be shipped across the globe. From our experience a point of intersection is given at a minimum number of about 2000 hours of audio material to be digitised.

- Expected increase of the collection

If the size of the collection is very small, but steady increase is to be expected, the setup of an in-house infrastructure is reasonable. The implementation of a center of A/V competence can be a big advantage for other institutions and also a financial benefit for the institution running the facilities.

- Not too many different (multimedia) formats to cover

If the formats vary extremely (e.g. very small quantities of a lot of different and/or obsolete media), setting up an in-house infrastructure will be very expensive and therefore not very effective. In this case, outsourcing should be considered e.g. parts of the collection for digitisation, keeping in mind the associated problems, as mentioned above. In practice a mixed strategy could be considered, if necessary.

Combined with the fact that educated (scientific and/or technical) staff with knowledge of the collection should be available, and cooperation with local IT specialists is possible, these requirements make an individual small scale in-house transfer cost-effective and possible to implement successfully.

Assessment and appraisal of the collection and infrastructure

The first step in starting such a digitisation project is an assessment of the collection with the aim to gain as much information as possible about the overall preservation status, the size in terms of playing time and technical parameters required for calculation of replay equipment. It is a fact that the more information about the collection that is available, the better the calculation of needs can be carried out.

One possibility of gathering information about the situation of the individual collection is to send out a questionnaire to the owning institution to cover the important main topics such as the amount of holdings listed by type of carriers, information about storage areas, analogue and digital infrastructure, IT implementation, metadata infrastructure, and so on.

A12								
LIBRARY #	RB	MATERIAL	THICKNESS MIL	SIDE	HEAD IN (HI) / TAIL OUT (TO)	SPEED	GOOD / BAD	CONDITION
IL1 69 / SCB1	5	POLYESTER	1.5	A&B		7 ½		START OF MUSIC WAS CUT
IL2 70	3	ACETATE	1.0	(L)MONO		3 ¾		CURLED
IL3 70	3	ACETATE	1.0	(L)MONO		3 ¾		CURLED
IL4 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL5 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL6 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL7 71	5	POLYESTER	1.6	(L)MONO		3 ¾	✓	
IL8 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL9 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL10 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL11 71	5	POLYESTER	1.5	A&B		1 ½	✓	
IL12 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL13 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL14 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL15 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL16 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL17 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL18 71	5	POLYESTER	1.5	A&B		A 3¼ B 1¾	✓	
IL19 71	5	POLYESTER	1.5	A&B		A 1¼ B 3¾	✓	
IL20 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL21 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL23 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL24 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL25 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL26 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL27 71	5	POLYESTER	1.5	A&B		1 ¾	✓	
IL28 71	5	POLYESTER	1.5	MONO		A 1¼ B 3¾	✓	
IL29 71	5	POLYESTER	1.5	A&B		A 1¼ B 3¾	✓	
IL30 71	5	POLYESTER	1.5	MONO		1 ¾	✓	
IL31 71	5	POLYESTER	1.5	A&B		3 ¾	✓	
IL32 71	5	POLYESTER	1.5	A&B		3 ¾	✓	

Figure 1. Result of the questionnaire, José Maceda Collection of the University of the Philippines

IASA offers a special publication to examine the issues underlying the process of setting priorities for the digital transfer of analogue and digital audio content, and to deliver a

statement of principles for use by sound archives in their planning for digitisation. This is the “Task Force to establish Selection Criteria of Analogue and Digital Audio Contents for Transfer to Data Formats for Preservation Purposes” (IASA, 2004).

A very helpful tool, especially for estimating the overall preservation status of individual collections, has been developed by the Indiana University Digital Library Program within the Project Sound Directions. The FACET (Field Audio Collection Evaluation Tool) can be downloaded from the website <http://www.dlib.indiana.edu/projects/sounddirections/facet/downloads.shtml>. Furthermore, this institution provides a very useful reader for best practices on audiovisual archiving, focusing on the individual transfer of heritage material (Casey and Gordon, 2007).¹³⁴

Other possibly helpful tools for such an assessment have been developed within the project PrestoSpace (the preservation, storage and cost calculators, see <http://prestospace-sam.ssl.co.uk/analysis/>). Although basically designed to meet large scale approaches, these tools can be used in small scale approaches, too.

