'*Kōmako* Database Usability Test'

by

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Submitted to the School of Information Management,
Victoria University of Wellington
in partial fulfilment of the requirements for the degree of
Master of Information Studies

May 2022

VICTORIA UNIVERSITY OF WELLINGTON
School of Information Management

Master of Information Studies

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ʻKōmako Database Usability Testʼ

(hereafter referred to as 'The MIS Research Project')
being undertaken by
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Topic Commencement: **Date   29/05/22**

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Abstract

Research problem: The *Kōmako* site aims to 1) aid research and scholarship related to Māori authors and text and 2) increase the visibility and accessibility of Māori texts. Therefore, this research is intended to investigate how well the online database is structured and designed in order to aid in these goals as well as what aspects need improving. Through this this paper will also look at who uses the site and whether the site meets their needs.

Methodology: This study uses Usability testing methods in conjunction with a Māori-centred research framework. Users were asked to complete a talk aloud usability test and subsequent interview. Six participants were interviewed all of mixed professions and locations.

Results: Several issues were found during testing including issues relating to the site's search function, filters and sorting functions, language, missing information, and bugs. Positive points and previous uses were also noted.

Implications: *Kōmako* is a valuable resource, especially among information professionals. It has several functions which make it useful for Māori research and inquiries. However, these uses can be inhibited by search issues and missing information. If these issues are addressed *Kōmako* could become more user friendly and help facilitate better access to Māori authors.

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Problem Statement

Introduction

Bridget Underhill's original Bibliography was published in 1998, entitled *A Bibliography of Writing by Maori in English with partial annotation*. The preface provides the cultural background and motivation behind the bibliography as well as the research methodologies used. This includes the influence of feminist theory from the 1970s and other revolutionary critics of literary canon (vii). Underhill states that the bibliography was written as a part of the larger "effort to reclaim the Māori literary tradition" from the marginalization it had faced under the western-Eurocentric literary tradition of the time. Literature prior to this period largely treated Māori literature as an ethnographic or historic artifact documenting a dying culture. This was largely shaped by philosophies such as social darwinism, and positivist scientific theories (Tuhiwai Smith, P. L., 2021, 28). During the 1980's contemporary Māori authors highlighted the ongoing invisibility of Māori writing in mainstream literary criticism (Underhilll, x). Underhill's thesis was only one of many projects and writings attempting to change these attitudes and validate Māori writings, along with multiple other efforts during the late 1980s and 1990s, such as *Te Ao Mārama*. Māori bibliographies also existed prior to this, including; Herbert W Williams *A bibliography of printed Maori to 1900* (1924-1928), and Kathie Irwin's et al. (1991) *Maori women : an annotated bibliography.* A key aspect of Underhill's bibliography was its dedication to Māori research methodologies, discussions and the involvement of Kaumātua. The resulting bibliography involved over 1000 authors and roughly 1400 publications. Underhill concludes that she hopes that the bibliography would act as a catalyst for future research and discussion.

Starting from 2003 work to create an online version of the bibliography was undertaken. In her original thesis Underhill acknowledges the limitations of a traditional bibliography, including the linear organization and the inability to change or update the information contained. In Underhill's words, the aim behind the site's design was "to return the research to the Māori writing community". The bibliography also had additional advantages, it can be "updated; it can be corrected and maintained effectively; and in its online form it can help introduce hitherto little known Māori writers to a wider readership" (Thomson, n.a). Underhill was the main editor of the

project with Jeanette King and Christopher Thomson who oversaw translating the original text into a database. Other contributors include Han Li and Rosalee Jenkin who helped with the site's design and Dave Ewing and Brendon Wyber who provided technical support. The resulting online bibliography was named *Kōmako.* The online bibliography was subsequently launched in 2017. Although it is known that the site is used, research into who uses it and for what purposes is largely unknown. This research aims to better understand how users interact with the bibliography, as well as what works and what does not. In order to achieve this, it will utilize usability methods and a Māori centered framework.

Research Objectives

The *Kōmako* site aims to 1) aid research and scholarship related to Māori authors and text and 2) increase the visibility and accessibility of Māori texts. Therefore, this research is intended to investigate how well the online database is structured and designed in order to aid in these goals as well as what aspects need improving. Through this this paper will also look at who uses the site and whether the site meets their needs.

Research Questions

1. How effective is the Kōmako database in making Māori literature more accessable?

    a. Does the *Kōmako* site meet its intended goals?
    b. Does the *Kōmako* site meet its users' goals?
        i.   How long does it take different users to find the information they want?
        ii. How intuitive are the browse and search functions?
        iii. What levels of satisfaction do users feel about using the *Kōmako* site*?*
        iv. Is the information contained within the site up to date or accurate?
    c. Are there any aspects of the *Kōmako* site which feel marginalizing?
    d. What do users feel can be improved?

Literature Review

Māori Literature

The history of Māori literature is interwoven with colonial literary canons, disenfranchisement, and the fight for Māori autonomy. As stated by Della Valle (2010), Māori were considered non-literate, not illiterate as a culture before contact with Europeans. Māori did not have literacy, however, they were trained to read the carvings of the *wharenui*, *whakapapa* and oral histories (19). In regards to literature, a Māori orthography was developed in the 1800s, with multiple early attempts being recorded as early as 1823, such as *A Korau no New Zealand* by Thomas Kendall and the *A Grammar and Vocabulary of the Language of New Zealand* by Church Missionary Society and (N.A *.,* 2016). In 1844 Rev. William Williams published *A dictionary of the New Zealand language.* Early writings by Māori include letters such as those exchanged between Tame Parata and Hori Kerei Taiaroa during the 1800s (Potiki, M., 2015) and traditional stories and histories submitted to *Journal of the Polynesian Society* (Keane, B., 2014). The 1900s saw Pei Te Hurinui Jones' and other writers' translations of English texts (Whaanga, H., 2015, Basil Keane, 2014). The 1970's saw the "Māori renaissance" with a boom in publishing among Māori authors such as Hone Tuwhare, and then Patricia Grace and Witi Ihimaera (Della Valle, P., 2010, 92). Along with this came the growing fight for self-determination largely led by educated young Māori (97) These protest movements firmly established racial issues within the public agenda in regards to education, treaty and land rights, health and employment (Plane-Te Paa., 2001, 104). The 1970s protests and cultural movements also coincided with the "Māori renaissance" of writers such as Alan Duff, Witi Ihimaera, Patricia Grace, and Keri Hulme(Underhill 1998, Della Valle 2010). Prior to this period, mainstream literature canon Māori largely labeled Māori as a 'dying race' (Underhill 1998, Valle 2010 & Smith, 2021). Underhill's original bibliography stems from this literary history and the fight against mainstream euro-centric institutions. There are, however, similar theories surrounding the structure of modern digital technologies which raise questions concerning their ability to be used whilst confirming non-western worldviews.

