

Thesis for the Degree of Master of Arts in Cultural Informatics

Data-based Heritage Interpretation:
An Ontology Design for Interpretive Information of
Korean Cultural Heritages

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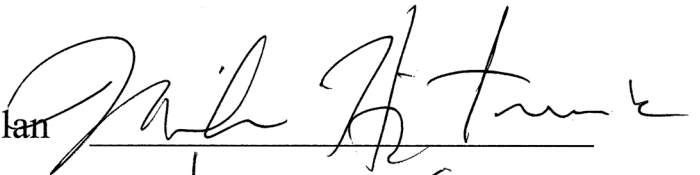
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Lyndsey Dianna TWINING

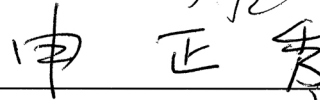
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ABSTRACT

Data-based Heritage Interpretation: An Ontology Design for Interpretive Information of Korean Cultural Heritages

Lyndsey Dianna TWINING

This thesis delves into the question of how we might maximize the potential of heritage interpretation in the digital age. It does so by looking at the way heritage interpretation is currently approached in Korea and suggesting a to-be model which may better accomplish the objectives of heritage interpretation. More specifically, the thesis presents five ideals of heritage interpretation which are based on a wide review of prior scholarship on the topic, evaluates the status of Korean cultural heritage interpretive content based on these five ideals, considers how these ideals can be approached from a data-based perspective, presents an ontology which addresses the current weaknesses and limitations of Korean cultural heritage interpretive resources while making use of the potential of digital technology to better accomplish the objectives of heritage interpretation, and demonstrates examples of such a data-based approach by implementing the ontology in a labeled property graph.

Over the years, many experts have proposed definitions and principles for heritage interpretation. However, since the turn of the century, the understanding of heritage interpretation has shifted from that of a top-down, expert-led education of the masses, to an ever-negotiated process of participatory meaning-making by a wide variety of diverse and variously motivated stakeholders. Concurrently, computers and the Internet have changed the expectations of and possibilities for heritage interpretation. When these developments are considered, existing definitions and principles prove too narrow in scope as a tool for judging the success of heritage

interpretation. Therefore, a broader way to evaluate interpretive resources long into the future needed to be developed. Thus, five ideals which heritage interpretation should strive to embody were distilled from the existing literature: clear/accurate, personal/tailored, contextualized/holistic, facilitates engagement, and sustainable/innovative.

Heritage interpretation plays a large role in South Korea, which has a massive corpus of over 13,000 cultural heritages designated or registered by the Cultural Heritage Administration (CHA) or with UNESCO. The CHA provides interpretations of its heritages in many forms, including interpretive texts on physical information panels and online, guided tours, mobile apps, and experiential events. However, the quality of the interpretations and their translations have been under fire in the past. Prior research has pointed to these flaws, but almost none have suggested a better methodological approach. Therefore, to better understand the true nature of the problems of current Korean cultural heritage interpretations, the following were surveyed and evaluated based on the five interpretive ideals: the currently available interpretive resources, the process of composing and translating interpretive texts, and the content of interpretive texts. The evaluation shows that the current method and form of interpretation provided by the CHA leaves much to be desired across all ideals.

While there are many potential ways to address such weaknesses, a data-based approach to heritage interpretation not only provides solutions to current problems, but also adds additional functionality which brings heritage interpretation closer to fulfilling the ideals of heritage interpretation. Databases facilitate the separation of content and medium which is not possible with old media or other digital technology. This means that rather than storing information about heritages in the form of expository texts about each individual heritage, the various elements which make up a heritage's greater context, i.e. people, places, concepts, events, etc., their relationships to the heritage, and their relationships to one another can be stored in the form of linked data which can be presented via a variety of interfaces. This allows for more efficient and improvable information compilation and a level of personalization and engagement which is just not possible with current, old media practices.

To generate examples of how such an approach to interpretation may work in practice, an ontology was designed which is suitable for a labeled property graph. The ontology was based on a review of the content of interpretive texts relating to on-site heritages and prior cultural heritage-related data model and ontology case studies. The ontology design strategy keeps in mind the five interpretive ideals, the limitations of current Korean cultural heritage interpretation, and the

potential future applications of the data in interpretive resources. Such strategies include favoring the use of relationships rather than node properties whenever possible to lessen translation and explanation redundancy while improving search and analysis functions, including measures for transparency of sources and contributors, as well as facilitating connections to further reading, media, and engagement opportunities, among others.

Finally, using the ontology proposed in the thesis, various examples are presented which demonstrate how data-based heritage interpretation can address the current weaknesses and limitations of Korean cultural heritage interpretative content while also capitalizing on the potential of the digital age to better realized the ideals of heritage interpretation.

Keywords: heritage interpretation, cultural heritage, Korean cultural heritage, Korean studies, ontology, digital humanities, translation, labeled property graph

I. Introduction

1. Background and Objectives

Traditional Korean culture is a key part of the South Korean national brand. This can be seen in the popularity of historical dramas, high levels of tourism to places like Gyeongbokgung Palace, Gyeongju, and Insadong, and in the official promotion of *hanbok* (traditional Korean attire), *hansik* (traditional Korean food), *hanok* (traditional Korean houses) and more – both in Korea and abroad. Cultural heritages, tangible and intangible, are physical and experiential embodiments of this so-called “tradition,” and the South Korean government clearly them as assets; It has taken active effort to designate and preserve cultural heritages of various tangible and intangible types across the country, now totaling over 13,000 in number.

However, this promotion and preservation of “traditional” culture is not unproblematic. First, it raises questions of what can be considered tradition or heritage and who has the authority to make such a judgment. Second, unconscientious promotion of tradition and heritage can easily lead to a kind of consumerist commodification of culture which is misappropriated by the not-so-well intentioned and the not-so-well informed. This is evident in the recent boom of hanbok rental services which claim to provide “traditional Korean” attire without mention of the extreme Westernization of the outfits provided. It can be seen in historical dramas and real-life historical reenactments, which “recreate history,” yet take substantial creative liberty in the name of entertainment – presenting an inaccurate telling of historical events and utilizing clothing, performances, and actions which are entirely out of context, etc. – without informing audiences of the liberties taken. It is also seen when information about the history of a heritage site, such as having been left in ruins for centuries and only recently rebuilt, is left out of information panels and during guided tours, thus giving audiences misleading impressions about the real age of a heritage.

Unless otherwise noted, all translations of quoted materials and references are the author’s own. Earlier versions of the ideas presented in this thesis were presented at the 4th Biannual KSAA Postgraduate Workshop (July 1, 2016; University of Auckland), the 8th World Congress of Korean Studies (October 5-7, 2016; University of Pennsylvania), and the 2016 Humanities Content Association Fall Conference Young Brain Session (December 3, 2016; Academy of Korean Studies). Further information relating to the thesis, including the Neo4J data used in the examples in Section VII of this thesis, is available at dh.aks.ac.kr/~lyndsey/wiki. The author can be contacted at lyndseytwining@gmail.com.

When the goals become “promotion,” “entertainment,” or “consumption,” the truth – that tradition and heritage are things which are passed down, negotiated, and transformed over time by new generations of diverse people – becomes secondary to money and image. Theoretically, the point of educating citizens about tradition (or heritage) is so that they can come to see value of such tradition and continue to pass that value down to future generations in ways that take into consideration societal changes. But if audiences are continually fed bastardizations of “Korean tradition” without context, they are never given the chance to truly appreciate, learn about, or draw their own conclusions about that tradition and how they can incorporate it into their own lives, today. Therefore, providing the fullest possible context for any claims of “tradition,” as well as encouraging audiences to personally engage with and investigate that tradition, is essential if the objective is not just to make money or get people to believe some (potentially unverified) historical claims, but to actually instill an appreciation for traditional values in the hearts and minds of future generations.

This brings us to the idea of heritage interpretation. Heritage interpretation, which can take many forms and which will be discussed in greater detail in this thesis, plays the role of a bridge between mere consumption and the kind of informed curiosity that gets audiences to engage. As will also be demonstrated in this thesis, current Korean cultural heritage interpretation resources fail on various fronts to facilitate such an informed curiosity. At the core of this failure is the fact that those responsible for facilitating heritage interpretation – scholars, translators, museum/archive professionals, or civil officials at the Cultural Heritage Administration (CHA) or local governments – generally either 1) themselves do not know the full context and therefore cannot successfully provide this to the public, or 2) assume that heritage interpretation is a kind of one-time dictation of so-called “important facts” from experts to a passive, one-dimensional, ignorant public, thus forgetting about the larger purpose of heritage interpretation: to encourage the continued engagement of an active, diverse public so that a heritage or tradition gains personal and sustained value in the lives of said public.

This failure to provide opportunities for engagement is a not just a long-term problem facing the South Korean government. It affects the field of Korean studies, as well. Cultural heritages, while manifestations of and conduits for the passing-down of tradition, are wellsprings for the plethora of information which forms the foundation of Korean studies research – the humanities disciplines in particular. The very context mentioned above as necessary to paint the full picture of “tradition,” is filled with historical events, figures, places, concepts, documents, practices (i.e.

handicraft, performance), and more etc., which have significance in the disciplines of history, art history, architecture, archeology, religion, literature, folk studies, musicology, anthropology, geography, and more. As such, cultural heritages are sites where those who have thus far only experienced Korea through consumption of modern, popular media such as that embodied by Hallyu, the Korean Wave, can be brought into the fold of Korean studies. Cultural heritages can be the bridge between the consumption of modern Korean culture and academic research on historical Korea. Therefore, it is of importance to all Korean studies scholars that effective ways to engage the public via heritage interpretation be researched.

Yet going forward with such research, we must not forget the time in which we are living. Hallyu itself was made possible by the Internet, which brought content to people around the globe, and allowed scattered fans to come together as creative and powerful communities. Much of the young generation around the world is comprised of digital natives, who are not satisfied with being passive consumers, but desire to be creators who make what they consume a meaningful part of their lifestyle and identity. Storage and access to information is no longer limited to physical and text mediums. Therefore, there is no need to limit heritage interpretation to old media and on-site means. In fact, limiting heritage interpretation in this way would be incredibly shortsighted. But we also must not be naïve enough to think that merely uploading old-media-form text to a webpage or digitizing heritage materials and throwing them into a digital archive fully capitalizes on the potential of the digital age to get the diverse and global public to engage. Heritage interpretation resources provided via digital means need to be tailorable and reusable by audiences as they engage in personal explorations through the heritage context. If Hallyu fans, historical drama production teams, Korean studies scholars, and others can access contextual information on heritages in a way which is targeted to their needs and interests, it can only serve to enrich the quality of education, research, and content creation relating to Korean history and traditional culture.

