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CONTENTS

It's been a busy year since the last issue of the journal was published. After much deliberation about safety and logistics, the Executive Board has decided to offer a hybrid conference this autumn. Delegates are invited to join us in person at the Fonoteca Nacional in Mexico City or to participate online from 26-29 September. I am excited about the conference programme we are offering this year (https://2022.iasa-web.org/programme). Recognizing that remote conference attendees often face attendance and scheduling challenges due to time zone differences, an "on-demand" programme will be available this year to all attendees in addition to the traditional scheduled papers, discussions, and workshops. Everyone who registers to attend the conference remotely will also have access to two live parallel programme streams.

In 2022, two new translations of IASA's Special and Technical Publications were issued: a German version of IASA-TC 05 ("Behandlung und Lagerung von Audio- und Videoträgern"), and a Spanish version of IASA-TC 03, 4th edition ("La salvaguarda del patrimonio audiovisual: ética, principios y estrategia de preservación"), continuing a series of successful collaborative translation projects which make IASA's publications available to a wider audience. Both new translations are available on the IASA website in HTML and PDF versions.

At the time of writing this editorial, the journal's Editorial Board is undergoing significant changes in membership. Before going into detail about departures and arrivals, I first would like to correct last issue's masthead to include Christopher Parroz as the Board's Australia-Pacific representative. I apologize for this omission. During the period between issues, his and several other representatives' terms ended. I thank Christopher Parroz, as well as Eleonore Alquier and Claude Mussou (Europe co-representatives), and Irfan Zuberi (Asia representative) for their years of service on the board and wish them all well in future endeavors.

I welcome the following new members of the Editorial Board. Ahmad Faudzi Musib from Universiti Putra Malaysia is the new Australia-Pacific representative. I had the pleasure of working with Dr. Musib on the 2021 Conference Planning Committee, as UPM was one of our 'local' hosts. He has been a long-time and prodigious contributor to this journal, having contributed to issues 40, 43, 47, 48, and 51 to date. Dr. Carolyn Birdsall from the University of Amsterdam has agreed to serve as our new representative for that continent. Dr. Birdsall has been serving as vice-chair of IASA's Broadcast Archives Section for the past few years, and among other things has been running the multi-year project TRACE (Tracking Radio Archival Collections in Europe, 1930-1960), and has presented at IASA conferences in the past. Welcome and thank you, Carolyn! And Dr. Lindsay Mattock has kindly agreed to extend her term as North American Representative, and I look forward to continuing work with her to improve the journal.

I am still in need of a new Editorial Board representative for Asia. If you are interested or would like to know more about the Editorial Board, please feel free to contact me directly at editor@iasa-web.org. In the meantime, I will update the masthead on the journal's website to keep readers and authors informed of any changes in its makeup.

I am also putting out another call for peer reviewers for the Journal. I've noticed that a small group of volunteers has done an outsize proportion of the review work since the journal instituted peer review with issue no. 46 in 2016. A large and diverse group of reviewers is necessary for a healthy peer review process, and more fairly distributes the workload amongst our community. Please contact me if you would like to know more about being a peer reviewer, or you may explore reviewer guidelines and register yourself as available to review on the Journal website: http://journal.iasa-web.org/pubs/reviewer-guidelines.

The journal particularly needs native Spanish speaking reviewers. In 2021 and 2022, the number of Spanish language conference papers has risen significantly. I would like to invite authors to submit to the Journal, but I need to have the proper support in place to manage Spanish-language content through the review and production processes.

The first article in this issue speaks to an interesting chapter in IASA's history: its expansion of scope to include audiovisual materials. Kurt Degeller, a past president and veteran IASA member, extensively utilizes issues of both the journal and its predecessor, the Phonographic Bulletin in his article. Aside from illuminating an important chapter of IASA's history, Dr. Degeller's research highlights the importance of access to IASA's own institutional history via its print archives. I'd like to remind readers that many of our historical publications, including journal issues prior to no. 45 and all issues of the Phonographic Bulletin, are available on the main IASA website: https://www.iasa-web.org/iasa-publications. Members have access to all past issues, and the general public has significant access as well. As an additional point of interest, it should be noted that IASA deposits its institutional records at the Recorded Sound Research Center at the Library of Congress in Washington, D.C. The finding aid for that collection can be found at: https://hdl.loc.gov/loc.mbrsrs/eadmbrs.rs020010.

Next we have an article from Joe Stolarick, Digital Systems Lead at the New Orleans Jazz & Heritage Foundation Archive. Stolarick's article, which examines non-alphanumeric characters in filenames and filepaths, and the effects of such characters on proprietary cloud replication software, leaves behind entirely issues of content and format, instead focusing on purely file-based digital preservation workflows. The case study laid out in Stolarick's article is a practical example of Degeller's definition of the audiovisual archive as being "not limited to a certain genre of content and… considered mainly from an ethical and technical perspective." A generation after IASA's name change, it is clear that IASA's mission has not been diluted or obfuscated by its expansion of scope, but that its more agnostic approach has provided ample common ground for the audiovisual preservation community.

Rounding out this issue are a pair of companion articles from Sandy Ditchburn and Sarah Johnson, focusing on two aspects of a project at Ngā Taonga Sound & Vision. The first article from Johnson focuses on the history of New Zealand's Mobile Broadcasting Units during World War II, and the efforts and challenges to making the collections more accessible to researchers and the public. The collection needed to be re-digitized, and the availability of military records from the Tāmaki Paenga Hira Auckland War Memorial Museum increased the descriptive capacity for this second go-round. Ditchburn's article focuses on preservation workflows for the project, the inherent challenges of working with transcription discs, and some distinctive features of this remarkable collection. Both articles challenge the idea of "one and done" digitization: archival projects are repositioned as iterative processes. Both the digitisation quality and level of description were significantly improved due to changing standards and newly-available resources.

With that I will leave you to explore this new issue of the IASA Journal. I hope to see many of you, either virtually or in person at the conference this autumn in beautiful Mexico City.

With best regards,
Jennifer Vaughn
IASA Editor

A LETTER FROM IASA'S PRESIDENT
Tre Berney, Cornell University Library, USA

Welcome to the 52nd IASA Journal. I am writing to you as the Russian invasion of Ukraine approaches its 6th month. In addition to the colossal loss of life, a massive refugee crisis, and destruction of infrastructure in Ukraine; cultural heritage is under attack. According to newspaper reports, Russian forces have caused the destruction or severe damage of 250 museums and cultural institutions in Ukraine. IASA's Executive Board declared support of UNESCO Director-General Audrey Azoulay's call for protection of Ukrainian cultural heritage on 3 March 2022. "We must safeguard this cultural heritage, as a testimony of the past but also as a vector of peace for the future, which the international community has a duty to protect and preserve for future generations," she stated.

Due to caution and safety over the Coronavirus pandemic, the 2021 annual conference was held virtually with four remarkable partner institutions across several time zones:

- Radio y Televisión Nacional de Colombia (for the Americas)
- Netherlands Institute for Sound and Vision (for Europe)
- University of Ghana (for Africa)
- Universiti Putra Malaysia (for Asia and Australasia)

The result was an engaging and inclusive virtual conference. Radio y Televisión Nacional de Colombia sponsored live English and Spanish translation services. I am grateful to our presenters, hosts, sponsors, and over 550 participants; and I thank the 2021 Planning Committee for their largely behind-the-scenes work in making this event a success.

Work is well underway for our 2022 annual conference in Mexico City. This year the conference will be a hybrid event, physically held at the Universidad Nacional Autónoma de México (UNAM) and Fonoteca Nacional. The return to a face-to-face conference is reason for optimism about the future of IASA's annual meetings. In including the online component, we hope to continue to reach the broad audience we have been able to over the duration of this pandemic.

Significant work continues in other areas of the IASA community as well. In support of UNESCO's World Day for Audiovisual Heritage, the Co-ordinating Council of Audiovisual Archives Associations is producing a promotional video to continue raising awareness of the challenges with audiovisual documents. Nadia Lai, of the Swiss National Sounds Archives, is the new Chair of the IASA Training and Education Committee. The IASA Preservation Training Programme will continue in 2022 with another edition of its five-day introductory audiovisual archival and preservation skills course. The Ambassador and DEI Committees meet regularly, and I thank the officers and members for their work this year.

Two IASA Research Grants have been awarded for the 2020-2021 funding cycle. The first grant went to Christian Poske of the School of Oriental & African Studies (SOAS) at the University of London. His research project concerns cylinder recordings made by anthropologist John Henry Hutton (1885-1968) in Nagaland in India between 1914 and 1916. This research project aims to gather information and context for the cylinder recordings, based on related archival materials, which will lead to metadata enhancements and a reconnection of these recordings to their place of origin in Nagaland.