Digital Technology and Western Biases

The digitization of Māori *taonga*, including information, art and texts enhances access, dissemination and the fluidity of digital artifacts. However, many writers have also discussed the issues inherent in the adoption of digital technologies and the subsequent need to critically engage with digital epistemologies and metaphors. Multiple writers have discussed the western biases of digital technology and how they embody Western metaphors. For example, Don Gotterbarn notes that digital technology has historically been enlisted to "to serve the agenda of a powerful elite" (2006, 11). David Golumbia elaborates on this by arguing that computers striate culture, which is subsequently "hidden beneath a façade of neutrality" (2009, 155).   He demonstrates this by arguing that the structure of "business computing" in modern Western countries functions to maximize profit by assimilating separate systems and peoples. This, Golumbia argues, resembles colonialism and the subsequent urbanization and loss of indigenous cultures as it sacrifices individuality for a collective drive towards efficiency and profit. He warns the "explicit embrace of computer technology" although elevated as a "great supporter of distributed knowledge and productivity", also means embracing "a loss of…minority languages and cultures' (155). This is exacerbated by computer systems' bias towards English. Tara McPherson also argued similar ideas concerning the history of computing. McPherson uses the design of systems such as the UNIX in order to discuss the ideological links between the UNIX's creation and design to post war North American race relations during the period of its development. These ideas link to Chern Li Liew (2005) and Elke Duncker Middlesex Unive's (2002) discussion on Māori Culture and the Library Metaphor. Liew discusses digital library resources, stating that "Metaphors have recently become an integral part of the graphical user interface design (UID) process" (2005, 228). Liew further elaborates that metaphors are what shape UID's as UIDs are inevitably shaped by preexisting cultural, cognitive and social attitudes and understandings. Therefore, If a UID is designed for a specific group of people, the metaphors they are designed in line with need to match the community's mental model. Liew points out that when Māori cultural knowledge is presented through western organizational structures, such as standard digital library user interfaces or the Dewey Decimal Classification, information can become inaccessible to Māori users (290). Such issues have also been raised by Sally Simpson (2005). In regard to Māori subject headings and other information structures and institutions such as museums and libraries (Davidson, S., 1996, MacDonald., T., 1993, Szekely., C., 1997 & Walker, M. G., 1988). Privacy and access can also become problematic as discussed by Paora Mato et al. (2016). In their usability study on a *te reo Māori* smartphone

interface, they note the risk digital media has of allowing for the misappropriation of indigenous knowledge (18). Specifically, that knowledge that was previously *tapu* (sacred), can become publicly accessible through digital platforms such as social media (Waitoa et al. 2015).

Taonga and Digital technology

With consideration to this criticism, there has been an effort on multiple fronts to design and create digital projects with targeted populations in mind. Stuart Foster et.al notes "While adhering to the fundamental values that sustain environmental and cultural resilience, Māori knowledge continues to grow, extend, and expand through use of digital technologies" (148). Michelle Horwood (2015) discusses examples of digital projects which are deliberately developed to challenge the colonial aspects of the GLAM sector and establish Mātauranga Māori as their base principle (522). Pauline Harris (2017) also references multiple current digital projects carrying out similar goals including portable planetariums used for teaching Māori astronomy (Harris, 2017, 136), *Virtual Repatriation*, a database of *taonga* Māori held in museum collections around the world (151) and content management tools such as Mukurtu (Horwood, 2017, 152).

Multiple writers have discussed the implications of digitizing *taonga* and other Māori cultural properties and information. Deidre Brown (2010) argues that, unlike Western artifacts, *taonga* are defined by invisible spiritual attributes. Therefore, Brown posits that digital *taonga* can only accurately reflect material *taonga* if the digital copy can replicate the inherent invisible qualities of material *taonga* (82, & Tapsell, P., 1997, 327- 338). Brown argues that if all these qualities can be transferred to a digital copy then digital or virtual copies can become *taonga* (83). Brown uses the concept of *mana* in *taonga* to demonstrate that these attributes can be replicated in digital copies. Brown argues that Māori arts gain *mana* through origin stories located in the distant past. Therefore, Brown posits that situating digital technologies in relation to Māori cosmology and *whakapapa* can imbue digital *taonga* with *mana*. Brown does this by relating the virtual realm to *te ao marama* or the world of light within Māori cosmology.

Assessing Digital Māori Resources

Research into usability and the ability of digital resources to include Māori worldviews and values have been undertaken since the call for better inclusion and partnership in texts such as *Te Ara Tika* (Szekely, Chris, 1997). More recent examples include Alastair Smith's "The Case of the Missing Macron"(2013) which investigates the use of macrons in online search engines, Dr Spencer Lilley's study(2013) on biculturalism in library websites and Sheeanda Lillian Field's (2008) investigation into the accuracy of iwi websites. Smith's study "The Case of the Missing Macron" investigates search engines, such as Google, and their usefulness for finding Māori resources by searching *Te reo* key words with and without macrons. One issue with search engines which discriminate words with macrons is that macrons have not always been used in computing. Early character encoding standards such as the ASCII standard was designed for American English and had very minimal use for other forms of English and other languages. Therefore, Māori long vowels were usually indicated through the use of double vowels and later on by dieresis marks. On the other hand, indicating long vowels is also important for differentiating between words. For example, Smith observes that without macrons *kēkē* (armpit) becomes *keke* (cake). Many sites and sources still don't use macrons which can effect a user's ability to find and access sources. For example, Smith found that within some search engines, such as the Tapuhi and Wellington City Libraries catalogs, searches failed to search terms with macrons and search engines such as Bing and Google yielded different search results depending on whether the macron was added. Lilley's survey of public library sites discusses additional access barriers and issues for Māori material online. His survey on biculturalism in public library sites outlines ten criteria for judging bicultural engagement. Each of these provide an environment and navigation which is user friendly for Māori visitors and were intended for library sites in order to improve Māori access to general materials. Sheeanda Lillian Field's look into iwi websites and measured their accuracy, update frequency consistency of upkeep (40). Karn Heavy (2014) discusses how library users interact with Māori digital resources. This study raised issues concerning the trustworthiness, accuracy and accessibility of digital Māori resources (8). However, Heavy's study also emphasizes the usefulness of digital Māori resources for students, including their use for dissemination and teaching of traditional knowledge (9). In order to do this, however, the needs of Māori users must be met (10). These examples demonstrate the need to test digital resources in a way which conforms with Māori world views.

