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A Landscape Archive: Methods for Interaction Design, Preservation, Access, and Mapping- A Case Study

Abstract

The National University of Ireland, Galway (NUI Galway) acquired the archive of Tim Robinson in 2013. Robinson is a cartographer and writer who lived, studied, and documented the landscape surrounding Galway Bay over the course of 40 years. This paper describes the methods taken for the digital preservation, access provision, discovery, and digital mapping of this landscape archive. We describe a user interface that allows exploration and discovery of the landscape archive on a digital map, linked to the archive, which allows the user to interact with the material from a perspective of place. The aim of this is to provide an enhanced user experience and create potential for teaching, research, and community engagement. The archive can also be accessed using more traditional hierarchical archival discovery interfaces and is selectively digitally preserved and accessible as a digital archive.

Background to the archive

In 1972, Tim and Máiréad Robinson first visited the Aran Islands off the west coast of Ireland. There, they discovered the islands had not been surveyed in almost a century and their most accurate maps were the six-inch Ordnance Survey (OS). Inspired by the landscape and its rich cultural imprint, Robinson soon found himself sketching out a rough design for a new map. *"I was anxious to get on with the actual mapping as soon as possible, though I had little idea of how to go about it"* (Robinson, 1996). In 1984, having published two maps

of the Aran Islands and the Burren Regions (Midwest Ireland), the Robinsons' founded

"Folding Landscapes" as a publishing house for their critically and scholarly acclaimed

original maps of the West of Ireland. In 1987, Folding Landscapes won the Ford Ireland

Conservation Award, and subsequently won the European Award in Madrid for the project's

"unique combination of culture, heritage and conservation" (Robinson, 2017).

The landscape archive

Robinson amassed records of considerable breadth in his research, map-making, and writing

work. They amount to over 25 linear meters of shelf space in our archives' strong room and

include a Townland Index, a comprehensive collection of research maps and 84 boxes of

manuscript material that document Robinson's multi-disciplinary research (NUI Galway,

2017b).

The self-contained 'Townland Index' is a set of over 7,000 record-sized cards transcribed

from Robinson's weather-beaten field notebooks. The cards describe 567 townlands and are

arranged by Civil Parish (NUI Galway, 2017c). These cards trace the Irish (Gaeilge) and

English language placenames, and their meaning and translation (Joyce, 1901). The cards

also record the local features of historical, ecclesiastical, archaeological, linguistic, and

geological significance; as well as occasional snatches of place and folklore. In transcribing

them to the index, their content was expanded to include contextual information derived

from local authorities and published secondary sources. The information contained within

the index marks the foundation stone of his mapping project. The cards are also an

important resource for researchers interested in placenames, gathering together the official

knowledge of the placenames' branch of the OS with local derivations and pronunciations of

the name.

Digital work

To stay true to the archive's multi-disciplinary approach and to keep the mapping project alive, the authors are currently engaged to digitally preserve and map the archive. We aim to represent Robinson's work digitally to increase access and present the archive in a visually engaging manner. The digital work is divided into phases and this paper describes the first phase of this work, the digital preservation and mapping of the Townland Index. The phases of work break down as follows:

1. Digital preservation, access, and mapping of the Townland Index cards (NUI Galway 2017d, e)

2. Transcription of the Townland Index cards

3. Digital preservation and access to the archive's manuscripts, photographs, and cartographical material

4. To facilitate connections with other/similar national and international digital initiatives.

Throughout all phases of this work we are guided by the principles of digital preservation, interoperability, and open access. We also strive to create innovative and transformative interfaces for an augmented user experience to further discovery, teaching, research, and community engagement. By extracting maps from physical collections and publishing them online in an open manner, we can greatly increase discoverability, usefulness, and research potential (Hurley, 2013, Cox, 2016, Burns, 2016). Importantly for landscape studies, using historical maps underpins current and future research (Panagos et al., 2011).

It is worth noting that for the phases of work defined above, the delivery of phase 1 has

been committed to by the Library and its partners. The delivery and detailed planning of phases 2 to 4 are still under discussion and await funding.