Filip Šír and Martin Mejzr of the Czech National Museum were also awarded a grant for their research into the World War II-era recordings of performers George Voskovec and Jan Werich. Poske, Šir, and Mejzr are scheduled to present their research at the 2022 conference in Mexico City.

We hope the 52nd IASA Journal is enriching to your work and in our mission to preserve the world's sound and moving image heritage. I extend thanks to our editor, Jennifer Vaughn, and the contributing authors. Please engage the IASA community by reaching out, posting on the listserv, and seeking answers to the questions you have.

With the kindest regards,

Tre Berney
IASA President
August 2022

FROM "SOUND" TO "SOUND AND AUDIOVISUAL": HISTORY AND FUTURE OF IASA
Kurt Deggeller, IASA President 2002-2005

Abstract
IASA emerged in 1969 from IAML, the International Association of Music Libraries, Archives and Documentation Centres. The interests of IAML's members largely focused on music as manuscript or score, and musical sound recordings were dealt with in the Record Library Committee. IASA was founded to consider additional types of sound recordings, including research and oral history. From the first years of IASA's existence, the question of the organisation's relationship to the moving image arose, represented by the International Federation of Film Archives (FIAF). But as early as 1979, a delegate from the United States also brought video into play. With independence from IAML in the late 1980s, an intensive discussion began about the future of IASA and the expansion of the scope of the association to include audiovisual documents. Finally in 1999, the constitution and the name of the association were adapted. The transformation process triggered by this name change is still underway today. It could prove to be an advantage for IASA because it opens possibilities of adaptation to the rapidly changing world of audiovisual production due to digitisation and online media.

Keywords: History of IASA, Future of IASA, audiovisual

Introduction
There is a commonplace that learning from history can help us to determine how to approach the future. To some extent, this article attempts to follow this line of thinking. IASA was founded in 1969 as a kind of spin-off of the International Association of Music Libraries, Archives and Documentation Centres (IAML). IAML was mainly interested in music collections, especially those in manuscript or printed form, but also in sound recordings. IAML had a Record Library Committee and a Subcommittee on Radio Archives, from which IASA emerged. The founding members of IASA were all also members of IAML; however, their interests went beyond music. They were interested in recordings from linguistic research, oral history and ethnography, and speech recordings from radio archives; so, they wanted an association with a broader scope. The founding institutions were mostly libraries and radio archives; specialised sound archives included the British Institute of Recorded Sound and the Nationaldiskoteket in Copenhagen. An important role was played by the Foundation for Film and Science in Utrecht and its representative, Rolf Schuursma, the first Secretary General of IASA.

Relation with Film Archives
During the first Council Meeting in Leipzig on 13 and 14 June 1970, cooperation with film archives was discussed for the first time:

> Mr. Schuursma then communicated a short report about the close cooperation of film archives in the Fédération Internationale des Archives du Film (FIAF) and the ties between sound archives like his own and film archives like the Dutch Filmmuseum and the State Film Archive of The Netherlands. Mr. Schuursma urged the necessity of some kind of relationship between IASA and the FIAF or individual film archives in the future. In the discussion it became clear that there are great differences in the problems of sound and film (TV) archives in the represented countries and that it is very difficult to obtain close cooperation if necessary ("IASA Meeting Leipzig, June 13 and 15, 1970," p. 19).

The issue of cooperation with film archives came up again at the 1973 Annual Meeting in London. In the minutes we can read:

> 5. Relation of lASA to International Film Archive Associations. The president asked the meeting for views on the possible closer co-operation of IASA with other international associations concerned with the preservation of records, whether aural, visual or written - such as the Fédération Internationale des Archives du Film and the International Federation of Library Associations. Mr. David Lance [Imperial War Museum, London] thought that IASA should first become a bigger Association before co-operating with, for instance, FIAF. Mr. Leavitt [Music Division, Library of Congress] asked how many members were interested in multi-media records; it is known, for instance, that many broadcasting archives are involved both with sound and film/video. Mr. Lotichius [Sound Archive of the Broadcasting Company of Northern Germany - Norddeutscher Rundfunk] said that in Germany the sound and film archives of the broadcasting organisations are separate, and relationship between them is quite loose. He asked whether the Constitution of lASA excluded visual archives. Mr. Leavitt said the Constitution of IASA does permit such co-operation (Article 11B). Mr. Eckersley [BBC Recording Services] said that it was his strong opinion that there was bound to be a move towards multi-media archives, and that IASA ought to keep closely in touch with this development ("5th Annual Meeting of IASA," pp. 4-5).

In Europe, Sweden was a pioneer for the integration of sound and moving image in a specialised archive. Claes Cnattingius from the Swedish Broadcasting Company documented with articles in the *Phonographic Bulletin* from 1975 and 1976 the development which led to the legal deposit act for sound and moving image of 1979, and the foundation of the Archive for Sound and Image (Arkivet för Ljud och Bild) in the same year (Cnattingius, 1975; 1976).

But there were also voices against such an integration. Patrick Saul, director of the British Institute of Recorded Sound pleads for national sound archives and against the integration of the moving image. His main argument was that archiving the moving image is much more demanding and therefore sound would be neglected in such an institution (Saul, 1976). Rolf Schuursma (Foundation for Film and Science) argued in a short article against some of Saul's arguments (Schuursma, 1976).

To finish the discussions of the seventies, an article on "Oral History: The Visual Argument" by Joel Garden from the University of California made an interesting point:

> I appreciate David's [David Lance, Chairman of the session] pointing out that in a sense I'm a pioneer, because I do have the feeling that in ten years I'll come back to IASA—wherever it may be, perhaps even in the United States—and there'll be a lot of video going on. A lot of you will have begun to concern yourselves with the care of video tapes with the same attentiveness you now observe for audio tapes and discs (Gardner, 1979, p. 8).

8

The "Future of IASA" debates

At the Vienna conference of 1988, the first organised by IASA without IAML, a session entitled "The Future of IASA" was on the programme. An important topic was the extension of IASA's scope to "Sound and Audiovisual." This was advocated above all by those institutions that had expanded their collecting area in the same direction, among them the Swedish Arkivet för Ljud och Bild, the Département de la Phonothèque et de l'Audiovisuel of the Bibliothèque Nationale de France, the Österreichische Phonothek (even before it was renamed Österreichische Mediathek) and the Motion Picture, Broadcasting and Recorded Sound Division of the Library of Congress.

Two of the main papers of the Vienna Conference were published in 1989 in the *Phonographic Bulletin* no. 53: Hans Bosma, former staff member of the Dutch Broadcasting Company, was in favour of an extension of IASA's competence. However, he stressed that the structures of the Association needed to be strengthened mainly the Branches and Affiliated Organisations and the Committees to ensure better cohesion of the membership (Bosma 1989). And Rainer Hubert from Österreichische Phonothek insisted on a closer cooperation between IASA, FIAT/IFTA (International Federation of Television Archives) and FIAF with joint conferences, publications and committees (Hubert, 1989).

Opponents of the expansion were people close to the record collectors and discographers, such as the American professor Michael Biel, who strongly warned against a loss of identity in his article "IASA's Focus on Sound - an Appeal to Retain our Goal" (Biel, 1992).

The decision of the 1992 General Assembly in Canberra that the expansion of IASA's interests to audiovisual archives needed further discussion was obviously a surprise for the Board. Past President Helen Harrison wrote in her article "IASA Future and External Relations": "Revised draft amendments to the Constitution and By-Laws were sent to the membership in July 1992 and, surprise surprise, in September in Canberra we were informed that not enough discussion and information had been given for members to make up their minds! How do you define *enough*!" (Harrison, 1993, p. 31)

In the same article Harrison gives an overview of the discussion on the topic on different levels including the Round Table on Audiovisual Records. The members of this group, FIAF, the International Association of Television Archives (FIAT/IFTA) and the audiovisual sections of the International Federation of Library Associations and Institutions (IFLA) and the International Council on Archives (ICA), were in favour of the extension plans of IASA. The main argument was that many smaller archives with audiovisual materials could not apply to join FIAT/IFTA or FIAF because of the membership conditions in the constitutions, and needed therefore another opportunity to be represented on an international level. A merger of IASA, FIAT/IFTA and FIAF to one big audiovisual organisation was considered impossible. However, common meetings on topics of mutual interest could be envisaged.