Usability

Usability studies for digital resources date back to the 1980s (Lewis, J., 2014, p. 664). The definition of usability and how it is measured is usually described broadly in literature. Lewis defines usability as a dependent variable defined by "interactions among users, products, tasks, and environments' (664). Kasper Hornbæk (2005) describes usability as testing based largely on interaction between tools, problems, and people (79). It is about the usability of a system, the ability to predict usability issues. Mari E. Ramler (2020) quotes Collinge's definition of usability which defines it as the extent to which a "product can be used by specified users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use" (2). These terms, effectiveness, efficiency, as well as the satisfaction of the user, are the most frequently used parameters for defining usability. Hartmut Hoehle and Viswanath Venkates (2015) also discuss this in relation to the International Standards Organization's usability standard (437). ISO 9126 defines usability as "the capability of the software product to be understood, learned, used and attractive to the user, when used under specified conditions." Essentially, usability testing is an attempt to measure and assess the usability of a product. The revised ISO 9241-11 standard also includes specifications concerning the subjective experience of users (Nigel Bevan et.al 2015). The original standard from 1992 defined usability as a "a set of attributes of which bear on the effort needed for use and on the individual assessment of such use by a stated or implied set of users". However, as Nigel Bevan et.al points out, usability levels can vary depending on the users and their goals (144). One main revision to come out of the revised standard was the need for user specific goals. For example, although the development goals may specify education or business needs, a user may use the product for entertainment or hobby related goals. Therefore, it is important to consider the goals involved in assessing a usability test. For example, if they are the goals set out by the creators or users (146). Therefore, revised versions of the standard have four main aspects, Effectiveness, Efficiency, Satisfaction and Context of use.

Summative vs Formative

There are two main types of usability tests, formative and summative. Formative usability tests are usually carried out during early development stages and are used to build and improve a product with a focus on issues and bugs. This type of usability is usually associated with iterative production processes. Summative tests on the other hand are undertaken at the tail end of a project and focus on the fulfillment of product goals. Summative testing also tends to measure user effectiveness, efficiency, and satisfaction while formative testing focuses on the absence of bugs and barriers (Sauro, & Lewis, J. R., 2016, 10 & Lewis, J. R. 2014). Because the site was launched over three years ago, this paper will be largely summative. The goal is to understand whether the project's goals were met but also what can be improved in the future.

Usability Testing and Specific Users

Usability tests are highly dependent on context and the subjective experience of users. As a result, methods and framework need to take the intended users, their needs, and their goals into consideration. For example, Mari E. Ramle (2020) proposes "queer usability" as a proposed model which would mean a "product can be used by anticipated marginalized users to achieve specified goals with effectiveness, efficiency, and satisfaction in an expected context of use." (2). Mator et al. (2021) looks at usability from different "domains", noting how tests aimed at different users utilized different methods. For example, studies including Autistic Populations were highly dependent on the individual users' preference for communication (9). David Danielson (2006) discussed usability in relation to biases and how this can affect usability outcomes. This includes issues such as stereotyping and anchoring.

How to Measure Usability

Usability is measured through varying means depending on the study. The main points, however, remain a measure of effectiveness, efficiency, satisfaction as well as a consideration of user goals (Nigel Bevan et.al 2015, Hornbæk, 2005 & Mari E. Ramler, 2020).

Success

An important aspect of any metric is to define what constitutes a successful action (Tullis, & Albert, 2008, 65). Therefore, each task given to users must have a clear end point. This is achieved through providing precise tasks and having users verbalize their process and the completion of the task (Tullis, & Albert, B., 2008). This can be numerically measured through binary methods where success and failures are measured through scoring. However, because this paper will be qualitative, success rates will be measured through the scaled "levels of success" method. Here success is measured through a scale, for example complete success, partial success, and non-success (72). These results will then be analyzed in addition with interview data.

Effectiveness

Hornbæk (2005) discusses the means of measuring effectiveness, stating that it can be measured through measures such as accuracy, recall, completeness or quality of outcome (82). Accuracy can be measured through a substitution of errors. Therefore, if you start with 100 you substitute points for each error or correction from the auditor (Hornbæk, 2005, 82). Recall relates to testing the user's recollection of the site after the test. Completeness is measured by the rate of task completion (Janine D. Mator, 2021, 8). This paper will specifically be looking at effectiveness through a mix of search revisions and user interviews.

Efficiency

Efficiency is measured through the time it takes to complete tasks but can include mental effort, and time on task. This paper will be using time on task as the measurement of efficiency. Time on task can be highly dependent, where one user might feel a task takes too much time, another will feel it was finished quickly (Tullis, & Albert, B., 2008, 75). This paper will be using

Zoom to record users in order to better record time taken without distracting users with stopping and starting timers. The time taken will depend largely on when the user decides that the task is finished after which they will answer relevant questions.