With this in mind, the primary objective of this thesis is to demonstrate how a graph database, among the various potential digital media, can serve as a solution to the current shortcomings of Korean cultural heritage interpretation, while also facilitating new functionalities which expand our understanding of interpretation from that of a top-down, one-directional education tool, to one of multi-purpose and multi-directional education, research, content creation, and self-directed learning. In order to develop such a database in a way which 1) accurately conveys the contextual information about Korean cultural heritages and 2) is an improvement on current interpretive resources, we first need a detailed understanding of what interpretive resources are currently

available, what content they contain, the process by which they are created (and translated), and why these resources, content, and processes have come to be the way they are. We also need a way to judge these resources' success in fulfilling their role as tools of heritage interpretation, so that we can identify places for improvement.

However, until now, there has been very little research on the current status of Korean cultural heritage interpretations, especially that which specifically identifies current weaknesses/limitations and the causes of such weaknesses/limitations. Therefore, in order to develop a meaningful ontology which would form the basis of a database, we must first investigate the current status of Korean cultural heritage interpretations, their strengths and weaknesses, and the root causes of said strengths and weaknesses.

Thus, by understanding current interpretive resources and developing an ontology to use in the implementation of data-based heritage interpretation, this thesis aims to serve as a contribution to the investigation of how we can make use of current and future technological capabilities to bridge the gap between the mere surface-level consumption of Korean history and traditional culture, and a more meaningful and sustained engagement with and understanding of that history and culture.

2. Methodology

To accomplish the objectives of this thesis, the following methods are employed. First, the meaning of heritage and heritage interpretation are understood based on a comprehensive review of definitions given by previous scholars and organizations. With these understandings in mind, five “ideals” of interpretation are generated from existing literature as a means of evaluating the extent to which an interpretive resource accomplishes the objectives of heritage interpretation and to serve as a guideline for the development of future heritage interpretation resources. The reason these ideals must be newly proposed in this thesis is that, although there are many existing definitions and principles for heritage interpretation, they are too narrow in scope (i.e. leaving out any possibility of digital approaches or only coming from a traditionalist perspective), or too general to be used as evaluative criteria (i.e. definitions along the lines of “heritage interpretation is a communicative process to educate people on the value of heritages”). Therefore, the many definitions, principles, and other key points are extracted from literature – both seminal and contemporary – on the topic of heritage interpretation, and key words and phrases which appear repeatedly in these definitions, etc., across the literature are identified and then grouped based on

similarity. Ultimately, the key ideas which appeared throughout the literature are sortable into five categories: clear/accurate, personal/tailored, contextualized/holistic, facilitates engagement, and sustainable/innovative. After these ideals are presented, other key phrases relating to heritage interpretation which appear throughout the thesis are also defined for the sake of clarity.

Second, the current status of Korean cultural heritage interpretations is surveyed. This includes overviews of the available interpretive resources – including analog, digital (offline), digital (online), metadata, and the relationship between analog and online resources–, of the process of creating and translating interpretive resources – interpretive texts in particular – and the existing guidelines relating to them, and the nature of the content found in such interpretive texts.

Third, current interpretations, as presented above, are evaluated via the ideals of heritage interpretation, including the ways in which they realize the ideals, the ways in which they fall short, the reasons for these shortcomings, and suggestions for changes which need to be made to better meet each ideal.

Fourth, the potential of data-based interpretation as an answer to the shortcomings of current Korean cultural heritage interpretation is explored. The possibilities of databases, distinct from digital technology or the Internet in general, are explained, with a focus on the unique capabilities of graph databases in particular. The concept of an ontology, which is how information, in this case Korean cultural heritage interpretive information, is organized so that it can be turned into graph data, is introduced. Then, the varied potential of graph databases as an answer to the limitations of current interpretations are presented in terms of the five ideals of interpretation.

Throughout these first four sections, prior research, case studies demonstrative of various phenomena, and a systematic survey of resources are all utilized as research methods.

Fifth, an ontology is presented which describes interpretive information of on-site cultural heritages so that it can be applied to a graph database. On-site cultural heritages are chosen because they represent a diverse range of information on cultural heritages and also because they are the responsibility of local governments which most lack institutional resources to effectively develop interpretive resources. The ontology is based on the review of the content of interpretive texts presented in Section II in the thesis, along with a review of existing ontologies relating to cultural heritages. The strategy for the design of the ontology - which accounts for addressing the current limitations of Korean cultural heritage interpretation and the potential of the ideals of interpretation – is presented, along with the ontology relationships themselves.

Finally, using this ontology, various examples are shown which demonstrate the effectiveness of a data-based approach to solving current shortcomings of interpretation and better meeting the five ideals of interpretation. The examples are visualized with the graph database visualization software Neo4J.

In summary, this thesis reviews existing Korean cultural heritage interpretation resources and practices, the possibilities of data-based interpretation, and the ontology presented in this thesis based on five evaluative ideals developed from a review of the prior literature on heritage interpretation.

II. What is Heritage Interpretation?

In order to evaluate and make suggestions for the improvement of Korean cultural heritage interpretation, as well as develop any new methods of practicing heritage interpretation, we must first understand what heritage interpretation even is. In addition, there must be factors by which heritage interpretation can be evaluated, to see whether a given interpretation is living up to its potential and to have a framework upon which to research new methods for interpretation. This section reviews prior research on heritage interpretation, from both scholarly works and guidelines presented by heritage institutions, to come to an understanding of what heritage interpretation is. Based on a distilling of the key concepts found in the many definitions, principles, and main themes presented in these scholarly works, this section presents the ideals which prior research suggests heritage interpretation should strive to embody into five broad categories. It also defines various phrases relating to heritage interpretation which will be used throughout the remainder of the thesis.

1. Understanding Heritage Interpretation

The concept of heritage interpretation has been discussed by many past and contemporary scholars. It has changed over time in line with changes in our understanding of heritage and the role it plays in society. This section, therefore, introduces prior research on the topics of heritage and heritage interpretation in an attempt to settle upon a common understanding of these broad, contested, and ever-changing concepts.

1) What is Heritage?

The concept of heritage is, on one hand, taken for granted, and, on the other, highly contested. As Harrison (2013) puts it, “heritage today is a broad and slippery term” (5). Heritage is generally considered to be a natural or cultural (i.e. man-made) object or practice which is deemed to be of value to preserve and pass down to future generations. Harrison notes “that heritage is invoked as a positive quality, [] assumes some relationships with the past, [] relates to ways of categorizing and classifying ‘things’ and traditions in the world,” “often implies a sense of threat... and various other qualities that set it apart from the everyday,” and “is distinctive as a concept in the broad number of different categories of things it might be found to describe” (7). Value judgments about what constitutes heritages are often taken for granted, but some scholars have raised questions about who gets to determine such value and the ways in which heritage is preserved and passed down.

Smith (2009) argues that “there is, really, no such thing as heritage” (11). She states that “‘heritage’ is not a ‘thing’, it is not a ‘site’, building or other material object,” but rather, it “is a cultural process that engages with acts of remembering that work to create ways to understand and engage with the present, and the sites themselves are cultural tools that can facilitate, but are not necessarily vital for, this process” (44). She also defines heritage as “a multilayered performance – be this a performance of visiting, managing, interpretation or conservation – that embodies acts of remembrance and commemoration while negotiating and constructing a sense of place, belonging and understanding in the present” (3). This perspective is shared by Giaccardi, who argues that “heritage is today about far more than museum artifacts and historic buildings, and how they are to be preserved and communicated. It is about making sense of our memories and developing a sense of identity through shared and repeated interactions with the tangible remains and lived traces of a common past” (2012, 1).

Smith argues that this understanding of heritage is undermined by what she coins “Authorized Heritage Discourse (AHD).” This discourse takes for granted the idea that “it is only [experts] who have the abilities, knowledge, and understanding to identify the innate value and knowledge contained at and within historically important sites and places,” (29-30) which “disempowers the present from actively rewriting the meaning of the past,” (29). Within this framework, “heritage is not defined...as an active process or experience, but rather it is something visitors are led to, are instructed about, but are then not invited to engage with more actively” (31). This rhetoric also precludes “subaltern and dissenting heritage discourses” (35), especially of indigenous peoples and

minorities, but also of the general “non-expert” public, as well. In other words, what constitutes heritage and its value to society is predetermined by experts – determinations of which all others become passive consumers, unable to actively engage with or create their own meaning. For example, scholars like Saeji (2012) have suggested that the very act of designating intangible heritages, especially, as cultural heritages causes them to undergo a process of “taxidermification” in which precisely because they are deemed “property,” the “living heritage” becomes frozen as a skin of its past self. By turning it into a “cultural property” of the state, it is no longer free to be a living cultural practice of and for the people as it once was. As Giaccardi also states:

“We socially construct heritage in the context of our own lives and imaginations to interact meaningfully with our past and shape our vision for the future. This fundamental understanding emphasizes that heritage meanings and values are not attached to artifacts, buildings or sites. Neither are they frozen in time. They are the results of repeated and ongoing interactions in the lived world of ordinary people” (2012, 2).

Yet, in the realm of Korean cultural heritage, the Authorized Heritage Discourse is king. In Korean, the name of the Cultural Heritage Administration (*Munhwajaecheong*) literally means the “Cultural Property Administration.” This evokes a strong sense of (national) ownership, physicality, and fixedness. According to a 2016 CHA report, the CHA's Cultural Property Advisory Committee (*Munhwajae wiwonhoe*) is 81 percent male and 75 percent academics (CHA 2016, 53). Though the numbers presented in this report differ slightly from those currently on the CHA website², it is safe to assume that the percentages are similar. Although not on the report nor stated directly on the CHA website, the age of the advisory committee members is likely on average high, and there appear to be no non-Koreans on the committee. This demonstrates that in the eyes of the CHA, old, Korean, male, academics are the authorities on Korea's cultural heritages, and by extension, the designators and interpreters of those heritages. As shown in later sections on the current status of Korean cultural heritage interpretation, it is clear that the public is considered a passive audience to these experts' claims of value. This may not be surprising considering Korean

² Cultural Heritage Administration. “Cultural Property Advisory Committee.” Homepage. Retrieved May 2017 from http://www.cha.go.kr/html/HtmlPage.do?pg=/seek/commit3.jsp&mn=NS_03_05_03

society at large but is important to keep in mind nonetheless as it aligns with Smith's claims about AHD.

