Acquiring metadata to support biographies of museum artefacts

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Abstract. Museum collections are primarily experienced in physical museums. Metadata and linked data have the potential to support new models of interaction with heritage objects outside museums. Object biographies are a conceptual lens through which to view object metadata. We explore the concept of object biography through an interview-based study of selected artefacts from local New Zealand museums. We discuss how the nature of this metadata can support new object-centric interaction in the wider environment.

Keywords: metadata, museum, object biography.

1   Introduction

Museum collections have challenging metadata requirements due to the unique nature of the artefacts to be described. Available metadata impacts in-museum display, participation in the linked data of the semantic web and potential new interaction models.

Previous studies have shown that heritage objects with insufficient display and interpretation can be ignored during on-site visits [21], they can be curated into personal collections online (either before or after on-site visits) but abandoned thereafter [19]. Heritage objects can often be seen as isolated in physical museums [10].

Ciolfi [4] argues that a variety of technological platforms and their applications have largely reproduced one restricted "model of engagement with heritage" that features a curator or guide offering a sole institutional voice to visitors. We share this desire for an expanded view of heritage and for exploring interactions and participation that convey heritage beyond museums. Metadata and linked data have the *potential* to support interaction with heritage objects outside museums but current inhibitory issues lie in the quality, quantity and dispersal of published artefact metadata and linked data [2, 7].

We see *object biography* as one approach to inform a richer representation of, and thus interaction with, heritage artefacts. Being an established, as well as a recognised concept in archaeology and museum studies [21, 24], this biographical approach seeks to uncover the relationships between people and objects via life histories of an object

or assemblage [10, 14, 15]. Artefacts accumulate and transform meanings and values from the moment they come into existence: the significance of an artefact is based in its connection to people and events. When consideration is given to these life moments of an object, their social contexts and consequences, "little is left out" [10].

In this paper, we describe a small exploratory study designed to investigate object biographies for selected artefacts from local New Zealand museums. The discussion considers the implications for supporting new models of artefact-centric interaction with collections.

2   Background

Heritage artefacts are commonly viewed as static items preserved inside physical museums. The motivation for the present study is an interest in exploring the relationship between the provision of object metadata and interactions outside museums. We aim to embed heritage artefacts into a general audience's everyday lives—where and when they are—via technologies that better create an ambient appreciation of place and integration into history. This perspective motivates an exploration of what is needed in an artefact record to support people in such engaged communities.

Creating heritage object metadata can be a difficult and laborious task. Unlike books and other similar items, heritage objects are not often self-documenting: metadata is not easily derivable directly from a heritage object itself. Except for some details such as dimensions, most metadata must be derived by practiced analysis and careful scholarship. Consequently, there is a very clear long tail with a few 'star' artefacts having rich metadata and most having minimalist sparse metadata. However, metadata aimed at supporting traditional descriptive uses is not necessarily biographical in form or detail.

Among heritage linked data publishing initiatives, some work has been undertaken into computational human biographies for historical or digital humanities investigation (see [9, 13, 16]). For example, one approach that explicitly models time and space for medieval and Renaissance manuscripts has an expectation of generalising the outcome to all types of artefacts [3]. Several classes relating to an object biography—manuscript, actor, time and location at regional, national and international levels—are used for description [3].These approaches suggest that representations of heritage objects can be explored via examining object-people relationships [10]. For example, Pye suggests framing this issue as: "what it [the object] means to people now" [22].

The reported quality, quantity and dispersal issues are currently featured in library, archive and museum (LAM)-provided artefact metadata. Applications facilitating the general audience's interaction with heritage information outside the institutions primarily use their resources, either directly or for producing new assets. By borrowing three categories—education, exhibition enhancement and reconstruction—proposed for elucidating the purpose of heritage applications [1], we summarise the characteristics of six applications that used heritage resources outside of physical institutions (Table 1). The selected applications cover all of the three primary purpose categories. There is a strong focus on photographic and video resources: which inherently locate attention to a particular place and time. An architectural focus is common in these applications, and

in other tours, as it naturally fits with walking in urban areas. Other resources are typically customised especially for the specific application. In general, these types of applications do not integrate complementary artefacts from local museums: we suggest that this is due to the lack of appropriate biographical metadata for those items.

Table 1. Summary of six applications that use heritage resources outside physical institutions.