Theoretical framework

Chris Cunningham (2000) states that Māori data can only be converted into Māori knowledge through Māori analysis(66). Therefore, this paper will be structured around a Māori centered framework. Māori focused research projects tend to use either a Kaupapa Māori or Māori-centered framework (Heavey, K. 2014, Mana Paul Tuhou, Troy. 2011 & Mato, P., 2006). Maui Hudson et al.(n.a) visualize the difference between Māori centered framework and Kaupapa Māori in *figure 1*. To generalize, Māori-centered frameworks and Kaupapa Māori frameworks both originate from a Māori world view, center Māori participants and are run by Māori researchers. However, while Kaupapa Māori methods primarily have Māori involved in all aspects, including peer review, quality analysis and dissemination, Māori-centered research uses a mix of Māori and western analysis tools (Cunningham, C, 2000, 63). Because this paper will be using mainstream usability methods, I will be using a Māori centered framework. Māori research frameworks largely arose from Māori concerns over the application of Eurocentric research methods involved in Māori research (Bishop, 1998, 199). Historically, research methods in New Zealand have perpetuated colonial values which assumed Māori as subject and undermined Māori knowledge, tradition and learning practices (200). In response, Kaupapa and Māori-centered frameworks were built upon the Māori world view, emerging during the post second world war era and rose in prominence during the social movements of the 1970s and 80s (Bishop, 1998, 201). As Anne-Marie Jackson (2015) points out, there is no singular "Māori world view", different iwi, hapu and regions have different worldviews (257 & Cunningham, 2000, 66). *Tino rangatiratanga* (self-determination)*,* largely influenced by grievances over the Treaty of Waitangi, was also a major influence on Māori research methods (Margaret, F, 2003, 47). Therefore, the involvement of Māori in all aspects of research is key. This paper will use Hudson's et al.(n.a) Māori framework structure. This structure looks at 4 aspects of research,

Whakapapa (genealogy), *Tika* (relating tikanga, proper proticles), *Manaakitanga* (upholding mana, hospitality,) and *Mana* (related to authority, in this context relates to relates to equity and distributive justice).

Whakapapa

Whakapapa looks at how research is developed and how Māori are involved in that development (Hudson's et al., n.a, 6). The ideal form of this is *Kaitiaki* where Māori communities involved are given control over the research. This also involves transparency and involvement of relevant Māori communities throughout the process. Due to the restrictions of time and resources in this paper, the Māori -centered approach of the diagram, engagement, will be referenced. However, in line with usability standards, the testing itself will largely be defined by Māori users.

Tika

Within a Māori-centered framework, *Mana whenua* is the prescribed benchmark for minimal considerations under *Tika.* This ideally involves consents, goals, aspirations and the involvement of *Mana whenua* (14).

Manaakitanga

Manaakitanga is important, both in regard to the authors and users involved in this research. *Manaakitanga* is tied to kindness, respect and actions which aim *kaua e takahia te mana o te tangata* (to not trample other's mana) (Smith,T, 2021 & Pipi, K, 2004). *Manaakitanga* can involve the giving of *kai* (food) and *koha* (gifts) (Kennedy, Vivienne et al. 2015). It also requires that *whānau* are able to support participants (Hudson's et al., n.a., 11).

Mana

Mana is related to authority and control (Hudson's et al., n.a, 13). *Mana* is closely related to the concept of *Tino Rangatiratanga*, or self-determination, control and cultural aspirations (Foster,

2003, 51). Hudson's et al. states that this involves transparency regarding the risks and concerns for the participants (n.a, 13).
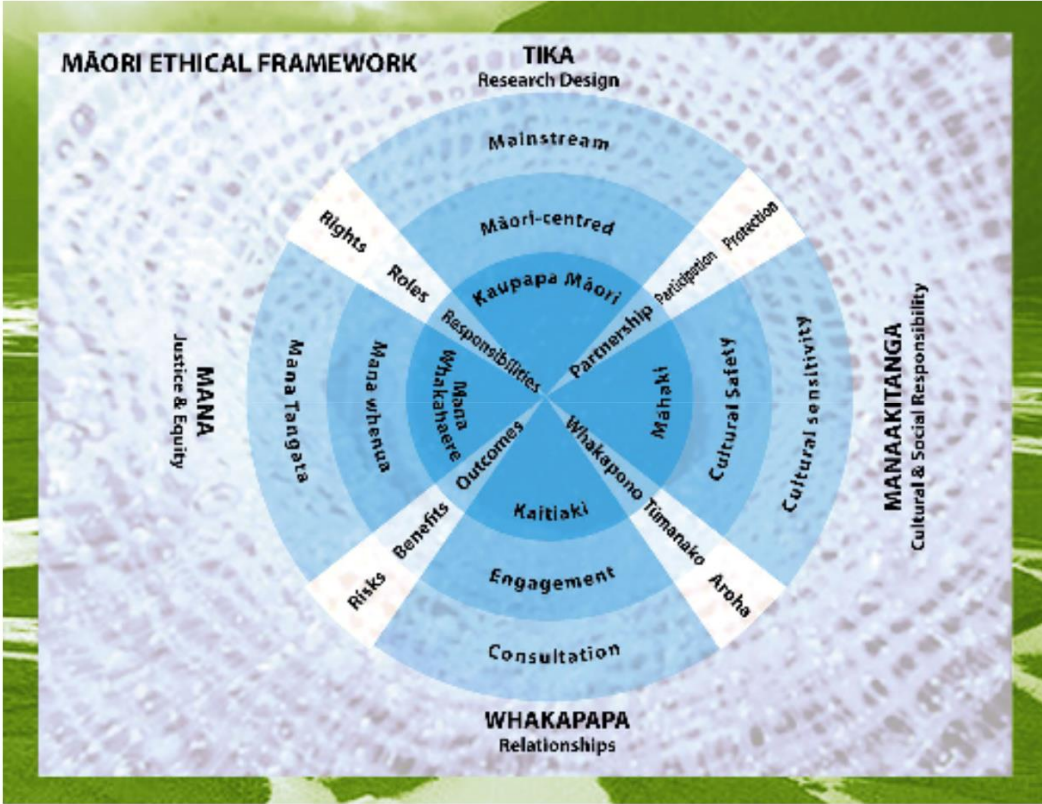

Figure 1

Methods

Data collection

This paper will collect data through an initial think-aloud usability test (appendix 1.1) which will be followed by a semi-structured interview (appendix 1.2) to better understand the user's thoughts and actions. The think-aloud method, also known as the 'verbal protocol' method (Brown, 8, 2002) was developed by Ericsson and Simon in regards to memory research. Clayton Lewis later adapted this method for survey data (Geisen, & Bergstrom, J., 2017). Jakob Nielsen (2012) defines the method as having users verbalize "their thoughts as they move through the user interface". Theoretically, this method informs researchers of users' honest thoughts in real time as they use the site. Think-aloud methods do have their limitations and issues, for example Nielsen notes that the method asks users to perform "a highly unnatural activity, namely, verbally unloading a stream of consciousness while interacting with a system" (1993). Thus, it can be difficult for users to maintain concentration and complete tasks as they normally would while they speak (Danielson, 2006, 653). Bill Albert and Tom Tullis (2010) state that the think aloud method is best for understanding issues and processes. The moderator can observe if users appear confident or confused in relation to their actions as well as non-verbal facial cues (103).