These conflicting conceptions of what heritage is and who the guardians of heritage are is mentioned here because they have a direct influence on the practice and objectives of heritage interpretation. Whether heritages and their value are determined by “experts” with the public as “passive audiences or tourists” of that heritage, or whether they are alive, evolving, and can be practiced by a public who are active and engaged meaning-makers, changes the agents and role of interpretation. For the purposes of this thesis, an understanding of heritage (and of interpretation) which makes space for both of these perspectives will be pursued. This is due to the fact that the current AHD orientation of the CHA will not change overnight, but there is nonetheless a need to begin to lay the groundwork for facilitating universal (i.e. non-expert, non-state-directed, and also non-Korean) engagement with heritage meaning making.

2) What is Heritage Interpretation?

Various scholars have attempted to define heritage interpretation. The most seminal of these definitions is that of Tilden in his book *Interpreting Our Heritage* (1950). His definition, along with those of others, has been organized into the following table.³ In addition to these definitions, some of the authors or organizations listed above also included various lists of principles of heritage interpretation (Beck and Cable 2011; ICOMOS 2008; Tilden 1950).

Table 1 Definitions of heritage interpretation

Author	Definition
Tilden 1950 (33)	An educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information.
Edwards 1976 (in Hirica 2005, 16)	Interpretation possesses four characteristics which make it a specialist discipline. It is an attractive form of communication, it offers concise information, it is conducted in presence of the object, and its aim is to help the visitor to understand the meaning of the heritage object.
Dean 1994 (in Hirica 2005, 16)	The act or process of explaining or clarifying, translating or presenting a personal understanding of an/the object.
Heritage Interpretation	The art of revealing in situ the meaning of the natural, cultural or historical legacy to the public visiting these sites in their leisure time.

³ Though compiled independently, a comparable table can be found in Shaliginova 2012 (18).

Association 1996 (in Hirica 2005, 17)	
Padró 2002 (in Hirica 2005, 16)	A method for presentation and communication of heritage, with the objective of promoting its use for cultural, educational, social and tourism purposes.
de las Heras 2002 (in Hirica 2005, 16)	A method which offers readings and options for an active use of heritage, employing a wide range of presentation and animation resources.
Hicira Handbook 2005 (15)	...a working method which facilitates presentation and social use of heritage and serves to provide a reading and options for its active use by means of many presentation and animation resources. Interpretation is based on cultural and/or natural evidence, either material or immaterial, found in a given location, and seeks to promote these features in their original context. To this end, the aim is always in situ recovery and the greatest possible contextualisation of heritage resources. The idea of the object as having value in itself in isolation from its function and setting, is rejected.
ICOMOS 2008 (2)	Interpretation refers to the full range of potential activities intended to heighten public awareness and enhance understanding of cultural heritage sites. These can include print and electronic publications, public lectures, on-site and directly related off-site installations, educational programmes, community activities, and ongoing research, training, and evaluation of the interpretation process itself.
Beck and Cable 2011 (xvii; xxi)	An educational activity that aims to reveal meanings about our cultural and natural resources. Through various media—including talks, guided tours, and exhibits—interpretation enhances our understanding, appreciation, and, therefore, protection of historic sites and natural wonders. Interpretation is an informational and inspirational process that occurs in our nation’s parks, forests, wildlife refuges, zoos, museums, and cultural sites; Interpretation is a process, a rendering, by which visitors see, learn, experience, and are inspired firsthand.
Shaliganova 2012 (17)	...interpretation is not a simple transfer of information about the site – it aims at showing connections and relations between objects, artefacts and visitors, provoking thought and motivation to explore the site further.
Staiff 2006 (loc. 106) ⁴	Heritage interpretation is a social and cultural process because, like all forms of interpretation, it cannot be limited to functional definitions, practical manuals, communication techniques, informal learning, planning approaches, multi-media performances and so on.
National Association for Interpretation (US)	A mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource.
The Association for Heritage Interpretation (UK)	Interpretation enriches our lives through engaging emotions, enhancing experiences and deepening understanding of people, places, events and objects from past and present.
Interpretation Canada	Interpretation is a communication process, designed to reveal meanings and relationships of our cultural and natural heritage, through involvement with objects, artifacts, landscapes and sites.

⁴ Staiff (2006) was accessed via its Kindle edition. Therefore, instead of page numbers, the Kindle location (abbreviated as “loc.”) will be used as the method for sourcing Staiff (2006) throughout this thesis.

Scholars have argued that the process of heritage interpretation itself is what imbues the heritage with value. Smith states that “...heritage is created by interpretation. Not only what is interpreted, but how it is interpreted and by whom, will create quite specific messages about the value and meaning of specific heritage places and the past it represents” (2009, 80).

Therefore, any assumptions made about the scope of heritage interpretation, the main actor of heritage interpretation, and how it should be done directly influence the message being sent. In the definitions above, we can observe some such assumptions being made. Many definitions assume that the public are passive and unknowing “visitors” or “audiences” who need the value and meaning of the heritage to be revealed to them by “experts,” not making mention of the public themselves being creators of heritages’ value or interpretations themselves. The definitions furthermore assume that the ‘audiences’ receiving the interpretation are in-person visitors to heritage sites, which implies that heritage interpretation does not occur off-site or online. However, some scholars and institutions mentioned above do imagine a broader and more inclusive definition of heritage interpretation, including Staiff (2016), Hirica (2005), and ICOMOS (2008), when their definitions are considered in the larger context of their work.

When we consider the conceptions of heritage and heritage interpretation as presented in Smith (2009), Giaccardi (2012), Staiff (2016), Kalay et al (2008), Cameron and Kenderdine (2007), Harrison (2013), and more, we can see a “new wave” approach to the discipline. The approach challenges the “traditionalist” perspective. Where a traditionalist approach to heritage interpretation was expert-led and prescribed in a top-down manner which situated the public as passive learners of knowledge, this new approach embraces the collaboration of the public in the process of heritage interpretation, allowing them to be active in the creation of meaning as they explore the world of heritages on their own terms. We also see a new emphasis on heritage interpretation being a part of a larger process, not an end in and of itself, which takes place not exclusively at physical sites via analog mediums of transmission, but is an amalgamation of the in-person experience *and* the virtual, off-site, and online realms. This new wave scholarship has also recognized that this so-called “democratic” (see Staiff 2016) heritage interpretation is facilitated by digital technologies, the Internet, and social media, which allow citizens to access and share information (via a wide variety of media) themselves, thus facilitating a more visual, discrete (as opposed to narrative), social and exploratory approach to interpretation, which was not possible in the past and thus limited heritage interpretation to largely narrative text and audio forms. This new wave scholarship does not necessarily dismiss the powerful role of on-site, person-to-person,

narrative forms of heritage interpretation, nor do they reject the opinions of “experts.” Rather, they emphasize that we should be wary of limiting ourselves to such an understanding of heritage interpretation when we live in a digital, global, and connected society. They argue that the possibilities of heritage interpretation have expanded greatly due to digital technology and the Internet, that these possibilities need to be acted upon rather than clinging merely to past methods, and that the voices of non-experts and marginalized groups need to be incorporated into the heritage discourse.

Table 2 Traditionalist and New Wave perspectives on heritage interpretation

Traditionalist		New Wave
Expert-led	→	Collaborative, civic
Top-down, prescribed		Bottom-up, explorative
Passive, educational		Active, creative
One-time only		Process over time
On-site, in person		Off-site, virtual
Analog		Digital, online
Narrative		Discrete
Text/audio		Visual

What can be seen in all the definitions and scholarly works referenced above is that heritage interpretation is a process which involves increasing awareness and understanding of “heritage,” however “heritage” is defined. While it may be difficult to more specifically define what heritage interpretation without making too many assumptions (and, in line with what Staiff as quoted in the table above, maybe interpretation should not be limited to a single definition), there are various recurring and broadly applicable themes about the nature of interpretation and what it should strive to accomplish which can be seen throughout these definitions and their sources. These themes will be introduced in the following section.

2. The Ideals of Heritage Interpretation

Throughout the literature on heritage interpretation, various perspectives on the qualities heritage interpretation should strive to embody have been presented. Some sources even include specific lists of principles for interpretation (Beck and Cable 2011; ICOMOS 2008; Tilden 1950). However, there are certain limitations to the specific principles outlined when it comes to using them as an evaluative tool for interpretation; Most only consider only the “traditionalist” on-site, analog interpretation and assume heritage interpretation to be an expert-directed process of educating a general public. Prior scholarship which embraces the “new wave” approach to heritage interpretation – taking into consideration the possibilities of the digital and online, and consider arguments, such as those made by Smith (2009), Giaccardi (2012), Staiff (2016) and others, regarding the need to let the general public (especially marginalized groups) participate in the meaning-making of heritages – generally do not include any criteria for judging the quality or effectiveness of interpretive resources. Even in the case of ICOMOS (2008), despite a noticeable shift toward a citizen-centric approach to heritage interpretation, its principles cannot easily be used as criteria for non-analog methods of heritage interpretation and its scope is too broad, focusing more on heritage management than on interpretation itself. Therefore, this lack of suitable criteria for evaluation and innovation of heritage interpretation resources meant that new criteria would need to be developed.

Therefore, in response to this shortcoming, criteria for evaluation and innovation were developed using the following method. First, prior scholarship which included both traditionalist and new wave notions of heritage interpretation was reviewed, with the various definitions of heritage interpretation, principles of heritage interpretation, and other key points regarding the nature and objectives of heritage interpretation extracted from the works.⁵ Then, the key words and phrases of these various definitions, principles, etc., were identified, and based on these key words and phrases, the definitions, principles, etc., from the various prior scholarship were grouped based on similarities. At the end of this process, the various definitions, principles, etc. were found to be groupable into five categories which characterize what heritage interpretation should strive

⁵ Reviewed works include Beck and Cable (2011), Cameron and Kenderdine (2007), Giaccardi (2012), Ham (2013), Harrison (2013), *Hirca Handbook* (2005), ICOMOS (2008), Interpretation Canada, Kalay et al (2008), Malpas (2008), National Association of Interpretation, Shalaginova (2012), Silberman (2006), Smith (2006), Staiff (2016), The Association for Heritage Interpretation, Tilden (1950), and the various references to other scholarship made within these works.

embody: clear/accurate, personal/tailored, contextualized/holistic, facilitates engagement, and sustainable/innovative. It was in this way that five ideals of heritage interpretation presented in this thesis were generated.