To gain a more detailed impression of the general status of the collection, it is advisable to take random samples from the collection and to have a more detailed analysis of the preservation status and recording parameters.

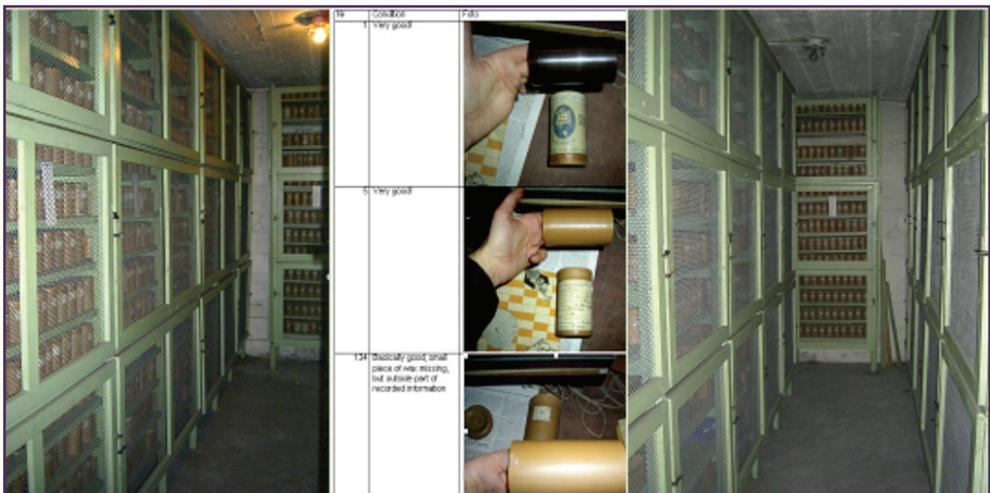


Figure 2. Assessment of the cylinder collection of the Institutul de Etnografie si Folklor “Constantin Brăiloiu” of the Rumanian Academy of Sciences, Bucharest (Rumania)

Additionally it is useful to make an assessment of the equipment that has been used for recording the original tapes. Although in many cases it is not possible to get information about all machines, it can still be helpful to find out details about track formats, speeds and other, maybe irregular, parameters to expect within a collection. This helps to avoid miscalculation concerning playing time and equipment needs. In a further step, the available equipment (including the IT infrastructure) should be evaluated for usefulness in the digitisation and documentation process.

The storage area and building constructions should also be assessed to calculate the measures needed for optimising long-term storage. Sometimes even minor equipment acquisition, like the purchase of a hygrometer and a dehumidifier, can significantly improve long-term storage conditions.

¹³⁴ see http://www.dlib.indiana.edu/projects/sounddirections/papersPresent/sd_bp_07.pdf

An assessment of the existing metadata structure is also useful and will help in calculating costs for database implementation.



Figure 3. Assessment of the metadata structure and of the original recording equipment of the collection of the Institutul de Etnografie si Folklor “Constantin Brăiloiu”, Rumanian Academy of Sciences, Bucharest (Rumania)

Developing a preservation plan

Next, a preservation plan has to be developed, proposing a prioritised sequence of actions based on different urgencies for different parts of the collection. In such a preservation plan the focus is on the most endangered medium with the highest scientific value and the most frequent access, balancing these factors carefully. The preservation plan should include calculations for optimising storage conditions, digital transfer and the definition of equipment needed. This plan should represent a profound basis for designing a business plan of investment.

A setup of infrastructure should include calculations and specifications for:

- Analogue replay equipment
- A/D Converter
- Maintenance equipment and spare parts
- Digitisation workstations
- Access stations
- Server
- Database
- Additional needs and infrastructure
- Running costs to keep digital data alive.