Qualitative research methods in conjunction with a Māori-centered framework will be used in this study. Rosaline (2008) states that qualitative research's strength is its ability to provide an understanding of how official figures are created through social processes. Qualitative methods also work well with Māori research methods (Smith, 2021, Heavey, 2014). This research will use a structured survey which is provided under *Survey Questions.* This will ask users to elaborate on their experience with the database as well as any suggestions and issues they may have come away with. This will also provide context for actions taken during the test as well as to measure feelings of satisfaction.

Population and samples

Usability tests deal with typical end-users; therefore, the participants of this study will consist largely of Māori information professionals (Mogamat Davids et.al, 2015,1052). Users will have various ranges of experience using the site and Māori resources. Different sources suggest different standard sample sizes. Jakob Nielsen (2000) states that 5 users are ideal, finding that it is better to test different iterations as a site develops with small samples than to test with a large group once. Nielsen and Landauer (1993) also found that the first five participants usually

found 85% of issues on the site. Other studies have suggested 8 users or more are needed (Perfetti, C., 2000) finding that Nielsen's study focused on now outdated software with less complexity and narrow user goals. Because of time and resource limitations, this paper will only be dealing with six participants. This also provides leeway in case participants choose to withdraw at any point.

Data analysis

Based on Heavy's (2014) discussion, conventional content analysis will be used in this study. Content analysis is primarily designed for qualitative data (Hsieh, Hsiu-Fang & Shannon, Sarah. 200, 1278 & Rosaline, B. 2008). Content analysis, unlike heuristics, is a bottom-up method of data organization where data is organized according to results rather than predetermined parameters (Barnu, C., 2010, 242). This paper will contain some heuristics. This will include broad categories of effectiveness, efficiency, and satisfaction which will shape tasks and interview questions. Content analysis will be used for interview results and satisfaction levels while effectiveness and efficiency will be determined by measurements discussed previously. Content analysis focuses on the characteristics of language as communication with attention to the content or contextual meaning of the text. Usually this is suited for interviews and written text. Content analysis methods are conducted by coding the content of text or speech into general consistent themes or categories. This is intended to allow researchers to uncover patterns and themes which occur over a body of text (Jake-Schoffman, S., 2017, 2 & Heavy, 2014, 19).

Ethical considerations

A Māori centered framework demands that research is transparent concerning individuals involved in a study. This includes who participants and organizers answer to and what happens to the information involved (Hudson's et al., n.a.). Therefore, in regard to this research, I acknowledge my own biases and backgrounds. Although I have Ngāti Ruanui and Te Arawa heritage, I acknowledge that I have grown up in Christchurch, away from my marae and

embedded in Pākehā world views. I have also previously worked with Chris Thomson and Bridget Underhill on the *Kōmako* project as a student assistant editing some of the site's content. I will also be using site data as a reference which also carries ethical issues.

Privacy and intellectual property are also important ethical issues to consider in relation to this paper. This paper will be collecting interview and video records of participants. Therefore, detailed consent forms must be used. Information concerning how the information will be used and when it will be destroyed must also be included. Data must also be destroyed after two years (Heavey, 2014, 18) and pseudonyms will be used in order to protect the privacy of participants (Allmark, P., 2009, 51, Hudson's et al., n.a., 11). This will be utilized with flexibility, as Hudson's et al. (n.a) states, in order to maintain transparency and honest practices as necessary (11). Other considerations include disclosure of the researcher's own background and the identities of those involved in all levels of research.

Limitations

This study was conducted with several significant limitations which make it difficult to generalize the findings to a larger population. Primarily, this study was conducted on a small scale, with only six participants, all of whom were female. Users were also spread among different professions and areas of Aotearoa. Due to factors such as Covid 19 restrictions most of these interviews and tests were conducted over Zoom and not in person. This restricted users to those which could use zoom or the internet to a certain extent. The majority of users interviewed were also information professionals.

Findings

Sample

A total of six participants were tested and interviewed for this study. One participant of the six identified as Pākeha while the rest identified as Māori. All participants were female, with three in information professional roles, one academic and 2 other professionals. Due to covid 19 restrictions all but one user was interviewed over Zoom. Three users were interviewed together as a *Whānau* group, as a result many of their answers are more conversational as they tended to discuss answers and help each other.

Success

Success was measured in three categories, *success*, *partial success,* and *non- success.* Success was noted when the user found the answer or completed the task with little to no issues. *Partial success was* marked when an answer was found but was incomplete or inaccurate. A non-success was noted when a user was unable to find a relevant answer. Some tasks were purposefully set out to be impossible in order to understand how a user would go about finding a similar query and to test the available functions. For example, the first task asks users to find the earliest date. This does not currently exist as a direct function but as a test of how dates can be filtered and applied to a search.

The results of the set tasks are displayed on Appendix 2.1. Overall, most tasks had clear cut completion rates. However, task three was comparatively more varied in its results. This task had the most "partial successes" because, although the user found relevant results which could meet their hypothetical searching needs, the results themselves were, in some cases, incomplete. For task three the outcome was largely dependent on the user's Iwi and in this case, non-successes appear to have resulted from *tohutō* (macron) use, alternative spellings and the search's inability to discriminate between texts about iwi or an author's biographical information. Therefore, although searches returned useful results users had trouble sorting through the results in a definitive way.

The tasks which all resulted in non-completeness were measured by the user giving up the search before any satisfactory result was found. Many of these tasks asked the user to complete tasks which were based on functions the site possessed in previous iterations, but which have since stopped working or were scrapped. Users' inability to complete these tasks do not necessarily affect the usability of the site but do restrict the methods users can utilize to find information. This will be explored further in the discussion section.