For lack of a better term, these five categories will be referred to throughout the thesis as the “ideals of heritage interpretation,” as they are something that heritage interpretation strives to embody. The benefit of these ideals is that they are not restricted to one definition of heritage interpretation, thus applicable to analog heritage interpretation methods, while simultaneously being able to take into account the influence and possibilities of ubiquitous digital technology, Web 2.0, and social media. They can also be applied to not only the interpretative resources themselves but also the process of interpretation and interpretive resource creation. Thus, these ideals can be used as a yardstick to evaluate the success of current Korean cultural heritage interpretation, and also to evaluate the potential of data-based heritage interpretation. The following sections will explain each ideal in greater detail, including how the ideal has been presented in prior scholarship and examples of various aspects of the ideals.

1) Clear / Accurate

Is the interpretation understandable?

A prerequisite of success in achieving interpretive objectives is that the information being presented is clear to the audience. This means that the facts presented are, of course, true, that the information is not misleading, and that it is presented in a way that is easy to understand. If incorrect or misleading information is presented to the audience, or if the way the information is presented makes the meanings and relationships conveyed therein difficult to decipher, then, of course, an audience cannot truly understand the meanings and significance of a heritage, and thus cannot make a real, personal connection to it. Therefore, this criterion must be guaranteed before all others.

This need for understanding, driven by clear messages and accurate information, has been raised by many heritage interpretation scholars. They argue that heritage interpretation is about revealing meanings and facilitating understanding, and how it is based on scholarly and scientific research and evidence which the public expects to be accurate. Scholars also emphasize that ensuring that the audiences are correctly perceiving the information which is being presented is key, which necessitates a clear message in a language of which the audience can make sense. These messages about understanding, clarity, and accuracy in heritage interpretation are presented in the following table.

Table 3 Select quotes from prior scholarship relating to the clear / accurate ideal

Author	Definition
Tilden 1950 (33)	[Interpretation is] an educational activity which aims to reveal meanings and relationships, rather than simply to communicate factual information.
Dean 1994 (in Hirica 2005) (16)	[Interpretation is] the act or process of explaining or clarifying, translating or presenting a personal understanding of an/the object.
The Association for Heritage Interpretation	[Interpretation involves a] deepening [of the] understanding of people, places, events and objects from past and present.
ICOMOS 2008 (3)	[An objective of interpretation is to] communicate the meaning of cultural heritage sites to a range of audiences through careful, documented recognition of significance, through accepted scientific and scholarly methods as well as from living cultural traditions.
Dean 1997 (in Shalaginova 2012, 71-72)	Most museums (and heritage sites) are places where exhibited information is derived from scholarly and scientific pursuits, therefore, the public expectation is that the information presented in museum programs and exhibitions is accurate.
Hicira Handbook 2005 (15)	Interpretation is based on cultural and/or natural evidence, either material or immaterial, found in a given location.
Beck and Cable 2011 (xxiv)	Interpretation texts must be understandable for those who receive them.
Shalaginova 2012 (74)	Perception is essential because messages are subject to multiple interpretations, and heritage interpretation needs to ensure that the messages are understood in the way they were intended. Sometimes in communicating with an audience, things are said that were not meant or the point is not transferred effectively; miscommunication cannot be avoided.
Shalaginova 2012 (74)	Another important issue is languages – it is really difficult to be attentive to the information which is provided in a language one does not know.

To break this ideal down more, first, heritage interpretation needs to be accurate. Any claims made need to be based on provable facts (and if the veracity of a claim cannot be ascertained, then this uncertainty also must be conveyed), and they need to be presented in a way which is not misleading. This is especially necessary for Korean cultural heritages, which as will be seen in the following sections, often involve claims which have a high potential to lead the audience to false conclusions.⁶ The danger of inaccuracy is magnified when heritage interpretation is done in a different language than the native language of the heritage site. There are often terminology or concepts which may be entirely mistranslated by unskilled translators,⁷ or which otherwise lack a direct cognate in the target language, and thus necessitate some degree of imperfect translation, which may result in loss of nuance or lead the audience to misunderstand what is being conveyed.

⁶ See the example about Sinhangseowon Confucian Academy in Section IV.1.

⁷ Examples include *gongpo* 공포 (which can mean either "horror" 恐怖 or "roof bracket" 栱包) and *uju* 우주 (which can mean "space/universe" 宇宙 or "corner pillar" 隅柱), depending on the Chinese characters.

In addition to accuracy, clarity of the message is also vital. Even if the facts and the translations are accurate, if they are conveyed in a way which is difficult for the audience to understand, the message transmission will be less successful. This means that information needs to be conveyed in language which is clear; for example, there may be terminology which are accurate and used widely by scholars, but if the target is a general public who is likely unfamiliar with such terminology, the accuracy of the term no longer matters because it is meaningless to the potential audience. Related to this is the form in which interpretive information is presented; Sometimes a narrative (in text or audio form) may not be the best way to present information, such as the layout of a structure or historical dates which could be more clearly conveyed in a diagram or timeline, respectively, than in narrative text or audio.

In addition, a lack of consistency or inclusion of extraneous information may be distracting to the message being sent. Inconsistency can be seen in the areas of word choice, content, and format. Though, as will be shown in following sections, inconsistency is an issue for the original (i.e. Korean language) interpretations, it is naturally exacerbated in translation, due to the fact that the way a word is translated (or even Romanized), what content is omitted or added for the “foreign” audience, and punctuation styles, etc., varies from translator to translator. This relates to the imagined audience and what information is appropriate or extraneous (and therefore unhelpful/a distraction to understanding) to them.⁸ However, the determination of what information is extraneous to whom leads to the question of who the imagined audience even is and what they want out of an interpretation, which brings us to the next interpretive ideal.

2) Personalized / Tailored

Is the interpretation tailored to the audience? Can audiences create a personal connection with a heritage via the interpretation?

This ideal aims to judge the extent to which an interpretation can meaningfully connect to the audience’s personality, experience, interests, and emotions. In other words, it asks whether the interpretation is relatable to the audience. This stems from the arguments made by interpretation

⁸ One example of this in the case of Korean cultural heritage interpretive texts is the inclusion of Chinese characters (*hanja*), reign years or pen/courtesy/posthumous names; Though academics may have interest in knowing the Chinese characters (which convey the meaning of a word in a way *hangeul* cannot), the reign during which a heritage was created, or the pen name, courtesy name, or posthumous name of a historical figure relating to a heritage, the general Korean public or foreign audiences may not find this information helpful, or may even become confused by it, asking themselves, “What does ‘Seongjong 3’ mean?” or “What is a ‘courtesy name’?”

scholars that interpretation is not merely educational in nature, not merely the transmission of a series of facts, but an act of forging a personal and/or emotional connection between the heritage and the person experiencing it – with each person demographically different from the next, and with each person coming to the heritage with differing background knowledge, interests and motivations.

Table 4 Select quotes from prior scholarship relating to the personalized / tailored ideal

Author	Definition
Tilden 1950 (33); see also Beck and Cable 2011 (xxiv)	Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile; Interpretation should aim to present a whole rather than a part and must address itself to the whole man rather than any phase.
Tilden 1950 (33); see also Beck and Cable 2011 (xxiv)	Interpretation addressed to children (say, up to the age of twelve) should not be a dilution of the presentations to adults but should follow a fundamentally different approach. To be at its best will require a separate program.
ICOMOS 2008 (4)	Interpretation and presentation programmes should identify and assess their audiences demographically and culturally. Every effort should be made to communicate the site's values and significance to its varied audiences.
ICOMOS 2008 (4)	The diversity of language among visitors and associated communities connected with a heritage site should be taken into account in the interpretive infrastructure.
ICOMOS 2008 (8)	Every interpretation programme should be considered as an educational resource for people of all ages. Its design should take into account its possible uses in school curricula, informal and lifelong learning programmes, communications and information media, special activities, events, and seasonal volunteer involvement.
Shalaginova 2012 (75)	Visitors to a heritage site are diverse and it is impossible to satisfy everyone, however that does not mean that heritage interpreters should not strive to do so.
Shalaginova 2012 (76)	Interpretive material... should be appropriate and interesting for a visitor, not just for the interpreter.
Shalaginova 2012 (74-75)	Another common limitation at heritage sites is a lack of varied interpretive media. Current research shows that people learn differently, and they usually choose the media which helps them acquire information best. Some like guided tours, others prefer audio guides, whilst others prefer interpretation panels. Nevertheless there are many heritage sites that provide guided tours or interpretive panels as the only way of interpretation.
Shalaginova 2012 (74)	Motivation matters because the type and degree of expected satisfaction can influence either learning or attitude change.
Shalaginova 2012 (74)	Heritage sites have a rather diverse audience who come from different social and cultural groups.
Shalaginova 2012 (20)	In such a definition three factors play an important role in the analysis and comprehension of the understanding processes, namely a person with his/her knowledge background, expectations, values and aims...
Smith 2006 (80)	In effect, the past is valued and understood differently by different peoples, groups or communities and how that past is understood validates or not a sense of place.

Research shows that visitors to Korean cultural heritages are demographically diverse, with differing levels of education, and different motivations - including a desire to experience

“artistic/beauty,” “culture,” “history,” “nostalgia,” “authenticity,” “escapism,” “knowledge acquisition/education,” and more - in visiting a heritage (Son 2015, Lee and Kim 2014, Kim 2015). The greatest percentage of visitors to heritages are motivated to visit due to recommendations from friends or colleagues (33.5 percent), followed by internet search (15.9 percent) (Kim 2015, 82). Many people visit heritages multiple times (Kim 2015, 82; Son 2015, 33), and such repeat visitors may have a different relationship to a heritage than a first-time visitor. Therefore, we can see that there is no such thing as a “general” visitor to a heritage.

This research does not even include non-Korean visitors, who add a whole new layer of demographic and motivational diversity. It also excludes demographic information, background knowledge, and motivations of those who aim to interact with heritage interpretations not as on-site visitors – such as those living abroad, students working on school projects, scholars engaging in research, or content creators looking for source material for their creative works (see also Chowdhury, S. 2015).

Creating interpretive resources which connect to the intellect and emotions of such diverse people with equally diverse expectations and needs presents a challenge. Yet as Shaliganova states, “[although] visitors to a heritage site are diverse and it is impossible to satisfy everyone, [] that does not mean that heritage interpreters should not strive to do so” (2012, 75). Therefore, better understanding the motivations of the potential “users” of heritage interpretation – whether they are visitors to heritage sites, content creators, or students/academics engaged in educational and research pursuits – and researching best practices to provide interpretive content in forms which can be tailored to the diverse interests and needs of such audiences are ongoing tasks of heritage interpretation.