Digital scholarship in NUI Galway

The pace of scholarship-focused digital content creation has grown substantially in NUI Galway, both in the Library and on a wider University level. New partnerships have both demanded and introduced an entirely new scale of digital preservation, digitization, and archive management. Innovation and investment in both the management and services of the digital library, as well as in high profile archival collections, have resulted in new partnerships, working practices, and strategies.

In 2013, the NUI Galway Library formed a Digital Library Strategy Group to improve and secure the future of its digital collections. The Library has invested and innovated to create robust and flexible ways of working with digital objects.

We created and published a digital library strategy, implemented preservation and discovery infrastructures, evolved the internal thinking in relation to the digital library, created a multi-functional cross-unit team to run digital library projects, and embarked on interesting and innovative projects (NUI Galway, 2017a).

In terms of archives, our work integrates both traditional (archival finding aids) and new digital discovery methods (faceted search for archives), while also tests the capacity to create visually engaging ways (mapping and deep zoom) to reach new audiences (Hurley, 2013, Deal, 2014).

Digital publishing infrastructure

The Library has an existing and evolving digital publishing platform created from a suite of open source software. As discussed, the first phase of the work on the landscape archive is digital preservation, access, and mapping of the top-level Townland Index cards. This work, the main subject of this paper, takes place on the Library's institutional digital platform. Key elements of this digital platform are:

- the digital repository using Islandora for digital preservation, access, and niche discovery (Moses and Stapelfeldt, 2013)

- digital exhibition and mapping using Omeka and Neatline (Nowviskie et al., 2013)

- archival management using CALM (Axiell, 2016)

- wide discovery using Primo (Exlibris, 2017).

Our digital repository, mentioned above, is implemented using Islandora. Islandora is an open-source software framework designed to manage digital objects, support long-term storage and preservation, and manage access. It is based on Fedora (Flexible Extensible Digital Object Repository Architecture) (Payette and Lagoze, 1998). Commonly known as Fedora, Fedora is a community driven open-source repository system. Fedora's main use is for the long-term preservation of digital content. It enables persistence, fixity, audit, versioning, and import/export (Duraspace, 2017).

In addition, other key components used for our digital collections are Omeka and Neatline. Omeka is used for exhibiting content (Hardesty, 2014) and Neatline is used for digital mapping of the archive (Nowviskie et al., 2013). Neatline allows for archival metadata and objects to be reimagined, while providing possibilities for deep interpretive or theory-based

expression (Deal, 2014, Kramer-Smyth, Nishigaki, and Anglade, 2007). At the same time, Neatline acts as a communication intersection point between scholars and managers of digital collections (Nowviskie et al., 2013). Neatline is a low-barrier technology that can be used quickly by new scholars, non-technical stakeholders and staff, and technical experts. In our environment, Omeka and Neatline are managed by the Library at an institutional level for the entire University as part of our digital publishing infrastructure. We view and encourage these tools being used by undergraduates, researchers, and staff for digital projects.

Digital preservation, access, and mapping of the top-level Townland Index cards

During the first phase of work, our aims and objectives are to preserve and create a visual interface to the Townland Index. When starting, we first identified potential user interactions with the content and subsequently drafted content flow and user interactions within our digital platform. See "Figure 1. Overview of Tim Robinson digital mapping project" for an overview of the user and digital platform interaction. Access is provided via the following multiple access points:

- a hierarchical listing of archival metadata using our archive search interface
- high resolution digital access to the objects along with their metadata using our digital repository
- a map interface where users interact with the digital objects using real polygon townland shapes on Open Street Maps (OSMs).

Furthermore, in terms of data flow and system interoperability, we aim for as little content