Effectiveness

Effectiveness was measured by the number of search revisions performed by the user before they reached a satisfactory answer (Appendix 2.2). This was divided into users who had no revisions, one to two revisions, and more than three revisions. Search revisions refer to a revisions of synonyms, Boolean logic, or system-designated delimiters to retrieve a set of results different from those obtained by an initial query (Daniels, & Yakel, e., 2010, 536). This also includes a switch in search strategy, for example a user turning to browse instead of search to complete a task.

Tasks which required more than three query reformulations were usually the outdated tasks which couldn't be completed. This included task one and four. In the case of task four users did find some relevant results by searching "female" or other gender terms into the search, however, it was clear to all the participants that the results were dominated by irrelevant texts and authors. The other task which prompted the most query reformulations was task seven which asked the user to submit an author. In this case most users expected the information to be under FAQ. Overall tasks were completed within one or two searches.

Efficiency

Efficiency in this study, was largely a measure of how well users managed to grasp the site's layout and function by the end of the test. For the majority of the users, the layout of the site was simple and straightforward. As one user commented "In some ways it's really easy, I mean

the search box is right there, the browse is right there" but also elaborated on the difficulty of using the search. This was evidenced by how long it took most users to either complete a task or realise that completing a task was impossible which is demonstrated in Appendix 2.3. The first task is the only example where users took more than 2 minutes to finish. This resulted from users experimenting with the search by entering different dates. There was also a clear learning progression demonstrated as task times became shorter as users moved through the test. Users, therefore, usually found the site easy to navigate and learn but certain functions difficult to use.

Satisfaction**.**

Satisfaction was measured through a Customer Satisfaction Score (CSAT) from 1- 10 (appendix 2.4). The average score after the test and interview was 7.08. This score was usually given with several notes. For example, one user gave 10 but noted that they could "definitely see opportunities to make it even more usable." and that the score would be slightly lower if it was not a site they valued culturally. On the other hand, users who scored lower also noted that the score resulted from a desire to see the issues fixed because the site was genuinely useful for them in their work.

Issues and bugs found

The issues found during the testing and interviews were divided into six categories; search, filters, missing functions, language, bugs and scope. The number of instances an issue came up during testing is demonstrated in appendix 3.1.

Search issues

Search issues were commented on the most by users. This is because most of the users tested choose to use the search function over the browse function. Search issues were brought up 12 times, with each user bringing the topic up at least once. The main comments given concerned the parameters of the search results. One user commented "the search functionality I found very mysterious." This also came up during the first task which asked users to find the oldest text listed on the website. The goal of this task was impossible for users to achieve; however, it did expose interesting issues which come up when searching dates. For example, multiple users tried to find the earliest text by entering different dates into the search bar. In more than one instance the date searched had no relation to the publication date on the text. One user commented that:

> "I picked a random date at 1860 and it gave me something back that was c1867. But when you just put 1800 into the search bar I get no options in the drop down year box…And nothing comes up for 1867... So then I put in 1880 and I searched by that. Which gave me lots of options for 1980 and then c1860 randomly. And then… if I search 1800 it doesn't come up as an option at all."

Another user stated: "I've noticed that what you get back is a bit haphazard…or it tries to narrow your focus to particular areas that weren't really your focus when you were searching. Like when I put in 1880 and it gave me back 100 things for 1980."

In regard to inconsistent search results, one user also commented that a relative they knew to be on the site was not returned when they searched their iwi in task three. The user then checked the relative's profile through the browse function and confirmed their iwi was correct. However, it was unclear why it was not returned when their iwi was searched.

Another issue which came up concerned the use of macron discrimination in the search function. This changed the search results for task three which asked users to find authors from their iwi.

"Sometimes it's useful to have a macron agnostic search...especially when not everyone knows where they go…technology can still be pretty racist, we're still in the stranglehold of colonial capitalism…not everyone's able to write macrons in certain circumstances."

Another user found that one result came up when they searched their iwi with no macrons. When they added macrons multiple results were returned.

Boolean search and search terms were also issues that came up. One user looked to the FAQ page for search tips because they couldn't figure out what functioned as the site's wild card. This became a recurring issue. One user commented that "the search… is quite good but you have to put in a random word and then it will take you to a search engine." Another user commented regarding the first task that: "you don't even know what the wild card is…there's no sort, there's only filter."

When asked if searching with an empty search bar yielded any results, the site produced an error message or in other cases the site would simply show a loading symbol. In one case all the site's entries showed up. Multiple users elaborated that additional filters for the search or in the browse function would make some of these issues easier to work around.

Filters and sorting

Five of the six users suggested that additional filters and sort functions or adjustments to current filters could make searching easier. This came up in relation to task one and three. Two users missed that "creator_family" referred to author names. This was also counted under this number. One suggestion was that the available filters be presented in a specific order to make filtering the full catalogue easier. For example, finding texts for specific dates would be easier if the date filter appeared in chronological order. Another suggestion was that the titles for each column in the search allow results to be sorted by title, author, year or category. The main comment concerning filters came up in regards to differentiating between whether a keyword was contained in a text or biography. This issue came up multiple times in task three. One user commented; "I just searched again, I just put Te Arawa in, but it just comes up with everything with Te Arawa as a key word."

Language

Three different users brought up issues regarding the term "creator_family" in place of the author's name. One user commented that "for a Māori website that's a random word to use…what does creator_family mean?" they elaborated during the interview that "for a Kaupapa Māori site there could be more reo used for those kinds of terms, potentially." Another user brought up the issue of differentiating between nonfiction and fiction texts. They stated:

> "I also have some issues with the terms fiction and nonfiction when applied to Māori material. I think I would have to go through it a bit more in depth before I spoke about that…just that kind of…the myths and legends way of thinking as opposed to pūrākau. I think fiction and nonfiction are very western concepts that don't necessarily apply to our beliefs and traditions and stories."

One user questioned the differentiation between primary and secondary sources: "I'm not a fan of the clear discrimination between primary sources and secondary sources. I think that if this is about things Māori then we could probably phrase that in a different way that makes more sense from a te ao Māori perspective. Though I think that's just me personally."

Most users stated that the language contained in the biography was "clear" and overall that the language was easy to understand. One stated "I think I haven't come across that many inaccuracies…When it comes to the biography there's not a whole lot of stuff that are "maybe" that are incorporated."