It took two more years until the 1995 General Assembly in Washington D.C. approved the constitutional amendment and the change of the IASA's name to "International Association of Sound and Audiovisual Archives"- the acronym IASA remained unchanged. Helen Harrison was satisfied and wrote in her last letter as editor of the IASA Journal: "it does not make IASA any different, just more effective and even friendlier towards archivists" (Harrison, 1996, p. 2).

In the same article Helen Harrison mentioned the difficulty of describing the meaning of "audiovisual":

> I do not like the way AV is being confused with multimedia. To me multimedia is a tool fed by the audiovisual materials. There are no multimedia archives and what the outside world calls multimedia is only electronic documents - surrogate AV materials sometimes, mere alternatives to print in most instances. To identify AV for what it really is - not just a component of e-documents is a cause worth pursuing, and I hope that IASA will recognise this. Without a clear distinction we will find our lives complicated by substitutions. We must go back to the original and remember - there is only one master sound recording, one original film and one original video. These supply the e-documents and multimedia. Electronic documents are copies taken from so many sources they may be difficult to trace. They have little in common with the issues of archiving of audiovisual materials - only as convenient storage materials and these are still somewhat suspect (Harrison, 1996, p. 3).

The years following the expansion to sound and audiovisual

The decision of 1995 did not lead to any spectacular developments in IASA in the following years. In January 1999, the Board published a "Concept for the integration of audiovisual matters in IASA's scope" in six points. The first point reads: "A definition of 'audiovisual.'" In the comment to this point the Board writes that it wanted to adopt the definition Ray Edmondson gives in his *Philosophy of Audiovisual Archiving* (IASA Executive Board, 1999, p. 7). Edmondson's definition is very pragmatic:

> Audiovisual – 'directed at the faculties of seeing and hearing' – has gained increasing use as a convenient single word covering both moving images and recorded sounds of all kinds. With some variation in connotation, it is used in the titles of some archives and professional groupings in the field. It is the term adopted by UNESCO to draw together the separately originated fields of film, television, and sound archiving which have found increasing commonality through technological change (Edmondson, 2016, p. 20).

The other points in the IASA Board's concept include identifying audiovisual competences within and outside IASA and encouraging work and publications in this area:

> Moreover, we should find out in which AV areas (video, film, photo etc.) there is the largest backlog and demand within the membership with the aim to create e.g. project groups. This should be discussed with the chairpersons of the Committees, Branches and Affiliated Organisations during the joint part of the Board meeting (IASA Executive Board 1999, p. 7).

The most important committee of IASA was—and still is—the Technical Committee (TC). Dietrich Schüller, who has been a member of this committee from the beginning, writes in response to the question of how the expansion of IASA affected the work of the TC:

> What I gather both from my recollection and from the papers is that the IASA TC was very early on open to an interest beyond sound, and was strongly sensitised to the chemical stability of audiovisual carriers through cooperation with the film archivists. I did not find a vote for an expansion of IASA in the direction of audiovisual in the TC minutes, certainly because there were no barriers for IASA technicians and there were many overarching issues that made expansion quite natural and desirable (Schüller, 2022).

Schüller cites as an important event in this development the Joint Technical Symposium of 1987 in Berlin, a meeting of the Technical Committees of FIAF, FIAT/IFTA and IASA.[1]

Relationship with FIAT/IFTA
FIAT/IFTA was founded in 1977. On its website the reason why another association of audiovisual archives was needed is explained as follows:

> The history of FIAT/IFTA begins in 1976, when the leaders of a small group of television archives together establish the need for collaboration and pooling of expertise in their specific domain. Most members know each other from the general framework provided by the European Broadcasting Union (EBU), but that organisation doesn't hold a specific forum for their issues and concerns, and neither does FIAF (Fédération Internationale des Archives Film) or IASA (International Association of Sound Archives) (FIAT/IFTA, n.d.).

After the expansion of IASA's scope of activities towards audiovisual matters, one could have imagined that IASA and FIAT/IFTA would have found reasons for closer cooperation. In fact, joint annual conferences took place in 1994 in Berlin-Bogensee and in 1995 in Washington, D.C. However, there were only a few joint sessions, and the programs ran more in parallel. After the Washington meeting in 1995, no more joint conferences took place until the virtual conference hosted by the Irish broadcasting company RTÉ in Dublin in 2020.

But there were other occasions where IASA met with FIAF and FIAT/IFTA. There was the already-mentioned Joint Technical Symposium (JTS). It was first held in Stockholm in 1983, organised by FIAF and FIAT, and was limited to the preservation of film and video archives. In 1988 in Berlin, IASA was also present, and the theme was extended to audio documents. As the title indicates, during these events, which lasted several days, primarily technical problems of preserving film, video and audio documents were discussed. The JTS has been held regularly at intervals of about 4 years, for the last time in 2019 in Hilversum following the IASA annual conference.

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1   *Archiving the Audio-Visual Heritage. A Joint Technical Symposium.* Ed. Eva Orbanz, Helen P. Harrison, Philippe Poncin, Henning Schou. Berlin, Stiftung Deutsche Kinemathek, 1988. All the previous proceedings of the past Joint Technical Symposia are accessible at: https://www.ccaaa.org/pages/news-and-activities/joint-technical-symposium.html.

Furthermore, an annual meeting of the three associations took place within the framework of the UNESCO Roundtable on Audiovisual Records. In 2000 on the initiative of IASA the Roundtable was renamed and reorganized and became the Co-Ordinating Council of Audiovisual Archives Associations (CCAAA). The accession of the Association of Moving Image Archivists (AMIA) and the Southeast Asia-Pacific Audiovisual Archive Association (SEAPAVAA) in 2002, the Association for Recorded Sound Collections (ARSC) in 2007 and the Federation of Commercial Audiovisual Libraries (FOCAL) in 2011 substantially expanded the spectrum of CCAAA.

And the Future?

Why IASA, FIAT/IFTA, and FIAF did not move closer together after IASA's expansion to audiovisual documents can be explained by the different focus of each association. Each of these three associations understands archiving and its goals in a different way: television archives are assets with a commercial value for reuse within or outside the broadcasting company to which it belongs. Film archives, as represented in FIAF, see themselves more as art collections—"film as the seventh art"—thus more as an art gallery or museum than as an archive. For IASA, the "audiovisual archive" has a broader meaning. It is not limited to a certain genre of content and is considered mainly from an ethical and technical perspective with a strong focus on research archives and national collections of audiovisual heritage.

The openness of IASA's purpose and aim may prove to be an advantage in the future. With the flux of digital images and sounds, traditional television may sooner or later prove to be a media history episode, and film, as understood by many members of FIAF, a museum discipline. This is not meant negatively per se, but it shows that after 50 years the time has come to rethink the organizational structures of the international community of AV archives which mostly emerged and grew after the Second World War (FIAF, founded in 1932, is the exception).

In such a new setting, IASA could play a leading role, as it did when the CCAAA was founded, because of its open objectives. On the one hand, the aim is to preserve the analogue audiovisual cultural heritage and, if necessary, to transform it into digital form. On the other hand, it is about preserving digital images and sounds, providing access to them, and networking them in the universe of mobile cultural assets. This requires new cross-media platforms and new forms of cooperation.

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REPLICATING DIGITAL AUDIOVISUAL ARCHIVES IN THE CLOUD: THE UNINTENDED CONSEQUENCES OF NON-ALPHANUMERIC CHARACTERS IN FILENAMES AND FILEPATHS

Joe Stolarick, Digital Systems Lead, New Orleans Jazz & Heritage Foundation Archive, New Orleans, USA

Abstract

Non-alphanumeric characters in filenames and file paths can lead to unintended consequences in digital preservation. The New Orleans Jazz & Heritage Foundation Archive conducted simple tests to investigate peculiarities related to this issue that surfaced when preserving their audiovisual assets. This case study resulted in a list of problematic, albeit commonly used, non-alphanumeric characters. It also uncovered significant implications for using proprietary cloud replication software as part of digital preservation workflows.

KEYWORDS: digital preservation, character encoding, cloud storage, case study

Introduction

Character encoding and its impact on digital preservation is a complex issue that has resulted in a small, albeit informative body of literature, primarily in the form of journal publications and blog posts. Most of the writings I reviewed in preparation for this report focus on the basics: introducing key standards (e.g., ASCII, Unicode) and the complications of identifying and converting plain text formats. *Plain Text & Character Encoding: A Primer for Data Curators by Seth Erickson* (2021) provides an excellent introduction to character encoding as it relates to digital preservation. Dig a little deeper and one will inevitably find more ethically and culturally-grounded conversations surrounding the implications of diacritic handling, examining the "racial and Western-centric implications of considering certain characters to be 'illegal'" (Blewer, 2019).