duplication as possible while creating a usable and engaging interface.
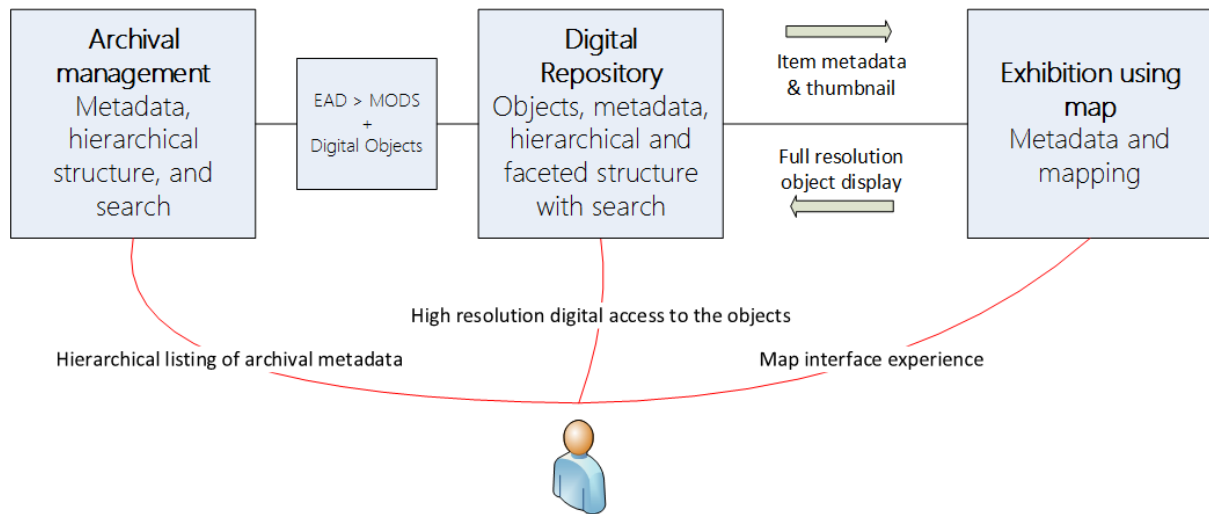

Figure 1. Overview of Tim Robinson digital mapping project

Methods

The work for phase 1 (digital preservation, access, and mapping of the top-level Townland

Index cards) can be broken into the follow sections:

- archival listing and arrangement

- digitization

- digital repository (digital metadata, digital preservation, ingestion, and access),

- mapping (metadata transfer to Omeka, creation of Neatline exhibition, generation of
  geo-spatial metadata for each townland, enrichment of metadata with geo-spatial
  polygons, and adding a geo-referenced map layer to OSM with archival maps
  sourced from the landscape archive).

Archival listing and arrangement

As detailed previously, the Robinson archive contains a substantial volume of material. The initial appraisal work on the archive identified three distinct sections, and the decision was made to approach archival listing in this order, making each section available once it had been listed. The archive was listed according to the General International Standard Archival Description (ISAD (G)) standard for archival description and catalogued on the Library's archival management system (CALM) (Axiell, 2016).

The priority was the Townland Index, a set of over 7,000 record-sized cards, containing information that was transcribed from Robinson's notebooks. In the archive, we have maintained their original order and created descriptive metadata at the level of townland. The second strand of the archive is a comprehensive body of reference maps and charts that fed into Folding Landscapes' cartographic output. Thirdly, Robinson's manuscript material builds a more complete picture of the evolution of his landscape work. Arranged per the geographical areas on Galway Bay where Tim worked (Aran Islands, the Burren and Connemara); it gathers together his research work for each area, documents his writing processes, and his involvement in local ecological matters such as the campaign to save Roundstone Bog, Mullaghmore / Mullach Mór. All sections of the archive have been described using ISAD (G) at item level.

Digitization

The Townland Index contains approximately 7,000 cards. As a first step, we digitized, in Tagged Image File Format (TIFF) format, the title card of each of the 567 townlands in the index. The title card provides the top-level information about the townland and most townlands have multiple cards associated with them. With thanks to the University's Centre

for Irish Studies, we were the beneficiaries of a successful grant application that funded an intern for two weeks who carried out the initial digitization work for us. At the time of writing, the Library has digitized all the index cards and published openly online the title card for each townland. Currently, we are organizing the digital objects and metadata to prepare for ingestion to our digital repository. When ingested, all the Townland Index cards will be available openly online with repository features such as navigation, faceted search, descriptive metadata, and deep zooming.

Digital repository

Digitization provides the digital object in a format that can be preserved (Brown, 2013, Duraspace, 2017). To complete the preservation and access component of this work, we required metadata for each digital object and a location to securely store both the objects and their related metadata. For digital preservation, we use a double strength approach. Specifically, we store objects and associated metadata in both our digital repository (using Islandora to store high resolution versions and provide lower resolution access alongside the metadata) and local storage (to store high resolution versions and the metadata). A precursor to digital preservation is the creation of a package that aids preservation, we achieve this by combining the digital object and its metadata in an appropriate format (OAIS, 2012).