Application	Primary purpose category	Tour focus	Tour type	Heritage resource used
CityViewAR [12, 18]	Reconstruction	Architecture (Buildings collapsed in earthquakes)	Flexible	Heritage photographs of architecture, objects
Explore [20]	Exhibition enhancement	Life stories of objects (Seasonal stories at Seurasaari Island)	Flexible	Images and videos with text descriptions
Public houses, Private lives: Excavating Christchurch's colonial hotels from Heritage Trails [11]	Education	Life stories of objects (Objects used during the stay of European settlers at hotels)	Fixed	Heritage photographs of architecture, images of objects
Mobile app of *Representing Reformation* [17]	Exhibition enhancement	Life stories of objects (Thetford Priory site)	Fixed	Images and 3D models of architecture, images of sites
Svevo tour [8]	Exhibition enhancement	Life stories of a person (Italo Svevo)	Flexible	Heritage photographs, images of manuscripts, images and 3D models of objects, radio and concert recordings, movies
Walk1916 [6]	Reconstruction	Life stories of an event (Easter Rising)	Flexible	Heritage photographs of sites

However, the observed focus of museums on the objects in their physical collections may also be related to existing practice. Chen and Marty [5] have noted the risk that museums are inclined to apply exhibit design approaches solely to think about the user in the life of the museum, but not to also think about the museum in the life of the user. A museum website or online collection can be accessed from home, but novel applications can bring museum resources into our lives; making us aware of cultural connections in our immediate vicinity. Just as more commercial apps try to make us aware of nearby shopping opportunities. Placing the museum into the lives of users means 'exporting' the artefacts into the wider environment (both physical and digital).

Vassilakis et al. [23] claim that "we need to give "life" to the cultural heritage in order for it to become active and support the delivery of rich experiences" and that existing descriptive metadata does not support such new access models. The examples in [23] focus on in-museum experiences where objects present themselves differently based on the proximity of other objects (in the context of travelling exhibitions). Objects should be able to 'answer' the question "where have I traveled" [23]: although it is not clear if that extends to the biographical sense that we have adopted.

Enabling artefacts to have a presence beyond the walls of the museum is one way to place museums in the life of their users and this can only be achieved digitally. Embracing the concept of object biography is one mechanism for structuring metadata to enable object-centric interactions. Current object metadata has not been created with this application in mind and so we need to explore specific biographical capture.

3   Study Design

To explore whether, and how, employing a biographical approach could contribute to acquiring and understanding heritage artefact metadata, we designed a three-phased qualitative study that involved selecting objects, interviewing key informants and collecting structured descriptive metadata. The key informants (participants) were recruited by word of mouth and using snowball sampling from three related groups: LAM professionals, heritage experts and enthusiastic amateurs. One practical benefit of working with these loosely defined groups was to expand the otherwise limited pool of potential participants. More importantly, participants with diverse backgrounds would help us explore possibilities in the "multiple communities that heritage engages" [4].

At the beginning of each session, we requested the participant to select two to four artefacts using six criteria: the artefacts should be travelled, studied by the participant, related to each other, presented in the institution's or participant's work, enquired of, or received feedback, from the public, as well as being varied in classification. Some flexibility was allowed so that not all criteria had to be met.

Once the selections were confirmed, a semi-structured interview was conducted with audio and video recording. The interview concentrated on acquiring artefact metadata via questioning the participant's experience with the artefacts, getting *direct* and *relevant locations* marked on maps, then asking for the participant's view of the artefacts' information that a general audience could find interesting, valuable information that they were eager to convey, as well as communication between the participant and audiences based on the artefacts. We used non-digital resources comprised of board game pieces, cut cardboard pieces, sticky notes, A3-sized maps printed from OpenStreetMap and pens to mark the locations where each artefact has been (i.e. direct), and to where it is relevant with the associated time and context (see Fig. 1).

Two pilot studies were run by separately focusing on academic visits and personally collected artefacts. After revising the study protocol, five sessions were conducted with the interviews lasting for 5.75 hours in total. The participants included one enthusiastic amateur who donated artefacts to museum (P1), one librarian (P2) and three museum professionals (P3, P4 and P5). P3 and P5 were based at council-funded or operated

institutions, whilst P4 was affiliated to their local museum, where volunteers from the community played an active role in operation. P1's interview was completed in a usability lab, and the remainder were performed in the respective institutions.
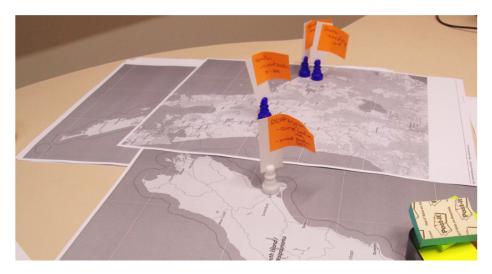

Fig. 1. Physical maps and markers used in a location marking activity

Table 2. The selected objects for the study.