3) Contextualized / Holistic

Does the interpretation present the heritage in its full context? Does the interpretation consider this context holistically?

It has been argued that a heritage in and of itself does not have value; It is the context and practice of a heritage which give it its meaning (Smith 2006). Therefore, the contemporary and historic context of a heritage is just as, if not more, important than the physical heritage itself. It is this context of which the heritage is an embodiment. Therefore, numerous heritage scholars have stressed the point that a heritage must be conveyed in context – the present, physical context where the heritage is experienced, as well as its natural, cultural, historical, political, and spiritual contexts.

Table 5 Select quotes from prior scholarship relating to the contextualized / holistic ideal

Author	Definition
Tilden 1950 (33)	Interpretation...aims to reveal meanings and relationships.
Tilden 1950 (68); see also Beck and Cable 2011 (xxiv)	A cardinal purpose of interpretation, it seems to me, is to present a whole rather than a part, no matter how interesting the specific part may be. It will be observed that I say "a" whole, not "the" whole. "The" whole soars into infinity, and the time we can spend with our listener or reader is all too brief.
Hicira Handbook 2005 (15)	To this end, the aim is always in situ recovery and the greatest possible contextualization of heritage resources. The idea of the object as having value in itself in isolation from its function and setting, is rejected (15).
ICOMOS 2008 (5)	Interpretation should explore the significance of a site in its multi-faceted historical, political, spiritual, and artistic contexts. It should consider all aspects of the site's cultural, social, and environmental significance and values
ICOMOS 2008 (3)	Respect the authenticity of cultural heritage sites, by communicating the significance of their historic fabric and cultural values and protecting them from the adverse impact of intrusive interpretive infrastructure, visitor pressure, inaccurate or inappropriate interpretation.
ICOMOS 2008 (5)	Interpretation should also take into account all groups that have contributed to the historical and cultural significance of the site.
ICOMOS 2008 (5)	The surrounding landscape, natural environment, and geographical setting are integral parts of a site's historical and cultural significance, and, as such, should be considered in its interpretation.
ICOMOS 2008 (5)	Intangible elements of a site's heritage such as cultural and spiritual traditions, stories, music, dance, theater, literature, visual arts, local customs and culinary heritage should be considered in its interpretation.
ICOMOS 2008 (5)	The cross-cultural significance of heritage sites, as well as the range of perspectives about them based on scholarly research, ancient records, and living traditions, should be considered in the formulation of interpretive programmes.
ICOMOS 2008 (4)	Interpretation should be based on a well-researched, multidisciplinary study of the site and its surroundings. It should also acknowledge that meaningful interpretation necessarily includes reflection on alternative historical hypotheses, local traditions, and stories.
Malpas 2008 (25)	...such integration itself depends on an understanding of the way in which those parts are themselves located in respect of one another and in respect of the whole. To have a sense of a work, or an artefact or site as a whole is, I would argue, to have a sense of its properly placed presence.
Shalaginova 2012 (30)	Of course, the aim of every communicative programme at a heritage site is to stimulate visitors to learn something about it, though one cannot expect people to memorise every bit of information presented. Rather one should aspire to show visitors connections between various events, to direct the visitors in their perception and understanding of the site.
Shalaginova 2012 (20)	In such a definition three factors play an important role in the analysis and comprehension of the understanding processes, and namely a person with his/her knowledge background, expectations, values and aims; the nature of the object (subject) that has to be understood...; and the context in which understanding takes place.

As the *Hirica Handbook* says, “the aim is always in situ recovery and the greatest possible contextualization of heritage resources,” however, as Tilden (1950) elaborates, the “the whole [context] soars into infinity, and the time we can spend with our listener or reader is all too brief” (68). Until now, most interpretive resources have been provided in the form of on-site information panels, museum video installations, or guided tours, and therefore a lot of heritage interpretation research has gone into trying to figure out how to best present the fullest contextualization of the heritage in the limited space of a new paragraphs of text, a two-minute video, or an hour-long tour (see Ham 2013).

A heritage’s context is comprised, more specifically, of contextual elements⁹, the heritage’s relationship to them, and their relationship to one another. These contextual elements include things like historical figures, time periods, places, events, artistic features, concepts, places, other heritages, etc. When connected to one another via various relationships, they create a contextual network or web. In this sense, though each heritage may have a context which surrounds it and gives it meaning, from a more holistic perspective, any single heritage is but just one element in a much more extensive historical and cultural network of information.

Therefore, if we approach the contextualization of a heritage from this holistic perspective, we can see a need for interpretation of the other contextual elements and their relationship to one another, as well. If an interpretation about a heritage argues that the heritage has value because it is related to So-and-So a person or Such-and-Such an event, the historical and cultural context of these people and events also need to be understood if the audience is able to fully grasp the context of the heritage. Therefore, interpretations about these various elements which make up a heritage’s context also need to be interpreted. In the opposite direction, heritages need to be able to act as contextual elements in the interpretations of historical figures, events, or concepts. In other words, there needs to be multidirectionality in contextualization, rather than interpretation centered merely around individual heritages.

Furthermore, the meaning of the heritage changes greatly depending on which contextual elements are included. An interpretive resource may mention only a heritage’s artistic qualities, or only its history, or only the historical figures who lived there – each one is a true context, but not

⁹ This concept is described by Kim (2013), who says: “Cultural heritage knowledge information contents are not information just on cultural heritages alone, but include information on “contextual information.” This includes the various Agents, Places, Time Spans, and Concepts which appear in a text which explain cultural heritages and provides a path toward “contextual information contents” which accurately explains the meaning [of those various elements].

a full context, and each decision about which context to present has consequences for the image presented to the audience. This begs the question of whether audiences have access to alternative contextualization or information on the context of the various historical figures, events, or concepts drawn upon in contextualizing a heritage's value. For example, can readers of an on-site heritage interpretation easily access supplementary interpretations of the various historical figures, events, or concepts mentioned within the heritage itself if they desire or need further information? Can they easily find heritages with overlapping historical or cultural contexts – a heritage with a similar appearance, or one which was created by the same artist or in the same period? This relates to the next interpretive ideal, which deals with the extent to which audiences can engage with the interpretive information.

4) Facilitates Engagement

Does the interpretation itself facilitate audience engagement? Does it stimulate and encourage further engagement with the heritage?

Facilitation of further engagement refers to whether there are means within the interpretive process to allow audiences to not be just passive receivers of interpretation, but act with agency. In other words, whether the audience can take the interpretation and do something with it or in response to it. Prior scholarship suggests that heritage interpretation should stimulate the audience toward a desire for further interest, learning, passion, reflection, exploration, discovery, conservation, etc., as shown in the table below.

Table 6 Select quotes from prior scholarship relating to the facilitates engagement ideal

Author	Definition
Tilden 1950 (33)	The chief aim of interpretation is not instruction, but provocation.
Tilden 1950 (59)	[The aim of interpretation is to] to stimulate the reader or hearer toward a desire to widen his horizon of interests and knowledge.
Tilden 1950 (60)	[The audience must] be stimulated first to want to discover things for himself, and second, to see and understand the things at which he looks.
Tilden 1950 (64)	The provocation to the visitor to search out meanings for himself, and join in the expedition like a fellow discoverer, was sometimes submerged in a high tide of facts, perfectly accurate, perfectly ineffectual.
Beck and Cable 2011 (xxiv)	Visitors must be inspired and provoked if their horizons are to be broadened.

Beck and Cable 2011 (xxiv)	One of the objectives of interpretation should be to simulate visitors, to instill a desire for beauty, to elevate the spirit and convey the importance of preserving what is being interpreted.
Hicira Handbook 2005 (15)	[Interpretation is] a working method which facilitates presentation and social use of heritage and serves to provide a reading and options for its active use by means of many presentation and animation resources.
Hicira Handbook 2005 (16)	The aim of heritage interpretation is to raise public awareness and provide guidance which will enable visitors to see, explore, situate, observe, analyse, understand, feel and truly «experience» the site. In short, to stimulate a set of experiences that will have meaning and life for visitors. Interpretation, in contrast to the cold rationalistic rigour which characterised traditional museum practices, seeks to evoke feelings and sensations: awareness, passion, emotions, and so on.
ICOMOS 2008 (4)	Interpretation and presentation should encourage individuals and communities to reflect on their own perceptions of a site and assist them in establishing a meaningful connection to it. The aim should be to stimulate further interest, learning, experience, and exploration.
ICOMOS 2008 (3)	Contribute to the sustainable conservation of cultural heritage sites, through promoting public understanding of, and participation in, ongoing conservation efforts, ensuring long-term maintenance of the interpretive infrastructure and regular review of its interpretive contents.
ICOMOS 2008 (3)	Encourage inclusiveness in the interpretation of cultural heritage sites, by facilitating the involvement of stakeholders and associated communities in the development and implementation of interpretive programmes.
Shalaginova 2012 (76)	... heritage interpreters need to provide an environment that encourages the exploring of interpretive material. Interpretive material itself should be attractive and able to motivate visitors to enjoy and explore a site.
Shalaginova 2012 (30)	Heritage interpretation becomes a tool that engages visitor imagination and enables them to create emotional connections to the site.
Shalaginova 2012 (30)	Visitors need to be oriented in their ways of perceiving a site, pointed in the direction of important facts and stories, and allowed to make their own conclusions.
Smith 2006 (70)	The engagement of emotion and the sharing of this emotive experience or performance, together with sharing of acts of remembering and memory making, are vital elements of the glue that creates and binds collective identities.
Silberman 2006 (31)	'Presentation' denotes the carefully planned arrangement of information and physical access to a cultural heritage site, usually by scholars, design firms, and heritage professionals. As such, it is largely a one-way mode of communication. 'Interpretation,' on the other hand, denotes the totality of activity, reflection, research, and creativity stimulated by a cultural heritage site. Although professionals and scholars play important roles in this process, the input and involvement of visitors, local and associated community groups, and other stakeholders of various ages and educational backgrounds should be seen as essential to the goal of transforming cultural heritage sites from static monuments into places of learning and reflection about the past, as well as valuable resources for sustainable community development and intercultural and intergenerational dialogue.

This ideal is of particular importance in regard to the authorized heritage discourse put forth by Smith (2006) and whether those who can engage in heritage interpretation and heritage-related meaning making are limited to a select few “experts.” It raises the question of who is allowed to engage in heritage interpretation, and how (and to what extent) they are allowed to engage in heritage interpretation.