The preservation plan developed in our projects is based on a concept for a small scale approach to digital storage and follows the specifications and recommendations of IASA-TC 03: “*The Safeguarding of the Audio Heritage: Ethics, Principles and Preservation Strategy*”, Version 3, December 2005,¹³⁵ and IASA TC04 “*Guidelines on the Production and Preservation of Digital Audio Objects*”, Second Edition, 2009.¹³⁶

The simplest and smallest concept is a single operator input and access station, where the archival files and the access copies are created. The digital audio workstation (DAW) has a desktop RAID array attached. The contents of the RAID have to be regularly, and with at least two copies, backed up to data tapes (e.g. LTO). The data tapes are manually loaded for storage on traditional shelving, with increased attention to minimising the presence of dust and other

¹³⁵ Download from http://www.iasa-web.org/downloads/publications/TC03_English.pdf

¹³⁶ See http://www.iasa-web.org/special_publications.asp

particulates and pollutants. As disc storage has become constantly cheaper during recent years, parallel copies on (externally stored) hard discs optimises data security. This concept is a comparatively easy, reliable and applicable solution. This setup requires a well structured plan for digitisation, as well as careful management of copy location information and version information, which is done semi-manually.

Access to the material can be managed traditionally, via copies on access media (like CDR or DVDR), or via browsing copies (e.g. in MP3 format) that are accessible from the workstation via a user account. Ideally, access is separated from the ingest station, so this approach is only applicable in very small institutions, following a restrictive user policy. Online access is not included, as this requires additional functionality.

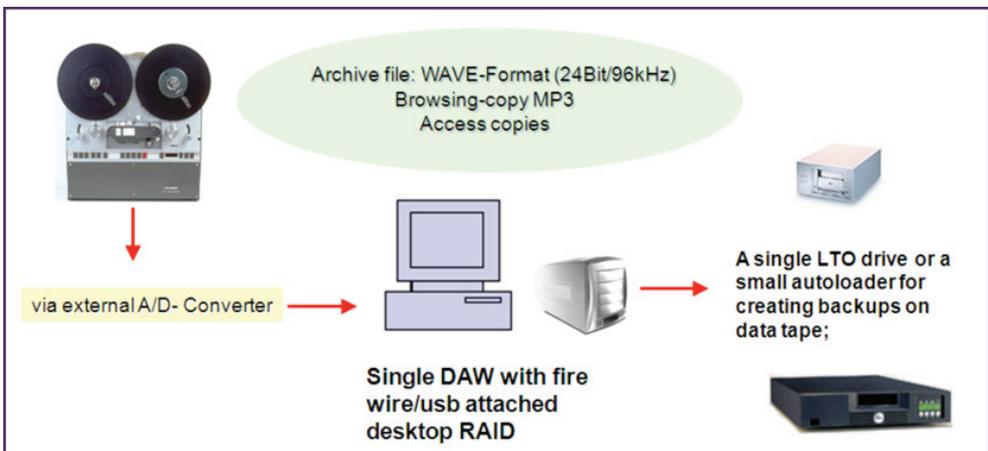


Figure 4. Simple concept for a small scale approach to audio digitisation

The system can be expanded to a small scale network for two or more ingest stations, also of different media (e.g. cassettes, DAT, etc.) and one or more users, on the basis of a Network Attached Storage (NAS) system with a capacity between ~ 0.5 to 20 terabyte (TB) of disk storage. Combined with an LTO autoloader this is already a midrange solution but certainly needs a higher level of administration to work properly.