Object No.	Object
S1 incl. O1 – O3	3 Uniform Patches
O4	Official Photo of Air Training Corps (ATC) Flying Scholarship
S2 incl. O5 – O7	3 Photos of ATC Flying Scholarship Cadets
S3 incl. O8 – O11	4 Pieces of ATC Course Documentation
S4 incl. O12 – O14	3 Photos of Cadet in Uniform
O15	Jansson Map
O16	Stokes Map
O17	Printing Press – 'Excelsior'
O18	Wedding Dress – Bodice and Skirt
S5 incl. O19 – O22	4 Pieces of Buckland China
S6 incl. O23 – O25	3 Illuminated Manuscripts
S7 incl. O26 – O30	5 Wooden Patterns for Moulding Mine Machinery Wheels
O31	Camera
S8 incl. O32 – O33	Cup and Plate
S9 incl. O34 – O35	2 Pamphlets – *Maori Settlement of the Waikato District*

4 Results

The participants selected 35 single objects: they were presented in the study sessions (and listed in Table 2) as 6 individual objects and 9 sets of objects that consist of the other 29 pieces. Individual objects and sets of objects are respectively numbered from O1 to O35 and from S1 to S9. The existing structured descriptive metadata (the *existing*

metadata) of 12 single objects—O16, O17, O18, O19 to O22 of S5, O31, O32 and O33 of S8, as well as O34 and O35 of S9—was gathered. The other 23 pieces did not have any structured descriptive metadata digitised by 4 July 2018: S1, O4, S2, S3 and S4 were recently donated to museum; O15 was rediscovered in 2017 and not catalogued; S6 and S7 also had no digitised structured information. The new metadata of all the selected objects were acquired verbally from the interviews (the *acquired metadata*). The verbal data was transcribed and then coded in NVivo 12. Both sets of metadata were interpreted through an object biography lens.

4.1   Two sets of metadata and their extents

In the existing metadata, that associated with O16 primarily described a facsimile edition of *Discoveries in Australia* in MARC standards[1], as O16 was attached to the book. O17, O18, S5, O31, S8 and S9 were recorded in compliance with Spectrum format[2]. For S5 and S9, the existing metadata were at the set level. O32 and O33, both part of S8, however had been individually recorded with the same *Acquisition Notes*.

The acquired metadata were free-flowing, narrative and thus less scholarly. They revealed their relatedness to seven types of biographies: the biographies of selected objects, "typical life" of the similar objects [14], related places, related time periods, related persons, other objects associated with the related persons, other intangible items associated with the related persons.

Employing object biography as a conceptual tool enabled the comparison shown in Table 3 of the extent and certainty (see 4.2) between the two sets of metadata across three object life stages—being made (*Made*), being exchanged, used or owned (*Exchanged*) and being collected (*Collected*)—informed by [14]. Six metadata property categories: location, time, person, event, value and meaning and context were abbreviated as *L*, *T*, *P*, *E*, *V* and *C*. Hyphens (-) symbolise no existing metadata. Black circles represent metadata values that were certain, whereas white circles represent uncertainty. Blank cells indicate no existing metadata and no metadata was acquired.

The details from the existing metadata and the acquired metadata were predominately given multiple labels from the six property categories. For example, one of the *Provenance Notes* of O17's existing metadata contained "… [a] Maori newspaper called 'Te Paki o Te Matariki' … was also published at the Parliament from 1891 to 1902, reputedly by this press, but it would seem to be too small for the pages." The implication was that there were events examining and cataloguing the use of O17 in a museum practice context. The related metadata acquired from P3 included some extra details: "… I know that [O17] is not likely to have been used for the newspaper and is more likely to have been maybe a notice or used for that kind of publication. "… [I]t would only have been a single sheet from this printing press, so we need to have an example of that and we don't have any here at the museum."

The acquired metadata overall covered a greater extent than the existing metadata, even with the differing amounts of existing detail. The information of the objects across

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1   https://www.loc.gov/marc/
2   https://collectionstrust.org.uk/spectrum/

their lives was difficult to derive from the existing metadata, particularly for the first and second life stages. The acquired metadata bridged some of the gaps with more details that embraced a higher level of uncertainties.