The facilitation of engagement hinges on the following factors: whether the interpretation *does* successfully provoke the audience into some desire for action, whether there are opportunities for engagement in place upon which the audiences can act, and whether there is a connection between the interpretation itself and the opportunities for engagement.

Whether the interpretation successfully provokes the audience to a desire for action is connected to the afore mentioned ideals relating to understanding, personalization, and contextualization, and naturally varies depending on the audience. Engagement opportunities could include consumption-oriented opportunities like buying goods related to a heritage, attending educational classes, watching a performance, or visiting other heritage sites, or they could be more production-oriented opportunities such as sharing photos on social media, participating in creative workshops, or engaging in research. It could also include volunteering to be a docent, tour guide, or grounds maintenance helper.

However, even if there are hundreds of diverse opportunities for engagement, if such opportunities are not once mentioned in the process of an interpretation, then how would the audience know such engagement is possible? For this reason, the link between interpretation and engagement opportunities needs to also be considered as a factor of this interpretive ideal. This is related to the issue of whether audiences can easily access additional information on the contextual elements in interpretations (both on- and offline), therefore following their curiosity and engaging with the interpretation itself, and whether other engagement opportunities are actively advertised and encouraged to audiences.

In addition, barriers to engagement – whether they deal with language, location, needed educational background, cost, etc. – must be taken into account when considering to whom engagement opportunities are made available.

5) Sustainable / Innovative

Is the interpretation sustainable? Can the interpretation be easily innovated upon?

Sustainability and innovation of interpretation resources and the processes by which they are created is crucial to long-term success in achieving the objectives of interpretation. This has been expressed by various institutions and scholars, ICOMOS in particular, as shown in the table below.

Table 7 Select quotes from prior scholarship relating to the sustainable / innovative ideal

Author	Definition
Beck and Cable 2011 (xxiv)	An interpretation programme must have political, social, financial, administrative and voluntary support if it is to prosper.
Silberman 2006 (29)	In an era when public culture budgets are shrinking and cultural institutions of all kinds are being forced to become self-sustaining, the choice of site interpretation methods and technologies is often determined by their ability to stimulate local economic development: by paid admissions, subsidiary sales of postcards and other museum-shop items, employment opportunities, and a steady flow of tourist revenue for hotels, shops, and restaurants in the immediate vicinity. All too often, finances and balance sheets are now allowed to become the real tyrants in determining how cultural heritage sites are presented to the public.
Shalaginova 2012 (74)	It is important not only to assume what effect a message might have, but to test it. Pilot projects are very useful in testing the interpretive activities with the target audience and adjusting the messages before activities are implemented.
ICOMOS 2008 (3)	Develop technical and professional guidelines for heritage interpretation and presentation, including technologies, research, and training. Such guidelines must be appropriate and sustainable in their social contexts.
ICOMOS 2008 (5)	Interpretation and presentation programmes and activities should also be documented and archived for future reference and reflection.
ICOMOS 2008 (6)	The interpretation plan for a cultural heritage site must be sensitive to its natural and cultural environment, with social, financial, and environmental sustainability among its central goals.
ICOMOS 2008 (6)	Any technical or technological elements selected to become a permanent part of a site's interpretive infrastructure should be designed and constructed in a manner that will ensure effective and regular maintenance.
ICOMOS 2008 (7)	Interpretive programmes should aim to provide equitable and sustainable economic, social, and cultural benefits to all stakeholders through education, training and employment opportunities in site interpretation programmes.
ICOMOS 2008 (7)	The interpretation of a cultural heritage site should not be considered to be completed with the completion of a specific interpretive infrastructure. Continuing research and consultation are important to furthering the understanding and appreciation of a site's significance. Regular review should be an integral element in every heritage interpretation programme.
ICOMOS 2008 (7)	The interpretive programme and infrastructure should be designed and constructed in a way that facilitates ongoing content revision and/or expansion.
ICOMOS 2008 (8)	The training of qualified professionals in the specialised fields of heritage interpretation and presentation, such as content creation, management, technology, guiding, and education, is a crucial objective. In addition, basic academic conservation programmes should include a component on interpretation and presentation in their courses of study.

Organizations engaged in interpretation, such as government institutions, are often non-profit institutions and with limited financial resources with which to accomplish interpretive objectives. Furthermore, there are limited human resources comprised of people who are considered to have the expertise and skills necessary to implement the groundwork of interpretation – the academic research which is the basis of the facts and claims in interpretations, the development of methods by which to present information, and the translation of the information into other languages. If such

resources are not used efficiently and are not sustainable, time and money will be invested in redundant efforts rather than in innovation. Furthermore, interpretations need to be easily updatable (especially for fixing mistakes) and improved upon if innovation is to be made possible. Therefore, if innovative interpretations are sought after, the process must be efficient and the fruits of such resources should be able to be reused and improved upon long into the future.

3. Definitions of Other Key Terms

Now that heritage interpretation and the ideals relating to it have been introduced, it will be helpful to define other related terms that will appear throughout this thesis. These phrases may be used in other ways in other contexts, and are likely to be understood differently by different readers, so for the purposes of this thesis, they are defined as follows:

- Interpretive information is the abstract collection of meanings and relationships related to heritages which can be utilized to reveal the greater context of a heritage.
- Contextual elements (also called nodes, entities) are the things, i.e. people, places, objects, concepts, events, etc., of which interpretive information is comprised and their meanings.
- Relationships (also called simply relations) are the relationships that the various contextual elements have with one another and which together comprise interpretive information.
- Interpretive content is the selection and organization of abstract interpretive information to present a particular context. In other words, it is storytelling using interpretive information, or the particular topic being presented.
- Interpretive medium is the sensorial (visual, auditory, or tactile) medium, that is linguistic or non-linguistic in nature, which can be conveyed among humans. It is the means by which interpretive content is conveyed as a resource.

Table 8 Breakdown of interpretive medium forms

	Linguistic	Non-linguistic
Visual	Written text, sign language	Photos, video, diagrams, visual objects
Auditory	Speech	Non-language audio (nature sounds, music, etc.)
Tactile	Braille	Presence in physical spaces, (touching, making or consuming) tactile objects, physical actions

▪ Interpretive resource is a manifestation of interpretive content via an interpretive media. Some interpretive resources may include multiple media forms together (multimedia), and may be presented by analog or digital means. The same interpretive content can be conveyed via various mediums, giving rise to varying interpretive resources.

▪ Interpretive text is a specific type of linguistic interpretive resource which conveys interpretive information in the form of expository writing, i.e. sentences and paragraphs of organized language (For the purposes of this thesis, and in practice, it is differentiated from linguistic forms such as lists, bullet points, labels on timelines, diagrams, or maps, etc.). It normally refers to the visual texts on information panels, brochures, or online websites. However, it could also refer to expository content even if said content is conveyed by auditory (speech, speech recordings) or tactile (Braille) means (though these are not “text” per say). It is the most commonly utilized and accessible interpretive resource.

▪ Interpretive data is a manifestation of abstract interpretive information in a medium which can be processed by computers. It is the only way in which interpretive information can be “understood” by computers as well as humans. This must not be confused with digital interpretive resources, which can be stored and accessed by humans via computers, but cannot be meaningfully processed by computers. For computers to process such information, humans must design data models which organize the contextual elements and relations of interpretive information. There are various ways for such data models to be designed. Interpretive data can be used in the creation of digital interpretive content and resources (such as data visualizations or automatically generated texts).

▪ Data-based interpretation is the practice of organizing, storing, managing, and accessing interpretive information and facilitating the creation of interpretive resources, through the utilization of data, the database, algorithms and interfaces.

▪ On-site cultural heritages refer to heritages which are tangible in nature and usually found at individual heritage sites (as opposed to museums). These include various structures or complexes which are difficult or impossible to relocate to a museum, such as archeological sites, fortresses, palaces, Buddhist halls, traditional Korean houses, pavilions (private, governmental, and commemorative), government offices, shrines, Confucian academies, tombs, placenta chambers, trees, wells, bridges, etc. They also include otherwise relocatable heritages which for some reason have been deemed more appropriate to keep on site rather than move to a museum, usually due to

their function as an object of worship or memorial, such as Buddhist statues, pagodas, and paintings, portraits held in shrines, or steles.

- Further engagement opportunities refer to actions that can be taken by audiences of interpretation who seek to engage further with heritages after having been provoked to do so via the process of interpretation. Such actions can include activities such as seeking out further interpretive information (including related conceptual elements or other heritages), visiting more heritages, sharing information about heritages with acquaintances, attending educational programs, making creative content relating to heritages, volunteering or donating money to help in the conservation of heritages, and more.

III. The Current Status of Korean Cultural Heritage Interpretation

The purpose of this section is to provide an overview of the current status of Korean cultural heritage interpretation. This includes a summary of the kinds and number of heritages designated by or registered with the Cultural Heritage Administration (CHA), the various interpretive resources available to the public, the process by which on-site interpretive texts are composed and translated (including a translation of the official CHA guidelines for interpretive text composition and translation), as well as a detailed breakdown of the kind of content generally found in on-site interpretive texts.

1. Korean Cultural Heritages and Managing Institutions

In South Korea, cultural heritages are designated by or registered with the Cultural Heritage Administration, which is an affiliated institution of the Ministry of Culture, Sports, and Tourism. Cultural heritages can be designated at a state or city/province level, with seven classifications at the state level and four at the city/province level. There are also classifications for Registered Cultural Heritages, which generally includes heritages from the 20th century, and Cultural Heritage Material, which are not designated as heritages, but still deemed to have preservation value. In addition to this are heritages registered with UNESCO. The number of cultural heritages designated or registered (including Cultural Heritage Material) with the CHA are as follows¹⁰:

¹⁰ Numbers were compiled from the Cultural Heritage Digital Hub and CHA Website Statistics Page, as of May 17, 2017

Table 9 Statistics on current CHA designated cultural heritages

Designation Level	Designation	Number
State	National Treasure	331
	Treasure	2,067
	Historic Site	493
	Scenic Site	110
	Natural Monument	456
	National Intangible Cultural Heritage	140
	National Folklore Cultural Heritage	292
City/Province	Tangible Cultural Heritage	3,099
	Intangible Cultural Heritage	519
	Monument	1,706
	Folklore Heritage	467
-	Registered Cultural Heritage	697
-	Cultural Heritage Material	2,593
World	UNESCO Heritage	44
Total		13,014

The cultural heritages themselves are diverse in nature. They include archeological sites, paintings, sculptures, architectural structures, song and dance traditions, old documents, and many more. In total, the CHA categorizes its heritages into 136 different categories¹¹. This thesis will focus on on-site cultural heritages, an unofficial category created for the purposes of this thesis, which include those heritages that are tangible in nature and usually found at heritage sites (as opposed to museums).