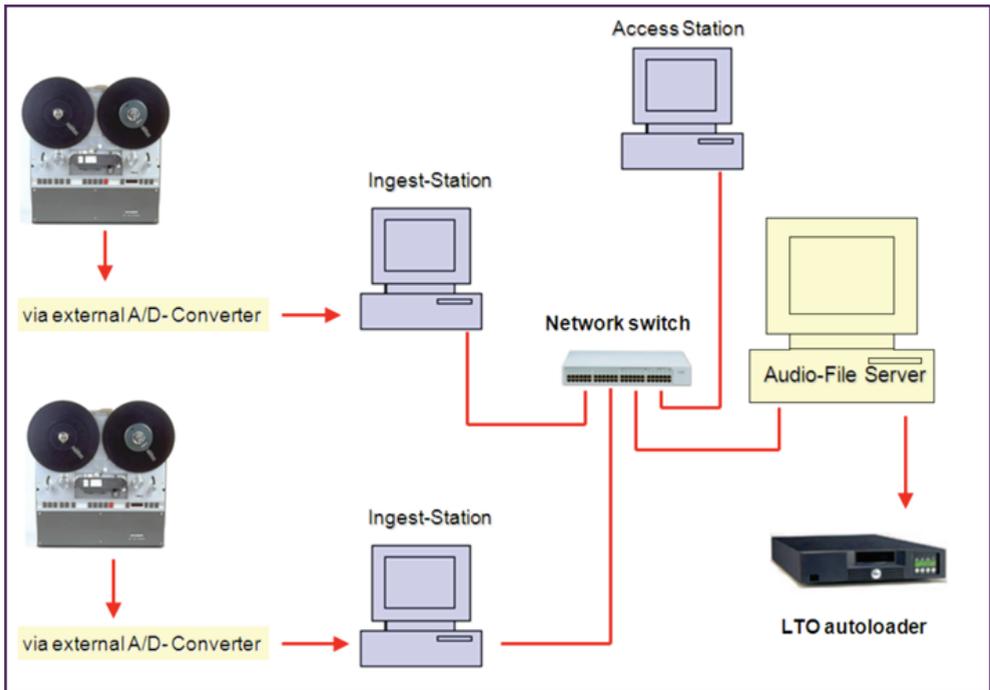


Figure 5. Small-scale network for two ingest stations and one or more users

Whenever such manually handled solutions are considered (in most cases due to lack of money), a stringent copy and safety strategy has to be implemented. This can only be reached by using unique identifiers that can be written to the data tapes header and can be useful for data verification, especially in future migration processes.

It is beneficial to direct the acquisition of all necessary equipment in a way that long-term support and service can be managed locally. Although it can be time consuming and long-winded to find a local dealer for dedicated equipment, this concept allows efficient troubleshooting and time saving in the long-term. To ensure the maintenance of such a concept, support is managed by cooperation with local IT specialists (e.g. coming from the IT departments of local Academies). It is necessary to have assurance that the system will be regularly updated, and that the upkeep of the digital data will be guaranteed. Preferably, a digital long-term storage strategy based on the Open Archival Information System (OAIS)¹³⁷ should be followed.

Metadata

As dedicated tools for capturing metadata were missing in the infrastructure of our digitisation projects, we had to find a cost efficient solution for this important point that was easy to implement. The focus was on a concept that can be easily managed and hosted locally, can be easily integrated to an existing intranet, can be opened to the Internet if necessary, and that provides very good safety mechanisms and data security strategies. In cooperation with our consultant Dr Andreas Matzke, who works for the Senior Expert Service SES in Bonn, Germany, a database, based on open source software and kept very simple and easygoing so that it can be handled by untrained staff, was developed. The system relies on widely used open source software: Linux Ubuntu, database system MySQL, Apache Server, user interface based on php5.

¹³⁷ CCSDS 650.0-B-1 Reference Model for an Open Archival Information System (OAIS). Blue Book. Issue 1. January 2002, adopted as ISO 14721:2003. See: http://nssdc.gsfc.nasa.gov/nost/isoas/ref_model.html and <http://public.ccsds.org/publications/archive/650x0b1.pdf>

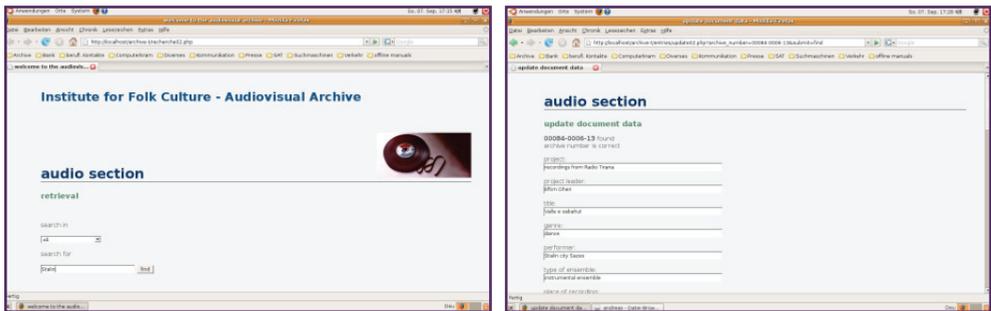


Figure 6. The database of the Institute for Cultural Anthropology and Art Studies of the Albanian Academy of Sciences in Tirana (Albania). Left: Screenshot of the search page of the database; right: Screenshot of the database input module