4.2   Detail, certainty, spatial and temporal granularity

The detail of the metadata varied among the artefacts or sets of artefacts from being "[f]ully catalogued" to being produced using limited resources. The existing metadata were machine-readable in principle, yet the catalogued details that were biographical and potentially useful for enabling access to artefacts in wider environment commonly existed in free-text form as descriptions and notes, very occasionally with uncertainties (e.g. one of O17's *Provenance Notes* in 4.1).

The acquired metadata yielded a considerable amount of details of each artefact/set of artefacts. The participants were willing to supply uncertain information that was either rarely catalogued or not included in the existing metadata. The amounts of uncertain information therefore markedly increased in the acquired metadata. Among the spatial and temporal details that were certain, some were clearly not fine-grained.

One observation was that raising the mutual relationships between the certainties or uncertainties in one selected object/set of objects and the uncertainties or certainties in the similar objects or the objects associated with the related persons was spontaneous and sometimes connected with the reasoning behind the information. P1 recalled the production of O3 of S1: "Because this shop [that did monograms] was literally across the road from the barracks we were in … and we'd seen people going out with patches and so I just went: 'Why don't we get one?'. I'm guessing there were probably other [cadets who took the] courses that did the same thing, I'd never seen one. So, in that sense I thought 'what's the rarity value?', put it on display." The location, value and context of O15's second life stage, as well as time, person and event across its second and third stages involved uncertainty. The reason was the purchase and acquisition events of O15 were associated by P2 with a deceased person and were "impossible to confirm": "It just is a very strong feeling on my part that that is what [they] did, because our careers overlapped and [they] would do this … We have a lot of good maps because of [them], so I think this is one of those."

The supplied spatial and temporal granularity was another recurring theme. The grain-size of the location properties frequently stayed at city or town level, whilst that of the time properties varied from within months to two decades. P5 explained how S8 saved their donor's life: "… [T]hey were used during World War I. "We're not exactly sure where [the related person] was, at what point in time, but it's believed that he was drinking, and the bullet came through. … [T]hat hit the cup and [plate] instead of him."

4.3   Interesting takeaway points

Artefact metadata that a general audience might find interesting and that the participants wanted an audience to take away were acquired.

Table 3. The extent and certainty of the existing and acquired metadata.

Object No.	Existing metadata divided by different life stages																		Acquired metadata divided by different life stages																		
	Made						Exchanged						Collected						Made						Exchanged						Collected					
	L	T	P	E	V	C	L	T	P	E	V	C	L	T	P	E	V	C	L	T	P	E	V	C	L	T	P	E	V	C	L	T	P	E	V	C
S1 incl. O1 – O3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
O4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
S2 incl. O5 – O7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
S3 incl. O8 – O11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–							●	●	●	●	●	●	●	●	●	●	●	●
S4 incl. O12 – O14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	○	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
O15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–																		
O16	●	●	●							●	●	●							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
O17	●	●	●	●			●	●	○	○	○	○							●	●	○	●	●	○	○	○	○	○	○	○	●	●	●	●	○	○
O18		●	●	●	●	●	●	●	●	●	●	●							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
S5 incl. O19 – O22	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	●	●	●	●	●
S6 incl. O23 – O25	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	○	●	○	●	●	●	●	○	○	○	●	●	●	●	●	○	○	●
S7 incl. O26 – O30	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●	○	●	○	●	●	○	●	●	●	●	●	●	●	●	●	●
O31								●	●	●	●	●													●	●	●	●	●	●	●	●	●	●	●	●
S8 incl. O32 – O33					●	●	●	●	●	●	●	●	●	●								○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
S9 incl. O34 – O35	●	●	●	●								●	●	●								○	○	○	○	○	○	○	●	●	●	●	●	●	●	●

A pattern was that the interesting and valued takeaway points of the metadata were strengthened by the intersections of the biographies (i.e. the seven types of biographies identified in 4.1), both factual and imaginary. The audiences made meanings via intersecting their own biographies—one sub-type under the biography of related persons—with other types of perceived biographies (e.g., "people putting themselves in the shoes of people in that time and thinking about that", said P3). The pattern was captured from the acquired metadata including those of O3 of S1, O15, O17 and S8. One example was a part of S6's (i.e. three illuminated manuscripts "for retiring local personalities") metadata offered by P4:

"… A lot of them haven't survived because they've been poorly stored … and then people can't see the value. … I think it depicts an era where your service to a business, organisation or whatever, was valued.