Biographies and missing information

Most users stated that the information contained within the biographical sections were clearly written, and from their experience, correct. However, there did appear to be certain chunks of information missing. For example, one user pointed out that the birth date they found for Tama

Te Kapua (Tom) Poata in task five was quite old. As a result, they looked up the author in google and found that they had passed in 2005. The site did not provide this information. The user who's relative did not appear when searched was also missing their bibliographic entries. Several users also noted that when they attempted to sort the search by date there appeared to be several entries with "0000" as a date. Bringing up all the entries there appears to be a total of 544 entries with "0000" as a date. Another issue was that texts which were listed as sources for biographies were sometimes not listed under secondary sources. For example, Hōhua Tūtengaehe has three sources under their biography but none listed under secondary sources.

Bugs

Overall users did not report many bugs. Errors occurred when users searched nothing in the search. However, even in this case this error was largely dependent on the machine being used. For example, for some users this method brought up an error message but for others the page loaded after some time. Another bug highlighted was that the one entry under Z in the browse section was split between two columns which made it look like it was two separate entries.

Scope

Three different users brought up confusion regarding the scope of the site. This came up in relation to whether writings in te reo Māori were included or not because in some cases they seemed to be. One user commented that:

> "The… thing which was confusing to me was inclusion criteria. Because, according to the banner of the site its writing by Māori in English. But then there seems to be lots of people included who have written in *te reo* and their works were then translated into English by some ransom pākeha. And then it seems that lots of composers from Ngā Mōteatea were included and I thought…did they really collect all that Mōteatea in writing? And they weren't in English. There's this chap Aporo, he's said to be included because he created what's described here as "dream drawings" now is that writing?

Is it English? And if it's not just English, which would be awesome, then wouldn't it be great if you could search by te reo?"

Another user also asked "was there ever any consideration around including writing by Māori in Māori?"

Positives and Uses.

Three users interviewed in this study had previously used Kōmako. All of these users worked in information professions. One user who had not previously used the site also reported that they thought that it was useful and expressed their intention to use it for their work in the future. One user applied the site for a range of customer enquiries. The function they used the most tended to be the iwi search function which was featured on the site but has since been removed. They also used the site to check on current writing and author information. Research papers were also listed by another user as the main reasons they had previously used the site. They also commented that they had used it as a reference to answer requests on Te Rōpū Whakahau. Another user stated that they had most recently used the site to confirm iwi and hapu affiliations for records they were cataloguing. They had also used it to aid in genealogy searches with customers and professional development and training.

"it's not always useful for genealogy enquiries but sometimes it can be depending on what any given person might know about their family. It's a nice place to look. And then, particularly for whakapapa, if you do find something in there…from somebody's family and then they then get to go…read what their aunty or great aunty wrote it's a really meaningful experience for them."

The inclusion of iwi information and the depth of the biographies was also seen as a draw for many of the users. One user who was new to the site stated:

"I quite liked how you could click on the author, and it took you to a bibliography of them. Because I often look for bibliographies of writers to make sure that I'm quoting someone who's legit. Because when you google scholar which I use google scholar all the time

and you'll find something written about something, but you don't know who the author is. You have to look up the author to find out if they're a legit source or a random white dude. I like that it had bibliographies built into it and that they were all Māori and it showed their iwi affiliations. That stuff is really useful."

The scope was also referenced as a positive. When asked what they liked about the site one user replied that they liked the "breadth. I think quite often we think of Māori authors as quite a small elite circle, and this site's a great way to think about it…we talk about how we don't have a lot of sources for this, but we do have a lot writers."

The browse function was also highlighted as a useful function, with the three information professionals preferring to use it for tasks involving finding specific authors. One user did point out that it was more accurate to think of it as a "forced" preference because the search was difficult to use. The clarity of the design was also commented on. As a result most tasks did not take long to complete. Because the design of the site is simple and straightforward users quickly surveyed their options before either finding their answer or understanding a task was impossible.

Discussion and recommendations

Search

The search issues found in this study appear to stem from two different sources, one is the specifications of the search engine, or the parts of a record the search pulls data from. The second is due to incomplete metadata. In regards to searching and information retrieval, Baeza-

Yates & Ribeiro-Neto (2011) state that the "representation and organization of the information should be such as to provide the users with easy access to information of their interest." (1). Confusion over how the search functioned was a common issue which inhibited users from completing tasks. There were comments which theorized whether only annotations and texts were being pulled from because users could not figure out how the search discriminated results. There were also questions concerning Boolean searches. One user tried using wild cards to search but was uncertain which symbols worked. They found that AND searches yielded successful results, but other techniques were unsuccessful. This also made narrowing down searches to their intended results difficult, especially for the inexperienced users who had more trouble using the filters to find the best results. Missing metadata and records also caused issues for the search function resulting in inaccurate results. Metadata, or data about data, is a core component of an information retrieval system (Pomerantz, J. & 2015 and Gilliland, 2008). However, missing date and bibliographical information led to relevant or important infomration being neglected by the search.

Recommendation: Correcting the issue of inaccurate or confusing search criteria can be reviewed by the site's developer. The issue of missing metadata is more straightforward as data simply needs to be added back into the site. Boolean search parameters may also be added to the FAQ to help with searching. Filters were also suggested as a measure to help narrow down searches better. However, as with all the recommendations made in this report, it should be acknowledged that the Kōmako database has limited staff and budget available and not all recommendations will be able to be implemented.

Macrons/ tohutō

The search's treatment of macrons was also a major discussion among users. As this paper has previously stated, macarons have not always been used in computing. Macron use is important for accurate spelling and emphasis, however, Teorongonui Keelan et al. (2020) points out the use and uniformity of macron use in Māori writing only became common after the 1980's. This has created a significant generational gap between older Māori and those who have moved through Kohanga Reo, Kura Kaupapa Māori, Wharekura and the modern developments stemming from Māori revitalisation efforts (169). This issue is contentious, because as pointed out by one of the users in this study, certain groups may not have access to macrons, whether

this is due to a lack of access to the appropriate technology, knowledge, or an alternative understanding of the language.

Recommendation: This study has no straightforward recommendation concerning this issue, those involved in the database may choose to make their site macron agnostic or leave the search function as it is. Each has their issues and advantages; however, this study can offer some alternative viewpoints.