Rather than spend time retreading this territory, I designed a simple case study addressing observations made during my personal digital preservation workflow. Recently, I discovered that files being copied from file system to file system (e.g., Macbook to Synology NAS, Synology NAS to Backblaze B2 cloud storage), were quietly failing to replicate correctly: or not replicating at all. The common thread among files that fail is non-alphanumeric characters in the filename. Additionally, the failures were not always consistent; for example, a file that reached one destination was not guaranteed to reach another. To keep this report grounded in practical application, I only address issues observed within specific systems that are part of my personal digital preservation workflow. It is my hope that these findings will be of use to other non-profits and repositories that may be establishing and managing their own digital preservation programs. For those interested in a much deeper dive, the resources are out there. For instance, *The Big List of Naughty Strings* (Woolf, n.d.) is intended as a quality assurance tool for programmers.

Before we discuss my specific workflow, here is a bit of context. In August 2020, I was hired as the Digital Systems Lead for the New Orleans Jazz & Heritage Foundation with the generous support of The Helis Foundation. I am tasked with implementing a digital preservation program for the New Orleans Jazz & Heritage Foundation Archive (referenced from this point forward as the "Jazz & Heritage Archive" or "Archive"). The Archive, located in a small Creole cottage in the French Quarter, houses records and materials relevant to the Foundation's history as well as its assets, most notably the New Orleans Jazz & Heritage Festival. I am one of two full-time employees in the Archive. In addition to our primary location, we have six off-site storage locations throughout the

country. Our digital preservation program is modeled on assessments and recommendations made by AVP, a digital preservation consulting firm. The Digital Systems Lead position was created in response to AVP's *Preservation Assessment & Planning Project Report* (or the "AVP Plan"), conducted in 2019.

Digital preservation workflow

My first task outlined in the AVP Plan was to "migrate data from external sources into managed storage." To do so, a custom bash script was used to create "snapshot" csv files, recording the file path, filename, and file size of each digital object stored on an external carrier. Md5 checksum values were generated for each file and all metadata imported to a MySQL database. The drive contents were then copied to our network attached storage device (NAS). Once migrated, the data was evaluated for fixity and attendance using the original checksums and newly generated checksums for files as stored on the NAS. Following checksum verification, the data was copied to two separate cloud storage vendors using NAS cloud replication software to have "more than two copies... of digital content stored in separate geographic locations," another AVP Plan recommendation.

To accomplish this workflow, hard drives were mounted via a TOTU Type C Hub to a MacBook Pro laptop running macOS 10.15.7. Occasionally, non-alphanumeric characters in file names would cause issues with delimiting or script execution (both snapshot and checksum scripts), at which point I would be required to amend file names. If this was done on macOS, it was performed manually or using the open-source program detox[1]. If the drive was formatted NTFS or otherwise restricted on my MacBook Pro, I mounted it on a Dell desktop running Windows 10 Pro (10.0.19043 Build 19043) to make changes manually or using a program called NB Renamer[2]. NB Renamer behaves similarly to the "replace" function used to rename files in macOS. Once all changes were complete, the drive was returned to the MacBook Pro to complete the workflow.

Despite my best efforts to remove potentially problematic characters, some files were copied to our Synology NAS (DSM 6.2.4-25556 Update 2) without sufficient changes. If no red flags were raised by the checksum verification process, the NAS's Cloud Sync software would attempt to replicate these files with problematic characters in their names or paths to their respective buckets in cloud storage. For cloud storage, we have accounts with both Wasabi and Backblaze B2. It was not until I began scrutinizing our data from within these accounts that I noticed some peculiarities.

Currently, Synology Cloud Sync replicates one in five shares on a staggered, bi-weekly schedule (i.e., each share updates twice per week). In total, our NAS is storing approximately 65 TB of data. To monitor our cloud storage data, I use rclone[3], a command line tool for monitoring and managing files in cloud storage. Rclone prints csv reports that I can compare with up-to-date versions of our hard drive snapshot data stored in our MySQL database. Comparisons showed that by and large, the files not being replicated contained non-alphanumeric characters in file names. However, the failures were not uniform among cloud providers (i.e., some files that were replicated to B2 were missing from Wasabi).

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1   detox available at: https://linux.die.net/man/1/detox
2   NB Renamer available at: https://hermit99.github.io/nbrenamer/
3   Rclone available at: https://rclone.org/

My first step in investigating this issue found me at both the Wasabi and Backblaze websites in search of any literature regarding known issues regarding file handling and non-alphanumeric characters. On Wasabi's FAQ page, it states that Wasabi does not support non-ASCII characters that are 4-byte UTF8 characters:

> "Certain files may have non-ASCII characters that are 4 byte UTF8 characters (such as emojis) in the filename. Wasabi does not support these characters and will return a 400 error message to an application that tries to write these files with 4 byte UTF characters in the file name. We recommend renaming the affected files if possible" (Wasabi, n.d.).

Similarly, Backblaze lists the following guidelines for file names on their website:

> "Names can be pretty much any UTF-8 string up to 1024 bytes long. There are a few picky rules:
> - No character codes below 32 are allowed.
> - DEL characters (127) are not allowed"
>   (Backblaze, n.d.)."

For someone not entirely fluent in the language of character encoding, these policies were not helpful for predicting which non-alphanumeric characters might cause problems with data replication. To better understand the limitations within my own personal workflow, I decided to design my own study.

Case study
To begin, I first compiled a dataset consisting of thirty-one text (.txt) files created in TextEdit (Version 1.15). Each file name had a unique, singular, non-alphanumeric character inserted between the "e" and "s" in the word "test" (e.g. "te!st.txt", "te/st.txt", etc.). The non-alphanumeric characters selected were based on their inclusion on our MacBook Pro's keyboard. I intentionally excluded diacritics from this study simply because they were absent from the filenames of files that failed to replicate. Once the thirty-one text files were created, I moved them to a folder titled "cloud-filename-tests" on the MacBook Pro's desktop.

Before I even finished creating my dataset, I ran into an issue. MacOS will not allow colons (:) in file names, automatically changing any instance of a colon to a hyphen (-). This is because the macOS Extended File System (HFS+) uses colons (:), not slashes (/), as path separators (Sánchez, 2000). Therefore, "te:st" was dropped from my dataset, due to the inability to create it (though it comes back to haunt me later).

The next step in the workflow was getting my files to our NAS device. While attempting a drag-and-drop copy of the dataset to the NAS device, I received an error message from Synology stating:

"Failed to upload 'cloud-filename-tests'. File and folder names cannot contain colons (:) and slashes (/), start with ._ (e.g., ._name), or use any combination of characters that are reserved for system use (e.g., . or ..). Please enter another name."

As a result, the file containing the forward slash (/) was not copied and dropped from my dataset. Similarly, the test file with double quote (te"st.txt) was copied, but its name was changed to "te%22st.txt". It seems likely that there is a discrepancy inherent in the file systems' data transformation logic that is misinterpreting the double quotes. Unlike the colon-turned-hyphen, I decided to leave this file as "te%22st.txt" for the remainder of the study to achieve a more linear result.

Now that the files were on the NAS, I needed to create two replication jobs in Cloud Sync. Each job would replicate the "cloud-filename-tests" folder to test buckets in both Wasabi and Backblaze B2. Once the proper connections were made to their destination folders within Cloud Sync, I ran both jobs, which completed with no *reported* errors (Fig. 1).

Fig. 1. Screenshot of Synology Cloud Sync

In fact, there were quite a few problems, particularly with the replications to Wasabi cloud storage. Only 15 of 29 files were copied. The files that failed to replicate had the following non-alphanumeric characters in the file name: close bracket (]), double quote ("), close brace (}), open bracket ([), open brace ({), acute (`), pipe (|), caret (^), hash (#), tilde (~), backslash (\), percent (%), greater than (>), and less than (<).

Replications to Backblaze B2, on the other hand, had a much higher success rate with only one file not copying ("te\st.txt"). I also recorded that "te%22st.txt" copied, but noted that it maintained its altered file name (Table 1).