Although cultural heritages are designated by or registered with the Cultural Heritage Administration (CHA), the direct management of heritages is left up to institutions such as public and private museums and archives, which manage artifacts and old documents, special CHA-affiliated organizations for important historical sites such as the Joseon Royal Palaces and

¹¹ See appendix

UNESCO World Heritage Sites, and local province, city, county and district governments (of which there are 250 in total), which manage most on-site heritages and the objects contained there within. These managing institutions are also responsible for the interpretive resources about the heritages they manage, namely the composition and translation of interpretive texts on information panels and brochures, as well as other interpretive resources such as tours, educational programs, events, audio-visual guides, etc. (explained further in the following section), although some online resources, video resources and children's resources are developed directly by the CHA. Other related institutions, which do not manage heritages but are involved in research about heritages, are the National Research Institute of Cultural Heritage, the Korea National University of Cultural Heritage, the Korea Cultural Heritage Foundation, and more.

2. Resources

As mentioned in the “Definitions of Other Key Terms” section, interpretive resources are comprised of content (a particular topic) presented via a medium. The mediums were explained in that section in terms of visual, auditory, and tactile, as well as linguistic and non-linguistic. However, for the purposes of this section, interpretive resources will be grouped into four categories based on the presentation technology: analog and digital (offline, online, and metadata). Analog resources include resources which are experienced in-person without a digital interface of any kind, such as visits to a heritage site, print media, in-person interpretations by tour guides, hands-on experiential activities, and in-person performances. Digital resources include resources which are experienced via a digital device, such as an audio device, video screen, mobile phone, tablet, or computer. These may include things such as audio device guided tours, touch-screen activity panels, photo, video, and text content presented via a digital screen, and augmented or virtual reality experiences. There are two subcategories of digital resources: offline and online. Online resources refer to a specific subset of digital resources which are connected to the Internet, and therefore, can utilize the power of the World Wide Web, such as the ability to search for further information. Furthermore, unlike offline resources, which are only available to those visiting the heritage site or museum in person, online resources can be accessed anywhere by anyone with an internet connection. Metadata is a subset of online resources, and for the purposes of this thesis, refers to the basic data which identifies and described each cultural heritage.

Most official interpretive resources for cultural heritages fall somewhere the umbrella of the Ministry of Culture, Sports, and Tourism (MCST), which includes the Cultural Heritage

Administration (CHA), the National Museum of Korea (NMK), the Korea Culture Information Service Agency (KCISA), as well as the Korea Tourism Organization (KTO). Official content also includes that provided by local governments, which are directly in charge of the management and interpretation of designated and registered cultural heritages within their jurisdiction. Other institutions which provide interpretive resources on cultural heritages are those such as Jangseogak Archives at the Academy of Korean Studies, Kyujanggak Archives at Seoul National University, among others. There are also private museums which hold many heritage artifacts, like the Leeum Museum or the Gansong Art Museum, which also have their own interpretive resources. There also may be “unofficial” interpretive resources available online and offline that are provided by private businesses, individual scholars, and hobbyists, ranging from books or blog posts to guided tours. For the purposes of this review, these “unofficial” resources will not be considered.

The research in this section was based on the information provided on the various websites of the organizations mentioned above as well as the personal experiences of the author visiting heritage sites and museums around Korea, and the brochures and photos of information panels collected and taken during those visits. Online material and apps were accessed in May 2017, while brochure materials were compiled between 2013 and 2017.

1) Analog

Let us first look at analog interpretive resources. These resources, available in-person at museums or heritage sites, include text or visual material (via stationary information panels and brochures/pamphlets which visitors can take with them), guided tours led and commentated by a tour guide, passive and active experiential activities (such as musical performances or hands-on activities such as craft making), libraries and museum shops, and educational and volunteer programs. The experience of being in the same physical space as the heritages can also be considered an interpretive resource of its own.

The most universally available analog resources are information panels and brochures. Most information panels include only interpretive texts, but some also include visual content such as diagrams. The amount of information provided varies, from a simple label with the heritage name and details on its time period and creator, to multi-paragraph text. Information panels usually include information on specific heritages, though in some cases they may explain concepts or other contextual material not directly about a particular heritage. Korean and English interpretive texts are standard on most information panels (though some older information panels may not have

English), and popular heritage sites also have Chinese and Japanese texts as well. Some popular sites also have brochures available in the four languages, which usually include interpretive texts, photos, and maps of the museum or heritage site. More information on the system of information panels (i.e. the various kinds of information panels, how they are situated within a heritage site) can be found in the *Cultural Heritage Guide Information (Explanatory Text, Etc.) and System Improvement Plan Research Final Report* (hereafter “CHA Report”) (Cultural Heritage Administration, 2014a, 3-40).

The next most widely available analog interpretive resource is speech content provided by tour guides. At popular heritage sites and at museums, guided tours are provided on a regular schedule in Korean, English, Chinese, and Japanese. However, at less popular heritage sites and museums, the languages may be limited to just Korean and English or only Korean, and may only be available with an advanced request. For large groups, heritage sites (for example Changdeokgung, Gyeongbokgung) may also recommend private, volunteer-based tour guide services such as Palace Guide or Rediscovery of Korea.¹²

Some museums or heritage sites provide performances or experiences for visitors. These events and activities are generally open to the public. Some of these performances or experiences are free while others have fees (ranging from a few thousand won to up to some ten-of-thousands of won for special performance tickets). Some must be booked in advance, like concerts or evening palace viewings, while others can be viewed or participated in without any registration. Some activities (like folk games and trying on traditional attire) and performances (especially reenactments of palace guard changes, for example) are available every day, while others (like music performances and craft activities) are available at certain times during the week (like every Saturday and Sunday) or on holidays like Chuseok, Seollal, Daeboreum, or Dano. Special events may also correspond to traditional rituals, such as the performance of Jongmyo Jeryeak once a year at Jongmyo Shrine. In addition to the events provided by museums or heritage sites are those provided by institutions which specialize in traditional performances and experiences, such as the Korea House, KOUS, and the National Gugak Center.

Libraries and museum shops--only available at some museums, Gyeongbokgung and Changdeokgung Palaces, the Korea Cultural Heritage Foundation, and some Buddhist temples--

¹² See Gyeongbokgung Palace and Changdeokgung Palace websites, both retrieved May 2017:
http://www.royalpalace.go.kr:8080/content/guide/guide01_tab06.asp;
http://www.cdg.go.kr/cms_for_cdg/show.jsp?show_no=15&check_no=2&c_relation=28&c_relation2=90

are also interpretive resources in the sense that they provide access to further interpretive resources, such as books, audio, and various cultural items, including replicas of cultural heritages.

Finally, the most in-depth interpretive resource available in person are educational and support (volunteer or financial) programs. Like libraries and museum shops, such educational programs seem to be provided only by museums or institutions such as Buddhist temples (which provide temple stays) or Confucian academies (which provide programs on the Chinese and Korean Classics - included in this are Jangseogak and Kyujanggak Archives). Educational programs can be one-time academic events, such as lectures, or more long-term classes. Some educational programs, like the Teens Workbook for Student Visits provided by Leeum Museum, are meant to be used concurrently with the museum or heritage visit, while others are separate from the heritage viewing experience. Regardless, most must be registered for in advance. In the case of the National Museum of Korea (NMK), for example, various education programs are designed for a wide variety of audiences including children, teens, adults, families, professionals, those with special needs, and non-Koreans. It should be noted that almost all education programs advertised to non-Koreans are not academic programs as much as relatively short-term experiential activities such as craft making or cooking with background information explained concurrently. Education programs for Koreans display more variety along the spectrum of experiential and purely academic. Some institutions also provide internship opportunities, such as the National Folk Museum of Korea, or volunteer opportunities, such as that provided at the NMK or the Heritage Guardians program operated by the CHA. These volunteer opportunities are advertised as being only available to Koreans (i.e. they are not included on the English-language versions of their websites). In the case of the Leeum Museum and the NMK, visitors can become “friends” or “members” of the museum by donating money, which gives them access to additional or preferential educational opportunities. The Korean Cultural Heritage Foundation also offers a thesis competition for research relating to cultural heritage education.

2) Digital – Offline

There are two kinds of digital resources: offline and online. Offline resources are those which do not need a connection to the internet to operate. This does not mean that they are not initially downloaded from the internet, but they are pre-installed or pre-downloaded in such a way that the resource can be used while not connected to the internet. Such resources can be accessed in two ways: via devices provided by the institution, such as AV guides, digital screens, or touch screen

panels, or via personal devices brought by visitors, such as smart phones or tablets. Digital resources provided via institutional devices may only be accessible on-site. AV guides are usually only offered at museums and often take the place of tour guides, and allow visitors to have a semi-self-directed tour of the museum, with each heritage having a corresponding number the visitors input to hear the interpretive speech. Digital screens may provide videos or a slideshow of photos to convey a variety of interpretive content. These are usually available at museums, rather than heritage sites, although some heritages, like Jongmyo Shrine, have video to convey the various rituals or events that traditionally occur there. Some museums may have touch screens or other interactive installations which allow visitors to select additional content, including text, photos, video, and audio, about which they are interested in further learning.

Some museums may also provide offline resources that are accessible via personal devices can be pre-downloaded and accessed anywhere, though they are usually meant to be used on-site in lieu of institutional AV devices. Such offline digital content available via personal devices usually comes in the form of mobile apps, though they are more like an e-book or audio guide which includes additional features such as GIS tracking, photo, video, animations, options to favorite certain heritages, and options to share information to SNS. An example of this kind of e-book style pre-downloaded mobile application is the “Palace in My Hand”¹³ series provided by the CHA which is a collection of separately downloadable apps for the five royal palaces and Jongmyo Shrine.¹⁴ The main resources (all of the photos, video, and text) of the application must be entirely pre-downloaded onto the personal device to be used (albeit in coordination with GIS location and the camera function), rather than accessed as needed as would happen with an application that connected to the internet (the CHA provides a different mobile service, “My Own Cultural Heritage Interpreter”¹⁵ which does connect to the Internet and will be discussed below). In other words, some “mobile” resources, which one may think implies “connected to the internet,” function basically as offline AV resources which are only accessed via the visitor’s personal mobile device instead of one provided by the institution directly.