Iwi Search Function

The display and layout of Māori taonga and information in physical and online platforms have been discussed amongst a range of theorists. As Heavy (2014) and Chern Li Liew (2005) state, Māori learners engage better with digital resources when resources connect with their cultural values, world views and heritage (47). There are multiple ways in which this has been demonstrated, for example, the inclusion of *te reo Māori* and structuring digital resources and displays around *whakapapa*, *marae* and *pūrākau* (traditional storytelling and teaching) (Brown, 2016, Tapsell, Paul, 2011, Whaanga, Hēmi., 2021 & Whaanga, H et al., 2015). Some aspects of *Kōmako*, such as the inclusion of iwi affiliations and the use of mihi, were commented on as significant draws to the site. On the other hand, issues, such as iwi searchability and naming conventions were seen as problematic. This is significant, especially when users were asked to find authors from their own iwi. Users saw it as a positive that they could search for their iwi, however, parsing out authors who had written about an iwi and who belonged to an iwi was viewed as a major flaw of this function.

Recommendation: It was noted that there used to be a function on the site that allowed users to search by iwi affiliation rather than relying on a generic keyword search. Users who had previous experience using the site cited this as a major draw about the site. There were multiple examples of using the iwi search to find family members on the site and new users who referenced the presence of iwi information as a draw. Users who were new to the site recommended that iwi information could be made easier to find using filters while experienced users noted that there was a search function for iwi and that it would be preferred that it be reintroduced.

Language and Kaupapa Māori

Building on the need for iwi and whakapapa information in *Kōmako*, another important aspect of Māori digital resources is the presence of *te ao Māori* (Māori world views) and *kaupapa Māori* (philosophy centred on Māori methodologies, values and worldviews) (Whaanga, Hēmi., 2021, Ristow., B, 2022 & Heavey, 2014). This should guide how data is stored, accessed, and shared and should be aimed towards connecting "Māori to their mātauranga and taonga, and to each other" (Whaanga, Hēmi., 2021). This broadly includes prioritizing *te reo Māori*, *mātauranga Māori*, and *tikanga Māori*. For the users in this study several aspects of *Kōmako* were commented on in relation to *te ao Māori* and *kaupapa Māori*. This included the use of "creator_family" as a category, differentiations between nonfiction and fiction categories and primary and secondary categories.

Recommendations: Issues, such as "Creator_family" seems to result from an error in the title data for this category. This issue, therefore, could arguably be the most straightforward to adjust. Issues regarding the differentiation between text categories, however, is more complicated. In regards to fiction and nonfiction, creators may choose to review which texts go under each category. Considering *pūrākau* may aid in the decision making of this issue. For example, creators can review whether historical texts covering Māori "myths" and "legends" are categorized in the correct place.

Scope

Comments by users concerning the scope of the site pointed out two criteria which were inconsistent. One was the inclusion of texts in *te reo Māori* and the other was the inclusion of texts or media which were not, technically writings. Users also questioned whether more *te reo* writings could be included in the site in order to make it more inclusive and give the site more cultural value.

Recommendations: Clarification on what texts are now being included may be added to the about. This information could be made more prominent for users.

Further research

This study only looked at feedback from six users. Through this the presence of a range of issues have been identified. Research into a wider pool of users would yield more insight into the extent of issues pointed out in this study. For example, the use of short online surveys could be used to reach a wider range of users. Changing the author profiles each user looks at could also allow different biographies and search functions to be examined for bugs and missing information. Studies into other aspects of the site would also be useful, for example a deeper look into site analytics or broader surveys on how the site is used would add more useful information to the site. A study which targets specific users such as students or researchers could also be useful.

Conclusion

Kōmako was created with the intention to create better access to Māori literature and authors. To do this the site must also fulfil its users' research goals. This study was conducted to better understand how well users feel that the site achieves its goals and how it can be improved. This study found that *Kōmako* is a valuable resource, especially among information professionals. It has several functions which make it useful for Māori research and inquiries. The simplicity of the site's layout makes it easy to navigate and, as a result, users were quick to finish tasks or realize that a task was impossible. Satisfaction among users was also reported above average with cultural value being cited as a major draw for users. Lower scores were often caused by the usability issues identified during testing. The most cited issue found through this study related to the search function which users often found confusing. Users often found it difficult to narrow down results using filters or boolean logic. Missing metadata and other information including bibliographic information also inhibited users' searching. Potentially marginalizing aspects of the site were also identified. This included macron discrimination within the search function, an absence of a iwi focused filter or search function and specific naming conventions and categorizations. This study has suggested several methods for addressing these issues

including a review of metadata, search parameters, categories and search functions specific to iwi information.

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Appendix

Appendix 1.1

Research tasks

Tasks

1. Find the earliest text listed on the site
2. Find texts <u>about </u>William Rex Austin
3. Find a list of authors from your own iwi
4. Can you search results by the gender or sex of the authors?
5. When was Tama Te Kapua (Tom) Poata born?
6. How many texts are listed by Angus Hikairo Macfarlane?

    Can you narrow Macfarlane's texts down to only non-fiction titles?

1. Submit an author to the site.

Appendix 1.2

Survey questions

1. Have you used the *Kōmako* site prior to this session?
2. If yes, what did you use it for?

    Did you feel that it was useful in this previous instance?

1. What parts of the site did you find the most difficult to use?
2. What did you think about the language used in the site?
3. From 1 to 10 how satisfied do you feel about the site, with 1 representing disappointment or frustration and 10 being satisfied?

Appendix 2.1

task	success	partial-success	non-success
1	0	0	6
2	1	4	1
3	5	0	1
4	0	0	6
5	6	0	0
6	6	0	0
7	6	0	0

Appendix 2.2

	number of search revisions		
task	0	1 or 2	3<
1	0	0	6
2	3	1	2
3	4	1	1
4	0	0	6
5	5	1	0
6	6	0	0
7	1	2	3

Appendix 2.3

Time taken to finish task

task	10sec-1min	1min-2min	2min<
1	2	0	4
2	5	1	0
3	6	0	0
4	4	0	0
5	2	4	0
6	6	0	0
7	6	0	0

Appendix 2.4

user	score
1	10
2	7
3	6
4	6.5
5	5
6	8
average	7.083333333

Appendix 3.1

issue	total times issue occurred	number of users to bring issue up
Search	12	6
Filters	7	5
language	2	3
bugs	3	3
scope	4	3
biography	2	2