Our already-created archival metadata was transformed from Encoded Archival Description (EAD) (Pitti 2009) to Metadata Object Description Schema (MODS) (Guenther, 2004). EAD was exported from our archival management system (CALM) and transformed to MODS using an Extensible Stylesheet Language Transformation (XSLT). This process created one MODS XML file for each digital object. The XML and the digital object (in TIFF format) form

the package for digital repository ingestion and local storage. The digital images, along with their corresponding metadata (in MODS format), are uploaded to our digital repository, where they are organized into a structure defined by their Civil Parish. They can be navigated through that structure or searched.

After ingestion, MODS metadata is enriched to include descriptive metadata fields as per "Table 1: Metadata Object Description Schema fields used".

Metadata field	Description
Filename	Filename of the digital resource
Id	Unique identifier, matches to physical archival record
Title	A word, phrase, character, or group of characters, normally appearing in a resource, that names it or the work contained in it.
Type of resource	A term that specifies the characteristics and general type of content of the resource.
Name *	The name of a person, organisation, or event (conference, meeting, etc.) associated in some way with the resource.
Role *	Designates the relationship (role) of the entity recorded in name to the resource described in the record. For example, Creator
Genre	A term or terms that designate a category characterising a style, form, or content, such as artistic, musical, literary composition, etc.
Date created	Date item was created
Date issued	Date digital resource was published
Publisher	The name of the entity that published, printed, distributed, released, issued, or produced the resource.
Description	Abstract, summary of the contents
Extend	Normally physical number of pages

Related item	Information that identifies other resources related to the one being described.
Subject > Topic *	Used as the tag for any topical subjects that are not appropriate in the <geographic>, <temporal>, <titleInfo>, <name>, <genre>, <hierarchicalGeographic>, or <occupation> sub elements.
Subject > Geographic *	Used for geographic subject terms that are not appropriate for the <hierarchicalGeographic> element.
Subject > Temporal *	Used for chronological subject terms or temporal coverage.
Cartographics	Cartographic (maps or charts) data indicating spatial coverage.

Table 1: Metadata Object Description Schema fields used.
* indicates that these fields can be repeated.

Table 1: Metadata Object Description Schema fields used.

Mapping

To present both the geographical range and subject material of the archive in a way that

honors its visual qualities, we selected the Neatline plugin for Omeka. Importantly, Neatline

was an existing component of our institutional digital platform and as such using Neatline

ensures the sustainability of this digital work. Neatline facilitates the creation of a narrative

using maps and timelines (Nowviskie et al., 2013, Evans and Jasnow, 2014). Neatline also

allows for spatial data to be added, providing metadata for each townland, as a point or

polygon. Point or simple polygons for each townland are straight forward to add using the

Neatline interface but the visual representation of the townland would not be detailed

enough, nor would it provide a modern and usable user experience. Using a simple polygon

to represent each townland visually provides little more than a single point or dot, when

ideally the borders of each townland are what are required in the visual display.

Importantly, Neatline allows for complex polygons to be added by using Well-Known Text

(WKT), a text markup language for representing vector geometry objects on a map. The data

points needed to trace the outlines or borders of these townlands are complex shapes with many points required to represent the real-life townland shape. Thanks to the open source and crowd sourced communities, the townland shapes were already available on the Web site of the Irish Open Street Map community in an open source Geographic Information System (GIS) format, GeoJSON. Building from this, we first defined a manual process to convert existing townland GeoJSON to WKT. We then scripted the retrieval and conversion of existing GeoJSON to WKT for import to Neatline. This script is open source and can be found on GitHub (Corrigan, 2016).