Character Name	Char	Wasabi	B2
plus	+	COPIED	COPIED
close parenthesis	)	COPIED	COPIED
open parenthesis	(	COPIED	COPIED
asterisk	*	COPIED	COPIED
close bracket	]	FAILED	COPIED
semi colon	;	COPIED	COPIED
double quote	"	FAILED	COPIED AS "te%22st.txt"
close brace	}	FAILED	COPIED
equal	=	COPIED	COPIED
ampersand	&	COPIED	COPIED
ampersat	@	COPIED	COPIED
open bracket	[	FAILED	COPIED
open brace	{	FAILED	COPIED
acute	`	FAILED	COPIED
question mark	?	COPIED	COPIED
pipe			FAILED	COPIED
caret	^	FAILED	COPIED
hash	#	FAILED	COPIED
colon	:	NOT IN DATASET	NOT IN DATASET
exclamation	!	COPIED	COPIED
tilde	~	FAILED	COPIED
backslash	\	FAILED	FAILED
percent	%	FAILED	COPIED
greater than	>	FAILED	COPIED
apostrophe	'	COPIED	COPIED
less than	<	FAILED	COPIED
dollar sign	$	COPIED	COPIED
hyphen	-	COPIED	COPIED
underscore	_	COPIED	COPIED
forward slash	/	NOT IN DATASET	NOT IN DATASET
comma	,	COPIED	COPIED

Table 1. Synology NAS to cloud storage test results.

Having tracked each point of the workflow, I decided to attempt this same experiment on my personal NAS, a QNAP TS-251B (Firmware: 5.0.0.1891), primarily to get a better sense of whether Synology and its CloudSync software could be having any effect on the file transfers. Almost immediately, I saw a difference in that the QNAP allowed me to copy all 30 files with only one filename change; the file "te/st.txt" was changed to "te:st.txt". As with the Macbook Pro, it is likely that QNAP's file system uses the forward slash as a path separator. Regardless, this change marked the triumphant return of the colon (:), which resulted in some momentary confusion.

As with Cloud Sync, I next created backup jobs in QNAP's Hyper Backup Sync (HBS 3) and established the proper connections with new test buckets in both Wasabi and Backblaze B2. After running both jobs without errors, I checked both QNAP test buckets and found that the replications done via QNAP were far more successful within Wasabi. In fact, every file copied successfully. Backblaze B2, while largely successful, did appear to have a character encoding issue with backslash (\), which was copied as "teXA==st. txt" (Table 2).

Character Name	Char	Wasabi	B2
plus	+	COPIED	COPIED
close parenthesis	)	COPIED	COPIED
open parenthesis	(	COPIED	COPIED
asterisk	*	COPIED	COPIED
close bracket	]	COPIED	COPIED
semi colon	;	COPIED	COPIED
quote	"	COPIED	COPIED
close brace	}	COPIED	COPIED
equal	=	COPIED	COPIED
ampersand	&	COPIED	COPIED
ampersat	@	COPIED	COPIED
open bracket	[	COPIED	COPIED
open brace	{	COPIED	COPIED
acute	`	COPIED	COPIED
question mark	?	COPIED	COPIED
pipe			COPIED	COPIED
caret	^	COPIED	COPIED
hash	#	COPIED	COPIED
colon	:	NOT IN DATASET	NOT IN DATASET
exclamation	!	COPIED	COPIED
tilde	~	COPIED	COPIED
backslash	\	COPIED	COPIED AS "teXA==st.txt"
percent	%	COPIED	COPIED
greater than	>	COPIED	COPIED
apostrophe	'	COPIED	COPIED
less than	<	COPIED	COPIED
dollar sign	$	COPIED	COPIED
hyphen	-	COPIED	COPIED
underscore	_	COPIED	COPIED
forward slash	/	COPIED AS (:)	COPIED AS (:)
comma	,	COPIED	COPIED

Table 2. QNAP NAS to cloud storage test results.

Conclusion

At the beginning of this study, I anticipated running into issues when moving files from system to system (e.g., from MacBook to NAS, NAS to cloud, etc.). However, I did not anticipate the high degree to which proprietary software used to replicate the data (i.e., Cloud Sync and HBS 3) could hinder my digital preservation workflow. While files were created and copied with relative ease in the MacBook and Synology/QNAP file systems, there were significant errors when replicated to cloud storage in the form of dropped files and unexpected file name changes. Most of these errors occurred when files were copied via Synology's Cloud Sync from the NAS to Wasabi cloud storage. In contrast, files on the QNAP NAS were copied to Wasabi with virtually no errors.

To conclude, this study is intended to investigate and address a specific problem in the Jazz & Heritage Archive's digital preservation workflow, not to examine or analyze the behavior of character encoding and data transformation at a technical level. The information presented here is certainly worth considering when planning a data migration to network attached storage and/or cloud storage. These results indicate the benefits of using a QNAP NAS, whose software performed far better with data transfers than that of our Synology NAS. However, the most salient point resulting from this case study is that the use of non-alphanumeric characters and diacritical markings should be avoided in file and/or folder names. The author understands that it is not always possible or desirable to change file/folder names in some archival circumstances. But when an organization has the option to determine file and folder names, it is strongly recommended that only letters (A-Z), numbers (0-9), hyphens (-) and underscores (_) are used. Trial and error have been ever present in my work building a digital preservation system. It is my hope that, in reading this, others might be able to bypass at least one of those errors.

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VOICES FROM THE WAR: IMPROVING ACCESS TO THE RECORDINGS OF NEW ZEALAND'S WORLD WAR II MOBILE BROADCASTING UNITS

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Abstract

In August 1940, three New Zealand radio broadcasters set sail on an army troop ship from Wellington. They were bound for Egypt, where the New Zealand armed forces were part of the British Empire's push to drive the German and Italian armies out of North Africa and the Middle East. With them was a mobile recording van, equipped to capture on lacquer discs the voices and sounds of New Zealanders at war, and send those recordings back home for radio broadcasts on the other side of the world.

For the next five years, the Mobile Broadcasting Unit recorded interviews and reports about the fighting and the day-to-day business of war, as well as thousands of simple messages home from servicemen, and a few women. Today, the 1600 surviving Mobile Unit discs form part of the sound archives of Radio New Zealand, held by audiovisual archive Ngā Taonga Sound & Vision.

In this article the author will outline the history of the Mobile Units and the context in which they worked. She will also describe on-going work to identify the speakers heard in their recordings and make this collection more discoverable and accessible to researchers. Ngā Taonga Sound & Vision is currently digitising the collection and preservation archivist Sandy Ditchburn will describe some of the challenges she has encountered in capturing sound from the 80-year-old lacquer discs.

Keywords: World War 1939-1945, lacquer discs, transcription discs, field recordings, digitisation, Ngā Taonga Sound & Vision, Radio New Zealand

Background and context

New Zealand declared war on Germany at the same time as Great Britain, in September 1939. Although colonised in the 19th century, at the start of the war many white New Zealanders still referred to Britain as 'home' and were proud to call themselves members of the British Empire. 'Where she [Britain] goes, we go; where she stands, we stand,' intoned Prime Minister Michael Joseph Savage in a famous radio address to New Zealanders on the outbreak of war (National Broadcasting Service, 1939, ID31615). Radio broadcasting in the country at the time was almost entirely controlled by two government-owned networks: the National Broadcasting Service (NBS), a non-commercial series of radio stations modelled on the British Broadcasting Corporation, and the National Commercial Broadcasting Service, which was financed through the sale of advertising.

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The Director of the NBS, Professor James Shelley, proposed in February 1940 that a mobile broadcasting unit be sent overseas with New Zealand service personnel. In an outline plan sent to the Acting Minister of Broadcasting, he noted the functions of the proposed unit, including, 'To make disc records of events, voices of personalities, eye-witness accounts etc. for sending to New Zealand to broadcast here and to form part of an historical library of the war for future use.' He added that as well as future historical value, the output of such a unit would also 'be of immediate value in maintaining the morale of the troops and of the nation' (Shelley, 1940).

The staff of the unit would remain NBS employees, but would wear army uniforms and be accorded the privileges of the rank of officers. Eventually the Broadcasting Unit staff would be classed as 'war correspondents' and fall under the army's Public Relations Office, together with press correspondents, cinematographers of the National Film Unit and official war artists and photographers.

The New Zealand government approved the proposal on 13 March 1940 and NBS engineers spent several months designing and building the necessary equipment, including a custom-built recording van fitted with disc cutting lathes. The Mobile Broadcasting Unit sailed for the war with the Third New Zealand Echelon of troops in August of that year.

Over the next five years, the men and equipment of the Unit would follow fighting from Egypt, across North Africa, through the Middle East and in the Italian campaign. It was initially envisaged by James Shelley and the NBS that the Unit would also be able to broadcast news and programmes sent from New Zealand to the men stationed overseas. For a variety of reasons this function was never successfully realized, and the Unit's main role became recording the voices and experiences of New Zealanders at war and sending those recordings back home for broadcast.

Although radio broadcasts began in New Zealand in 1921, the NBS did not acquire disc recording equipment from overseas until 1935, so the formation of the Mobile Unit represented an opportunity to take recording technology out of the studio and into a conflict zone for the first time. Outside broadcasts had also been made since the 1920s, covering events such as horse races and rugby games, but sending broadcasters to war and making disc recordings in the field presented a new level of technological challenges for NBS engineers.