The database connects documents and according metadata, supports the collection of documents and metadata and offers facilities to access its content. One of the basic design concepts of the system was to make handling and maintenance as safe and easy as possible. In fact the number of screen pages used as an interface between the archivist and the system is rather small, and there are just three different types of screen pages a normal user of the archive will see. As a result, using the system can be learned in a short time. This should not keep the archivist from taking special care during the manipulation of metadata. The archive system can easily be adapted to future needs, like additional types of metadata, different and complex retrieval functions, integration of existing external documents and data or facilities to transfer its own content to other external archives. A specific feature is also its ability to handle multiple scripts. It has been already used in Arabic applications, and in the Ethiopian Project it will use Amharic script.

Training and practical implementation

Within the projects, a two week hands-on training of technically interested/educated staff (with practical archival experience) in the Vienna Phonogrammarchiv was calculated. The main focus of these training sessions was on the unmodified high quality transfer (conforming to IASA TC03/TC04), digitisation workflow, maintenance of analogue tape machines and documentation, especially of transfer metadata. Our experience shows, that this is a good time span for training, balancing costs and demands, provided that the staff to be trained have a minimum preparatory education.

The practical implementation of the projects includes the acquisition of adequate replay equipment. In practice, as new analogue magnetic tape machines meeting the IASA specifications are not available on the market anymore, used replay equipment was purchased and revised to fit the necessary specifications and parameters outlined in IASA TC04 [p.8f. and p32ff.]. The equipment was shipped and thereafter was installed locally. Digital equipment and other infrastructural devices were purchased from local providers, mainly to ensure local maintenance and support. After successful onsite installation, the local staff were trained in-house, and digitisation of some initial analogue tapes was carried out. This task was calculated to allow up to three weeks for server and database installation, and one week for the audio setup. Within this process the workflow for digitisation was optimized and adapted to the needs of the specific archives.



Figure 7. Discussing the workflow for the digitisation of halftrack consumer tapes with the team of the Institute for Cultural Anthropology and Art Studies of the Albanian Academy of Sciences in Tirana (Albania)

After successful processing of some critical tapes, the first results were presented to the department heads. Additionally, the projects were regularly presented to the public by organising press conferences and digitisation workshops. By means of such specific actions, public awareness could be raised and the importance of the collections as a promising basis for a sustainable consolidation of such repositories of important ethnomusicological sources could be emphasised.

Subsequent technical and conceptual support

The projects are currently either already completed, or are working autonomously (except the digitisation of the sound archive collection of the National Archives and Library of Ethiopia, which is still in the phase of preservation planning and equipment acquisition). Nevertheless the Phonogrammarchiv gives ongoing support and training concerning A/D transfer, technical problems on the playback side, as well as help in obtaining spare parts and additional equipment to guarantee high quality transfers with optimum signal retrieval from original tapes. Additional features of specific quality checks have been implemented so that the quality can be controlled from afar. Long-term service of storage facilities is solved by cooperation with local IT specialists, as outlined before. Additionally, a second digital copy of the important collection of the Institute for Folk Culture of the Albanian Academy of Sciences has been deposited in the Vienna Phonogrammarchiv. This acts mainly as an additional safety measure for ultimate disaster preparedness, but also as a second access point under restricted access rights.

Conclusion

The examples of practical implementation of small scale digitisation projects outlined above show that the IASA guidelines and standards relating to the long-term preservation and digitisation of sound recordings are a most useful reference in daily archival work.