"… I say it compares [with medieval illustrated manuscripts] because the artwork is similar but now that's been done with pen, … It makes you think, doesn't it?

"… [A lady] said to me this is a medieval skill. I was thrilled … I said: 'Yes, it is a medieval skill.' She said: 'I didn't realise that in modern times that that skill had carried through.' … She was just blown away that the museum had gone to the trouble of raising money, finding a conservator and getting them [restored] in such high quality."

5   Discussion

The acquired metadata has the potential of being transformed into biographical metadata and, therefore, supporting novel interactions with heritage artefacts. The following section discusses the knowledge gained from the study for creating biographical metadata and new scenarios of accessing heritage artefacts.

5.1   Creating object biographies

The notion of object biography was used in this study as:

- A conceptual tool for designing the metadata acquisition method, analysing and understanding the existing and acquired metadata
- A potential structure of the acquired metadata.

The method was successful in establishing the viability of metadata acquisition for biographies of the selected objects, however, time constraints meant that some follow-up would be needed to produce complete descriptions suitable for implementation. The method might also only work with a relative small number of objects, the present focus is nevertheless on quality over quantity. For some artefacts and for some participants, an acquisition tool could possibly be used on location or remotely with digital mapping services. Future prototyping could help participants with temporal and spatial granularity as providing metadata for a novel visitor interaction may well be too abstract.

The biography of an artefact should comprise "a reasonable number of actual life histories" [15], though it does not have to tell "a neat linear life story" when the evidence is lacking [14]. Together with the captured biographical intersections that were

perceived as interesting, this understanding offers an implication of biographically structuring the acquired details of the selected artefacts.

The mutual relationships between the certainties/uncertainties in one object and the uncertainties/certainties in the similar objects or the objects associated with the related persons, signifies alternative approaches for representing uncertainty that could in turn lead to new user experiences. Additionally, the rich stories of the wooden patterns of S7 might extend to other industrial artefacts in the region with a mining context. The acquired details could be a resource for creating the biographies of the similar artefacts with insufficient records [14, 15].

5.2   Using object biographies to create new access models

An object can die and be reborn as it joins in and departs from relationship spheres [14]. By adopting this biographical viewpoint to cope with the jumps and idleness that an object experienced, we could assist a user to not only appreciate the object's remembered past, but also connect with the object's co-created present in their life [5, 19].

Vassilakis et al. [23] suggested shifting the viewpoint of a collection to an artefact and allowing the artefact to 'present' itself to visitors. We aim to extend that approach by allowing the artefacts to be present across the external environment. We have seen that the participants can express biographical metadata about the objects in their collections and this potentially enables these new forms of access.

The implication of a user expressing interest (by whatever means) in an object is that their interest is *spread* to the biographical trail of that object across time and space. This transfer of user interest enables new scenarios of use that can take objects outside museums and place them into their geographical context, for example:

Jane is visiting a foreign country. She uses an audio tour guide to access enhanced descriptions of selected objects during a museum visit. Later in her trip she visits a different town and her mobile device notifies her that several of those objects had been present in this town. Her device offers to customise a tour of the relevant locations in chronological order and suggests other related objects in the local museum.

Conversely, user location histories can be used for in-museum recommendation: where the recent biography of the visitor intersects with the biographies of the artefacts.

6   Conclusion

The potential of object biographies to enable new forms of context-rich interactions is constrained by the available metadata. Artefact records typically do not contain the type or detail of machine-readable metadata needed to support the projection of objects from physical museums to the wider environment. Although a small scale, exploratory study, we believe we have shown the potential of our approach as a method to gather object biography metadata. Participants seemed to find the study enjoyable with relatively low effort: which is important if we are to ask busy people with expertise to share insights. The acquired metadata was somewhat different from the existing metadata:

- More extensive, narrative and less scholarly
- More mutually informed uncertain and certain information among the artefacts
- More focus on biographically intersected topics that would be of interest to a visitor
- Less consistent as to the level of detail, spatial and temporal granularity.

As such, although we refer to the information obtained as artefact metadata, it has many features more in common with the kinds of information provided on interpretive displays next to artefacts in exhibits, than to the fields in an artefact collections database. The main contributions of this paper are:

- To adapt the object biography as a conceptual tool to support new forms of context-dependent interaction with museum artefacts
- The description of a metadata acquisition technique tailored for object biographies
- To report that metadata acquired via this method has properties which seem promising for creating engaging user experiences.

We note that these initial findings are derived from a small focused sample and we aim to expand our set of artefacts as the ideas are implemented in a mobile application.

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