The custom-built van body built in Wellington was fitted out as a recording studio, the plan being that when the Unit arrived in Egypt it could be mounted on a truck chassis, allowing it to follow the troops. It would tow its own power generator on a separate trailer. The 16-foot-long van was kitted out with two disc cutting lathes, as well as radio receivers and a 'Presto' portable disc recorder (Figure 1), which was eventually to prove to be the most useful piece of equipment. A three-man team was assembled from existing staff: NBS engineer Noel Palmer was officer-in-charge and Norman Johnston served as the young assistant engineer. Doug Laurenson, a World War I veteran and the Unit's 'commentator' was seconded from the National Commercial Broadcasting Service (Figure 2). Over the course of the war they would all be rotated out and replaced by other NBS staff, with the Unit finally returning home from Italy in December 1945.

Figure 1. Noel Palmer and disc cutters inside the Mobile Unit recording van in Egypt, 1942. [Photograph by M.D. Elias. Ref: DA-02474-F. Alexander Turnbull Library, Wellington, New Zealand]

Figure 2. The initial staff of the New Zealand Mobile Broadcasting Unit in 1940: (L-R) Norman Johnston, Noel Palmer and Doug Laurenson [*The New Zealand Listener*, 13 December 1940].

In March 1943 a smaller two-man Mobile Unit was sent with New Zealand troops into the Pacific war, where it recorded men and their experiences over an 18-month period in New Caledonia, the New Hebrides and the Solomon Islands.

The staff of these units were not radio journalists in the modern sense. As war correspondents they were assigned the military rank of officers and provided with Army uniforms and assistance in the form of Army drivers, batmen, and occasionally, loaned vehicles. As government employees, embedded with the forces of the New Zealand Division and operating under wartime censorship, their outputs were heavily constrained in terms of objectivity. However, the material they recorded signaled several new developments in terms of New Zealand's media and social histories, and it is these that will be explored further in this article.

The Mobile Unit collection contains a wide variety of radio programme material: action reports and eye witness accounts of military engagements; 'talks' by and interviews with service personnel on their part in the war or action they had been involved in; coverage of non-conflict events such as concerts, sports matches, and other social occasions, and hundreds of simple 'messages home' recorded by servicemen who were selected by ballot to record greetings to loved ones.

These messages were then sent home, compiled, edited, and broadcast in a weekly programme called *With the Boys Overseas*. Everything the Units recorded had to be passed by military censors. No place names or descriptions of action could be mentioned in case these could be used as intelligence by the enemy. Similarly, the tone of all wartime broadcasts was expected to be morale-boosting—mentions of high casualties were edited out, and a recording of men singing a World War I Māori *waiata* (song) with lyrics that lamented dead soldiers was marked 'Not to be Played.'

These constraints meant the content of the messages home tended to be fairly formulaic: 'Hello Mum and Dad and all at home in Auckland, I'm doing well. Send mail,' 'Hello darling, hope all is well with you and the kiddies. Lots of love and hope to be with you soon,' etc. The men (and the few women recorded) sound resolutely upbeat and optimistic about the war and their part in it. Beginning on Sunday mornings in February 1941, *With the Boys Overseas* swiftly became very popular with New Zealand radio listeners, with demand seeing the programme extended to an hour and then repeated later in the week. 'No single feature ever presented by radio in New Zealand has been the cause of so many letters to the NBS, 'reported *The New Zealand Listener* magazine in May that year, 'So great has been the public interest in the messages from the New Zealand Broadcasting Unit in the Middle East, expressed in telephone calls, letters and telegrams after every broadcast' (*The New Zealand Listener*, 1941). Extra staff had to be hired by the NBS to cope with the mail from listeners wanting to hear messages repeated or to know when their loved ones' messages could be heard.

Wartime broadcaster Peter Harcourt, who compiled the programme from the discs once they arrived in Wellington, realised the generic nature of the messages was not important to listeners: 'It is often not what is said that matters, but merely the sound of the voice itself,' he wrote (Downes and Harcourt, 1976).

It could take many weeks for the recorded discs to make their way back from the Mobile Unit in the Middle East or Europe to New Zealand. After the fall of Singapore to Japan in February 1942, air routes to New Zealand were disrupted and sometimes months could pass between a message being recorded and it eventually making it back to NBS studios in Wellington by sea.

There, Peter Harcourt had the grim task of checking the names of the men recorded against military casualty lists. If a man had been killed or was missing in action, in most cases his message would not be broadcast. The NBS would notify his next of kin and they were able to come and listen to his message in private at the radio station, although there is evidence that some messages from deceased men were still broadcast—presumably as a tribute and with the agreement of their families (*The Northern Advocate*, 1942).

At the height of the Mobile Units' operation, in the year to 31 March 1944, the NBS reported that it had broadcast some 6,750 messages on *With the Boys Overseas*, occupying five hours per week on the main national radio stations (Shelley, 1944). This was a formidable output for a programme which was originally intended as something of a side-show to more substantive war correspondent work. As Noel Palmer recalled, the messages were 'a spin-off, which somehow or other became conjured up as an idea and once started, was a roaring success' (Downes and Harcourt, 1976).

Actuality, immediacy and democratisation

Aside from the hugely popular messages home, the staff of the Mobile Units recorded first-hand accounts of military action or 'action despatches', which today would be called voice reports.

The Units' commentators were the first broadcasters to accompany New Zealand forces into conflict and their despatches provided important eye-witness records of historic events such as the battles of El Alamein and Cassino, and the liberation of the cities of Florence and Tripoli. Using the Units' portable disc recorders (which offered greater manoeuvrability than the cumbersome recording van), they demonstrated what could be achieved in terms of recording actuality in a conflict zone and brought the sounds of war into New Zealand living rooms.

Experienced broadcaster Arch Curry (Figure 3) replaced Doug Laurenson as the North African unit's main commentator in October 1941, and he acquired a reputation for the standard of his reports which were often broadcast to New Zealand (and the world) via the BBC's shortwave service. Ahead of the start of the second Battle of El Alamein in October 1942, having been briefed on when the opening barrage could be expected, he timed the recording of his report so that he could also capture the actuality of the artillery pounding in the background. Fellow commentator John Proudfoot recalled the disc was then rushed from the front by an army motorcycle despatch rider, over 260 kilometres to Cairo, where it was transmitted by radio telephone to the BBC in London, the morning after the opening of the battle. It was then broadcast worldwide by the BBC in conjunction with the official War Office communiques (Radio New Zealand,1988).

Figure 3. Arch Curry of the Mobile Unit recording a message home from Flight Sgt. Pat Newman, Italy 1944 [Photograph by George Robert Bull, 1910-1996, Ref: DA-05602-F. Alexander Turnbull Library, Wellington, New Zealand].

This co-operation with the BBC meant a new immediacy in international news coverage for New Zealand radio listeners. Their daily war news came via shortwave radio from the BBC Overseas Service transmitters in Daventry, England. News bulletins and any items of particular interest to New Zealanders were recorded as they were received in Wellington by the NBS 'listening watch' (Figure 4), which monitored the BBC and other international broadcasters 24 hours a day during the war. Any notable or New Zealand-related items were recorded via a series of disc cutters for re-broadcast to the domestic radio audience (or for transcription, if the shortwave reception was particularly bad).

Figure 4. National Broadcasting Service 'listening watch' during World War II. Basil Clarke records an incoming shortwave news bulletin in Wellington for re-broadcast [The New Zealand Listener, 11 May 1945].

When the Mobile Unit broadcasters produced a report on newsworthy New Zealand action (such as the Alamein despatch) it could be heard back home within 24 hours via the BBC, overcoming the country's geographic remoteness and allowing listeners to hear familiar New Zealand radio voices such as Arch Curry, telling them what their men were up to in the fighting on the other side of the world. In broadcasts such as the reports on the bombardment of Cassino, Italy in February 1944, the Mobile Unit broadcasters brought the sound of the war into New Zealand homes. Over the background roar of bomber aircraft and artillery fire, Arch Curry describes the historic hill-top town as 'seeming to bulge and heave, as scores of shells tear simultaneously at a hundred points' (National Broadcasting Service, 1944, ID18883).

The preserved output of the Mobile Units also represents a development in the democratisation of New Zealand's broadcast media and media libraries. Prior to the war (possibly largely due to the expense of imported blank discs in the economically depressed 1930s), broadcasters tended to only record and keep significant events or the voices of 'the great and the good'—interiews with leaders in the country's political, sporting or cultural spheres. We know from newspaper radio listings that everyday New Zealanders were appearing on radio—especially in live musical performances which were a major feature of the new commercial stations—but very few of these pre-war broadcasts were ever recorded or saved for posterity.