This work created an interface, using Open Street Map, which displays each townland visually. Users can simply select a townland to view more information. For example, see "Figure 2: Tim Robinson's title cards mapped to townlands".
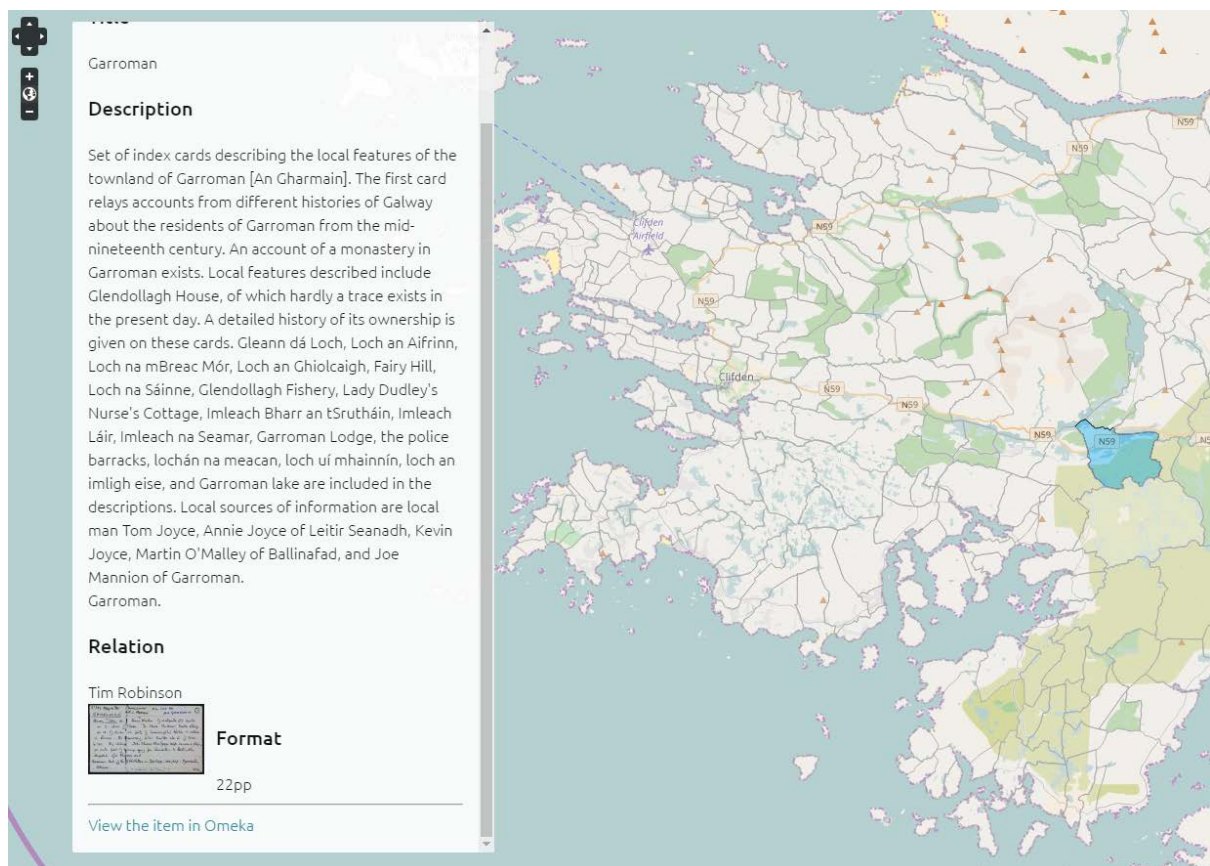