Nevertheless, there were many lessons to learn in their practical application. Creativity, helping yourself in situations where infrastructure is lacking, a soldering iron and the famous gaffer tape, as well as good mood and the enthusiasm to have the job done, are essential ingredients and make life easier. Balancing between different mentalities is important, and sometimes the ambition to meet the ultimate quality requirements has to be pragmatically modified and efficiently realised. Outstanding personal engagement and enthusiasm of the staff is the basis for successful implementation.

The digitisation projects discussed in this paper have also been designed as regional pilot projects that should be seen in a larger context. They present a strong relation to identity, democracy and human rights, as they directly and indirectly strengthen the self-respect of cultures that predominantly rely on orally transmitted cultures, promote linguistic and cultural diversity, and ensure sustained access to that kind of documentary heritage. Additionally, they secure jobs and increase the competence of the institutions.

Under the prevailing financial conditions of the countries, sustainable audiovisual preservation can only be achieved by cooperation. The projects outlined could meet the high expectations to serve as examples for the cooperative solution of similar problems. Cooperation to manage and further develop all audiovisual holdings of the region is ongoing, and the competence acquired in the training and practical implementation of the projects can be maintained and further developed for the benefit of all existing audiovisual holdings of the region. This creation of competence centers also diminishes the risk of declining preservation budgets, and hopefully such projects will be supported even beyond present financial limits.

Further cooperation and, not least, a cordial friendship connects our institutions and shows that no archive should stay an island in the ocean of digitisation!

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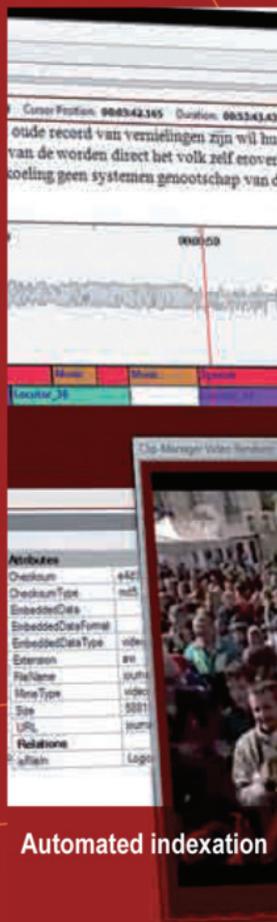
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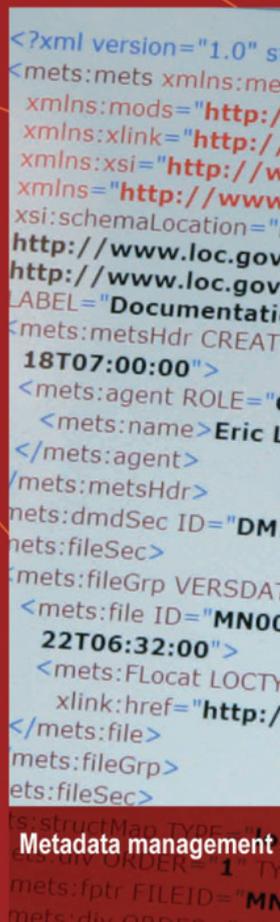
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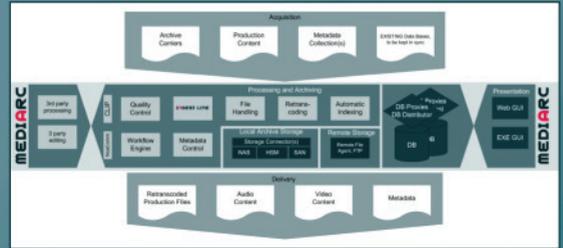
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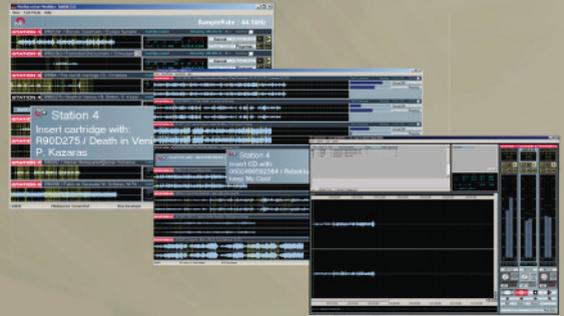
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