With the conflict of World War II came the need to ensure that a broad spectrum of New Zealand society supported the war effort. This saw the Mobile Unit microphones capture the involvement of hundreds of regular New Zealanders who were 'doing their bit' overseas. As well as interviews with generals, officers and decorated military heroes, they recorded infantrymen, army drivers, bakers, nurses, and clerical workers. The recordings feature a broad cross-section of New Zealanders, from all parts of the country: urban and rural, Māori and Pākehā (non-Māori), working class and elites. These recordings meant that for the first time a substantial sound library of the voices and experiences of everyday New Zealanders could be populated.

Creating 'an historical library of the war for future use' was one of the actitivies intended for the Unit from its conception, as outlined by James Shelley in his initial proposal to the government. (Shelley, 1940). This intention was conveyed in publicity about the Unit as it prepared to leave New Zealand in August 1940. Describing the newly built recording van, *The Listener* magazine noted: 'Such is the marvel of modern science that through this tiny travelling unit…future generations will hear the voices of their soldier heroes of the world war' (*The New Zealand Listener*, 1940). Further, in his annual report to New Zealand's Parliament for the year to 31 March 1941, Shelley noted the historic worth of recordings now being sent back to New Zealand by the Unit: 'It is impossible to overestimate the future value of these recordings for programmes, anniversary celebrations, historical, and educational purposes' (Shelley, 1941).

One limitation in the breadth of this collection of wartime New Zealand voices is the small number of women recorded. This is due to the fact that roles for women near the Allied frontlines in World War II were very limited. But some women were captured by the unit's microphones: we hear from nurses in New Zealand military hospitals, volunteers in forces' canteens or service clubs, and the wives of generals and other dignitaries, such as Lady Barbara Freyberg, wife of the New Zealand Division's commanding officer, Major-General Bernard Freyberg.

The recordings made by the Mobile Units also meant a substantial number of Māori voices were able to be kept. The recordings the Unit made of the men of the 28 (Māori) Battalion are especially treasured by descendants, and their *waiata* (songs) and *kōrero* (speech) in *te reo Māori* (the Māori language) have become an intrinsic part of the legacy of this highly-decorated unit. An example is the *Concert by the Māori Battalion at Taranto, Italy,* recorded in November 1943. These musical recordings continued to find an audience post-war, regularly featured in broadcasts marking Anzac Day (New Zealand's national day of military remembrance), and were released on CD by the National Library of New Zealand in 2006. Additionally, some of the Battalion's men who recorded their radio talks or messages home in Māori were native, first-language speakers of *te reo*, making their recordings a valuable source for studying changes in language and dialect (Figure 5).

Figure 5. Repatriated New Zealand prisoners of war recording a message for family back home, Egypt, 1943. L-R: Mobile Unit staff Charles Goodwyn Lewis (with a portable recorder) and John Proudfoot; Sergeant Harry Taituha and Private C.A. Pearce. Photograph by George Robert Bull [Ref: DA-03223-F. Alexander Turnbull Library, Wellington, New Zealand].

Access and discovery
For the reasons outlined above, the World War II Mobile Broadcasting Unit recordings were nominated for inscription in UNESCO's Memory of the World programme. The Memory of the World Aotearoa New Zealand Register is one of 60 such UNESCO programmes worldwide that aim to recognise significant documentary heritage.

The nomination was successful and the wartime Mobile Unit recordings were inscribed in February 2020, joining other significant New Zealand audiovisual heritage items such as the National Film Unit's newsreel collections and the post-war oral history recordings made by another Mobile Broadcasting Unit between 1946 and 1948. In order to facilitate access, a project to fully digitise the wartime collection was begun, along with plans to enhance description and metadata.

In 1993, the 12-inch lacquer discs were transferred to digital audio tape by the Radio New Zealand Sound Archives, according to preservation best practices of the time. Although much of the specific data on the transfer of these discs to digital audio tape (and subsequent transfer to CD-R) was not recorded, there is ample evidence to show that the methods used have been superceded by our current standards.

During the 1993 transfer, the discs were cleaned manually with a soft, soapy brush whilst lying on a towel, with another towel used to dry them. The discs were recorded using a range of custom styli which captured the audio directly onto digital audio tape at 16

bit 44.1 kHz. Some were also played wet, but it was not noted which specific discs this applied to. Access copies were then made from digital audio tape onto CD-R in the early 2000s. The same sample rate and bit rate was used for this transfer. Unfortunately, the durability of both of these formats was less than expected. The digital audio tapes contained a significant number of errors. This was, in part, due to poorly understood processes of this new technology. A misaligned machine would inevitably cause transient clicks or dropouts in the audio. The media was also a particularly vulnerable format due to its thin, narrow tape and mechanically fragile nature. These digital audio tape errors were then transferred to the CD-R copies.

In addition, the recording standards and limitations of bit and sample rate set by the media of this time were below what is now considered as best practice, and therefore inferior to the original lacquer discs which are now able to be captured at a higher quality. IASA's *Guidelines on the Production and Preservation of Digital Audio Objects* (2009, p.8) states 'When producing digital copies of analogue material IASA recommends a minimum sampling rate of 48 kHz for any material. However, higher sampling rates are readily available and may be advantageous for many content types... IASA recommends an encoding rate of at least 24 bit to capture all analogue materials.'

A print catalogue of the Mobile Unit recordings was produced in 1996. Virtually no original documentation or descriptive metadata survived with the discs from the time of recording, and apart from scant notes on handwritten disc labels, the only way of knowing who is speaking in the recordings is by listening—and hoping a correct spelling of the speaker's name can be guessed. Earlier cataloguers tried to verify the identities of some speakers through correspondence with military archives, but resourcing meant this was only feasible for a limited number of discs, and there was no easy way to verify the names of the speakers via any online database.

Each disc side contains around four minutes of audio, and when there is only one speaker per side, the speaker's name is sometimes written on the label. However, some of the discs of messages home can contain up to a dozen speakers per side, each with a 20-second message, with no written metadata at all as to their identity.

In the absence of any easily accessible verifying authority, the names of speakers listed in the 1996 catalogue were sometimes mis-heard, mis-spelled or are simply missing altogether. In order to improve discoverability of this collection and to establish it as an authoritative primary source for researchers and historians, names of speakers need to be verified and descriptive metadata improved.

New Zealand's World War II military service records are not yet fully digitised or available online, but enlistment details for most of those who served have been uploaded to Auckland War Memorial Museum's Online Cenotaph database. Online Cenotaph describes itself as 'a living memorial to those who served Aotearoa New Zealand on active service during times of international conflict' (About Online Cenotaph, 2021). Covering conflicts from New Zealand's 19th-century colonial land wars, to Afghanistan and Iraq, it collates information relating to an individual's service from official military and government records, as well as crowd-sourced contributions by families and private researchers.

This database had proved invaluable during the World War I centenary period from 2014-2018, when Ngā Taonga Sound & Vision experienced increased client demand for archival recordings of World War I veterans for use in commemorative projects. Online

Cenotaph was used to verify the identity of interviewees, making World War I archival material more discoverable and useful for clients.

When a speaker recorded by the World War II Mobile Units has an unusual name, it is relatively easy to find them in Cenotaph. However, verifying a 'Bill Wilson' or 'Jack Brown' is more complicated. Using Cenotaph data taken from a man's enlistment record, we can cross-reference this with information in his recording to identify him. The date a man enlisted, the address of his next-of-kin, names and places he mentions in his recorded greeting, or even his pre-war occupation can all be useful clues.

As part of on-going research into this collection, speakers are being identified and details are progressively being added to the Online Cenotaph entries of those found in the Mobile Unit recordings. This will eventually link to their digitised audio uploaded to Ngā Taonga Sound & Vision's online database. The copyright in most of the Mobile Unit recordings has expired and Radio New Zealand is keen to see its historic sound collection made accessible. The current projects to digitise and identify these voices mean the Mobile Unit recordings will eventually be accessible to all New Zealanders, revealing more of our wartime experience.

At its most fundamental, this project will allow New Zealand families to discover and hear the voices of their relatives on recordings which many never knew existed. Beyond this, increased access will also allow analysis of a step-change in New Zealand media history. It is hoped that listening to these recordings, historians and scholars will gain new insights into the development of broadcast journalism in this country and the part played by wartime radio in New Zealand's growing sense of national identity.