Figure 2: Tim Robinson's title cards mapped to townlands

In addition to the OSM base layer, Neatline can also be used with further map layers (functionality that allows us to increase the complexity of the information we can make available thereby increasing access) to enhance both usability and the end-user experience as stated in our original objectives. We created another map layer using two of Tim Robinson's maps from the region. These maps are of Connemara and the Aran Islands. The goal is to enable users to visually interface with the townlands using the original Robinson maps with all the features. For example, see "Figure 3: Tim Robinson's title cards mapped to townlands interfaced with original maps".
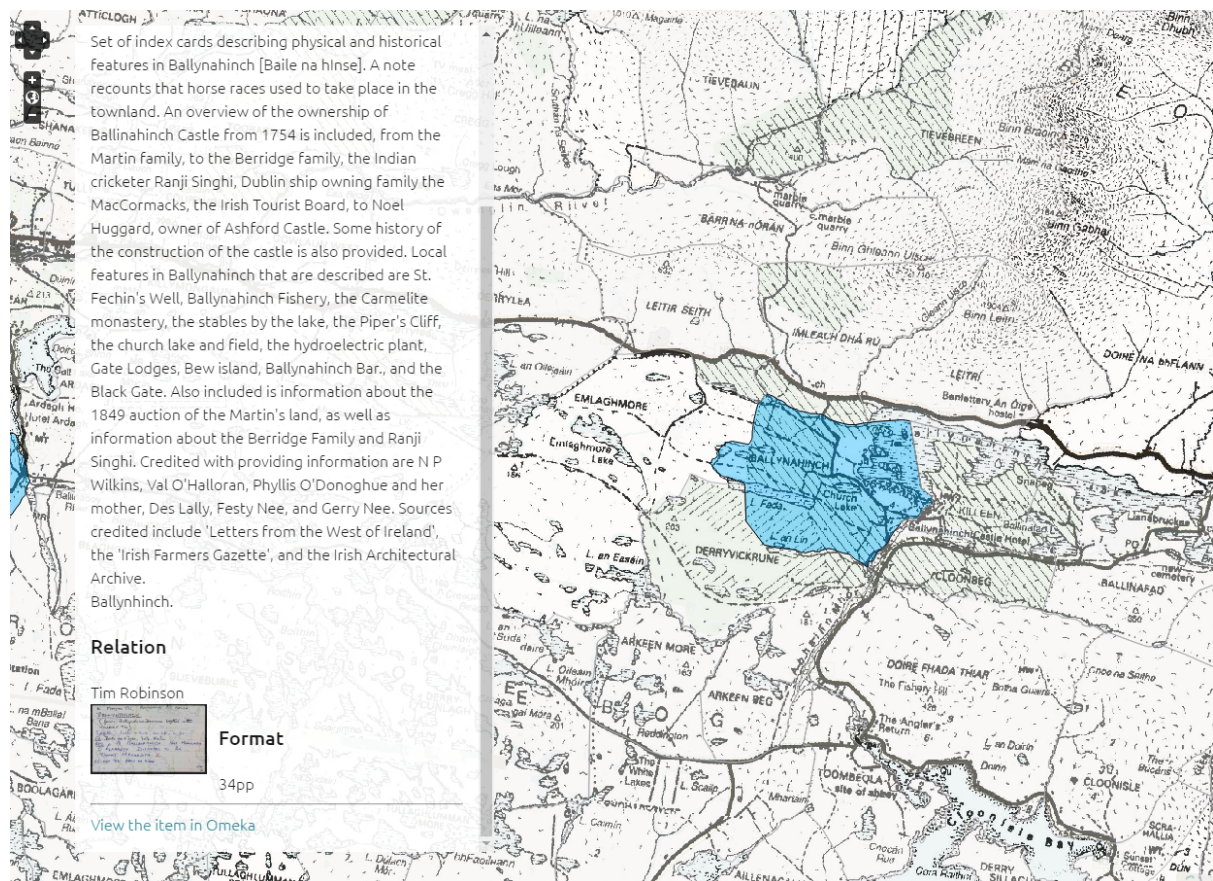

Figure 3: Tim Robinson's title cards mapped to townlands interfaced with original maps

The digital mapping project (NUI Galway, 2017e) can currently be viewed as a beta version. A user can either conduct a search for the townland they are interested in on the exhibition,

or they can hover over the map. By selecting a townland, they will get the result shown in Figure 3. Here you see Tim's map, the townland of Ballinahinch on it, the descriptive metadata, and a thumbnail image of the title card relating to that townland from the Townland Index. Two considerable components of the archive are visually represented – the Townland Index and the maps.

Next steps

Our next steps in the project are to publish freely online the complete set of Townland Index cards. The archive has applications to many areas of research focus at NUI Galway including the Irish language, history, archaeology, botany, marine science, and geology, as well as strong local community engagement in the West of Ireland. Our intent is to enable transformative uses of the materials with a cartographic base layer that can be built upon and enriched with multi-formatted digital objects. The material in the digital archive has connections with other national digital initiatives such as logainm.ie, the Placenames Database of Ireland, and duchas.ie, the National Folklore Collection of Ireland, and we are open to increasing connectivity with these digital resources as we progress our project.

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