Figure 6. A New Zealand soldier in the Pacific records a message home with E.V. Spencer (left) of the New Zealand Broadcasting Unit based in New Caledonia, c.1943 [Photograph courtesy of the Spencer family].

PRESERVING NEW ZEALAND'S VOICES OF WORLD WAR II

Sandy Ditchburn, Preservation Archivist, Ngā Taonga Sound & Vision, New Zealand

These 1600 discs have survived bumpy truck rides across war-torn deserts, journeys across the globe by 1940s air and ocean transport, editing, broadcasts, numerous location moves within New Zealand, and even several major earthquakes. That they now sit carefully stored in crates four doors down from my office is miraculous. Although not without their imperfections or preservation challenges, they have kept remarkably well through 80 adventurous years .

The aluminum (and occasionally zinc or steel) base of these lacquer transcription discs is coated in a thin layer of cellulose nitrate lacquer. Tracks were cut into this lacquer by a recording engineer using a lathe fixed in the back of a modified van or on a portable 'Presto' disc recorder. Although the manufacturing origins of these discs are unknown, it is suspected that they were sourced from different companies, which would explain the discrepancy in base materials. The composition of the lacquer includes a plasticiser that was used to soften the cellulose nitrate and reduce surface noise. However, over time this plasticiser exudes from cellulose nitrate in the form of palmitic acid, stearic acid, or lauric acid, depending on the plasticiser used. The acidic surface can eat away at the lacquer and have the opposite effect of increasing surface noise. It is not uncommon to pull out a disc for digitisation and find the surface covered in white crystals and fatty deposits associated with this type of decomposition (Figure 1). After the disc is spun through a diluted detergent solution in an ultrasonic cleaner to help loosen and remove any dust or grime, ammonia hydroxide is wiped over the grooves of the affected discs to clean off any acidic deposits. The label in the centre of the disc, which carries important information, is protected during this cleaning process (Figure 2).

Figure 1. Disc suffering from palmitic acid, prior to cleaning [Sandy Ditchburn, Ngā Taonga Sound & Vision].

Figure 2. A cleaned series of discs ready for digitization
[Sandy Ditchburn, Ngā Taonga Sound & Vision].

The loss of plasticiser stresses the lacquer's structure leading to cracking, shrinking, and peeling away from the metal base. Capturing playback on a cracked record requires patience and good audio editing software. Sometimes the easiest solution is to continuously place the needle in different grooves and edit the audio together in post-production. The preservation principle of capturing as much audio as possible from a degrading disc must be kept in mind when this work is undertaken. A stray stylus needle in a crack can easily cause more damage, so drop-ins need to be calculated and precise. Revolutions per minute may also be reduced for more accurate capture before being processed back up to normal speed with editing software.

Dealing with natural grime build-up, cracking lacquer, and acidic deposits is just the beginning of readying a disc for preservation. A team of engineers, censors, and broadcasters each added their own marks to these war recordings. Often the black lacquer grooves are scrawled over in yellow chinagraph wax pencil to convey to the broadcaster which parts of the recording were to be used, or where a certain speech or event begins (Figure 3). These marks tell a story themselves, but also add crackles and distortion to the recording. However, they are often left untouched for posterity. There are also instances of deep scratches or grooves embedded into a disc in attempts to 'delete'

sections of audio. In this case, the audio is captured using the same process that is used for cracked discs. When these discs are recorded to a digital format, every part of the audio is captured, regardless of the quality or fidelity of the original audio and, as these recordings were happening in the middle of a war zone or desert, the recording quality is, at times, decreased.

Figure 3. Disc with chinagraph pencil instructions for broadcasters [Sandy Ditchburn, Ngā Taonga Sound & Vision].

The digitisation process for these lacquer discs takes place on a Technics SP-15 turntable. The signal is passed through a Elberg MD12 preamp to a MOTU 1248 analogue-to-digital converter, which captures the audio at 96 kHz 24 bit into Wavelab 10.0 audio editing software. The turntable is readied with anti-skating and the tone arm weight set at 3g or higher to ensure the stylus stays in the grooves, the correct playback speed selected, and the disc is placed on the turntable's platter. Next comes the selection of an appropriate reproduction stylus. There are a number of different sizes and shapes to choose from, with the objective of finding the best signal-to-noise ratio and widest frequency capture. The years in which these discs were recorded dictate that larger sized styli (approximately 0.00035 – 0.00020 inches) produce the most accurate reproduction. This selection process is usually done by ear and spectrometer monitoring. An elliptical shaped stylus tends to capture an improved frequency response and lower distortion than a conical stylus.

Once the disc has been assessed, cleaned, and accurately captured, it is given a unique identifying filename, and catalogued into a digital database. Metadata is embedded into the WAV file (Figure 4) which reflects the recording and processing equipment used as well as the disc's title, unique accession number, and filename. This metadata is also recorded into the digital database along with the date of capture (Figure 5). The digital

file is safely stored in a mirrored and backed-up LTO array and the processed disc is re-housed into a flat, acid-free card which is then placed into an archival plastic bag. The bag is mostly, but not completely, sealed to allow for continued off-gassing. A temperature and humidity controlled vault is the final resting place of these unique discs. They are stored with the belief that this preservation and digitisation process may be changed or repeated in the future with the advancement of knowledge and technology.
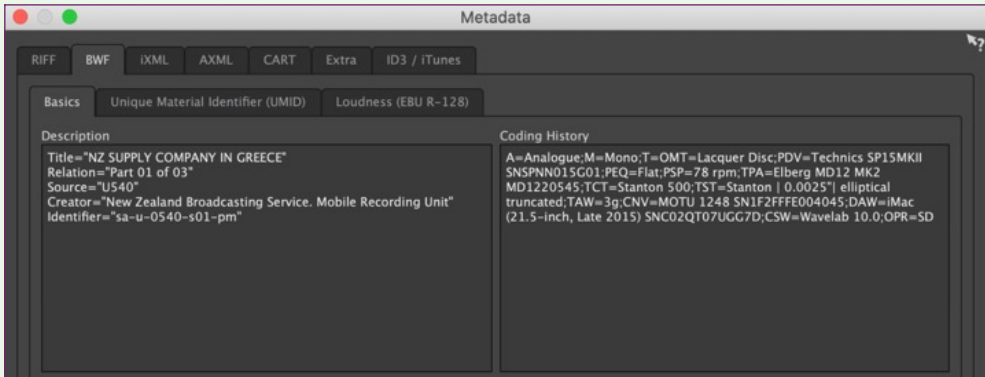
Figure 4. Screenshot of Wavelab showing a file description and coding history [Image:Sandy Ditchburn].
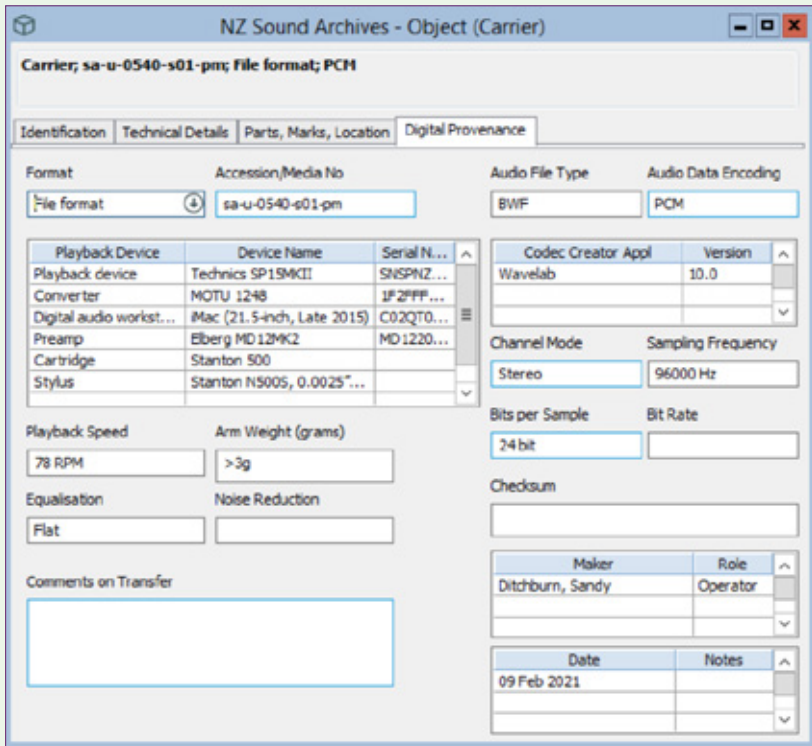
Figure 5. Screenshot of a Vernon database record showing technical metadata for an individual digital file [Image: Sandy Ditchburn].

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