¹³ In Korean, *Nae sonanui gung* 내 손안의 궁

¹⁴ It is of interest to note that the English names of all five of the “Palace in My Hands” applications have different capitalization and Romanization formatting, suggesting a lack of oversight and attention to detail – see the table in Section III.2.3.

¹⁵ In Korean, *Namanui munhwayusan haeseolsa* 나만의 문화유산 해설사

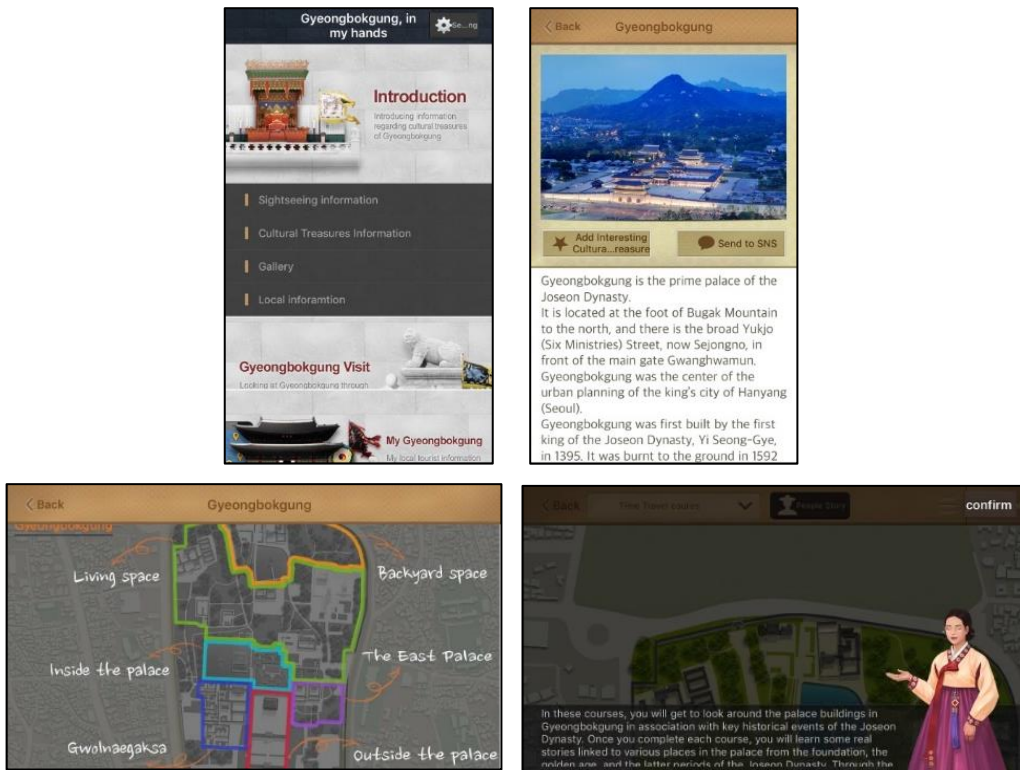


Figure 1 Screen captures from the official CHA “Gyeongbokgung, in my hands” app¹⁶

3) Digital – Online

Online digital interpretive resources refer to resources which can be accessed via a digital device by anyone with an Internet connection. Online resources, thus, can be accessed both on-site and off-site. Such online resources usually come in the form of websites and mobile applications. Forms of online resources are varied, including searchable databases of individual heritages with photos, videos, diagrams and interpretive texts, written explanations of various concepts, glossaries of terminology with and without accompanying visual material, GIS information about heritages, or collections of narrative video content. There are so many of these resources that they are best introduced in the form of a table. These online resources have been reviewed and organized into a

¹⁶ Retrieved July 17, 2017. Notice the basic spelling errors (“Local inforamtion”), capitalization inconsistencies, un-official Romanizations (it should read “Bugaksan Mountain” not “Bugak Mountain” according to official government guidelines), and highly inaccurate translations (such as “Outside the palace” for *oejeon*).

table by Kim (2015, 22; 40).¹⁷¹⁸ These websites or mobile apps all provide to the audience via the Web some kind of interpretive information about Korean cultural heritages - whether they are about specific cultural artifacts or about contextual elements (including historical figures, people, places, or events). They are organized by service type and topic. The services have been categorized into six types:

- glossary/encyclopedia – hosts a searchable list or database of terminology or entries on various items, i.e. cultural heritages
- map – allows cultural heritages to be seen on and searched for via a map, may include pre-suggested theme maps
- media content – provides academic articles or reports, photos, video, audio, 3D renderings, diagrams, etc.
- mobile app – a combination of the other service types designed to be used on a mobile device
- portal – does not directly host interpretive information, but provides searchable links to a variety of services which do
- theme – provides interpretive resources on certain topics

Not mentioned in the table are privately or collaboratively operated large-scale encyclopedia services like Doopedia or Wikipedia, which may provide quality interpretive information on cultural heritages and their contextual elements, but the scope and accuracy of which is difficult to verify. In total, the table includes 41 different digital resources (all “online” in the sense defined above except for the “In My Hands” mobile app series) by 10+ institutions on 19 different topics.¹⁹

¹⁷ The table presented below has been based on the table by Kim, but with some changes to the table design, the inclusion of additional resources, and the exclusion of resources which seem to be no longer serviced or are not relevant to this thesis.

¹⁸ A similar table of online resources is also provided in the CHA Report (2014, 243-244).

¹⁹ Descriptions and links for the services can be found in the appendix and bibliography, respectively.

Table 10 Online Korean cultural heritage interpretive resources

Site Name	Type	Topic	Org.	Language
CHA Cultural Heritage Search	Glossary / encyclopedia	Cultural heritage - State and province/city designated	CHA ²⁰	KR
Comprehensive Information System of Korean Historical Figures	Glossary / encyclopedia	Misc. - Historical figures	AKS ²¹	KR
Heritage Terminology Dictionary	Glossary / encyclopedia	Cultural heritage	CHA	KR
Heritage Type-based Search	Glossary / encyclopedia	Cultural heritage	CHA	KR
Names of Parts of Cultural Heritages	Glossary / encyclopedia	Cultural heritage	CHA	KR
North Korean Cultural Heritage Information	Glossary / encyclopedia	Cultural heritage - North Korea	NRICH ²²	KR
Traditional Korean Art Search	Glossary / encyclopedia	Cultural heritage	Leeum Museum	KR, EN, CH, JP
Cultural Heritage Administration English Site	Theme + Glossary / encyclopedia	Cultural heritage - State designated	CHA	EN (CH, JP sites also available)
Cultural Heritage Digital Hub	Theme + Glossary / encyclopedia	Cultural heritage - State and province/city designated	CHA	KR +
Digital Local Culture Encyclopedia of Korea	Theme + Glossary / encyclopedia	Misc. - Local culture	AKS	KR, English
Encyclopedia of Korean Culture	Theme + Glossary / encyclopedia	Misc. - Korean culture	AKS	KR
Local Government Tourism Sites	Theme + Glossary / encyclopedia	Cultural heritage - Local	Various local gov'ts	KR +
Cultural Heritage GIS Service	Map service	Cultural heritage - State and province/city designated	CHA	KR
Daum Cultural Heritage Map	Map service	Cultural heritage - State designated	Daum	KR
3D Content	Media content	Cultural heritage	KCISA ²³	KR
K-HERITAGE Channel	Media content	Cultural heritage	CHA	KR, EN

²⁰ Cultural Heritage Administration

²¹ Academy of Korean Studies

²² National Research Institute of Cultural Heritage

²³ Korean Culture Information Service Agency

National Research Institute of Cultural Heritage	Media content	Cultural heritage	NRICH	EN (CH, JP sites also available)
Traditional Pattern Design	Media content	Misc. - Traditional patterns	KCISA	KR
Bulguksa Temple in my hands	Mobile app	Cultural heritage - Buddhist temple	CHA	KR, EN, CH, JP
ChangDeokGung in my hands	Mobile app	Cultural heritage - Royal palace	CHA	KR, EN, CH, JP
ChangGyeongGung in my hands	Mobile app	Cultural heritage - Royal palace	CHA	KR, EN, CH, JP
Cultural Heritage Survey National Treasure Smart App	Mobile app	Cultural heritage - National treasures	CHA	KR
Deoksugung, in My Hands	Mobile app	Cultural heritage - Royal palace	CHA	KR, EN, CH, JP
Gyeongbokgung, in My Hands	Mobile app	Cultural heritage - Royal palace	CHA	KR, EN, CH, JP
Jongmyo in my hands	Mobile app	Cultural heritage - Royal shrine	CHA	KR, EN, CH, JP
My Own Cultural Heritage Interpreter	Mobile app	Cultural heritage - State and province/city designated	CHA	KR
Smart Tour Guide	Mobile app	Misc. - Tourist sites	KTO	KR, EN, CH, JP
World Heritage Suwon Hwaseong	Mobile app	Cultural heritage - Fortress	GTO ²⁴	KR
CHA Digital Library	Portal	Cultural heritage	CHA	KR
Cultural Heritage Research Knowledge Portal	Portal	Cultural heritage	NRICH	KR
Culturing	Portal	Cultural heritage	KOCCA ²⁵	KR
Korea National Heritage Online	Portal	Cultural heritage - State designated	CHA	KR
National Memory Heritage Service	Portal	Cultural heritage - Documentary	CHA	KR
Changdeokgung	Theme	Cultural heritage - Royal palace	CHA	KR
Changgyeonggung	Theme	Cultural heritage - Royal palace	CHA	KR
Children and Youth Cultural Heritage Administration	Theme	Cultural heritage - For kids	CHA	KR
Deoksugung	Theme	Cultural heritage - Royal palace	CHA	KR
Gyeongbokgung	Theme	Cultural heritage - Royal palace	CHA	KR

²⁴ Gyeonggi Tourism Organization

²⁵ Korea Creative Contents Agency

Jongmyo	Theme	Cultural heritage - Royal shrine	CHA	KR
Joseon Royal Palace	Theme	Cultural heritage - Royal palaces and Jongmyo Shrine	CHA affiliate	KR
Royal Tombs of the Joseon Dynasty	Theme	Cultural heritage - Royal tombs	CHA affiliate	KR

The list demonstrates that there already exist a significant number of resources relating to Korean cultural heritage interpretation, however, as the following sections will show, this does not necessarily speak to the quality or organization of such resources. Many of the resources have redundant information (i.e. nearly identical information on the same topic). These resources are furthermore often not linked to one another, especially inter-institutional links, which presents a challenge to the discovery of helpful and related resources.

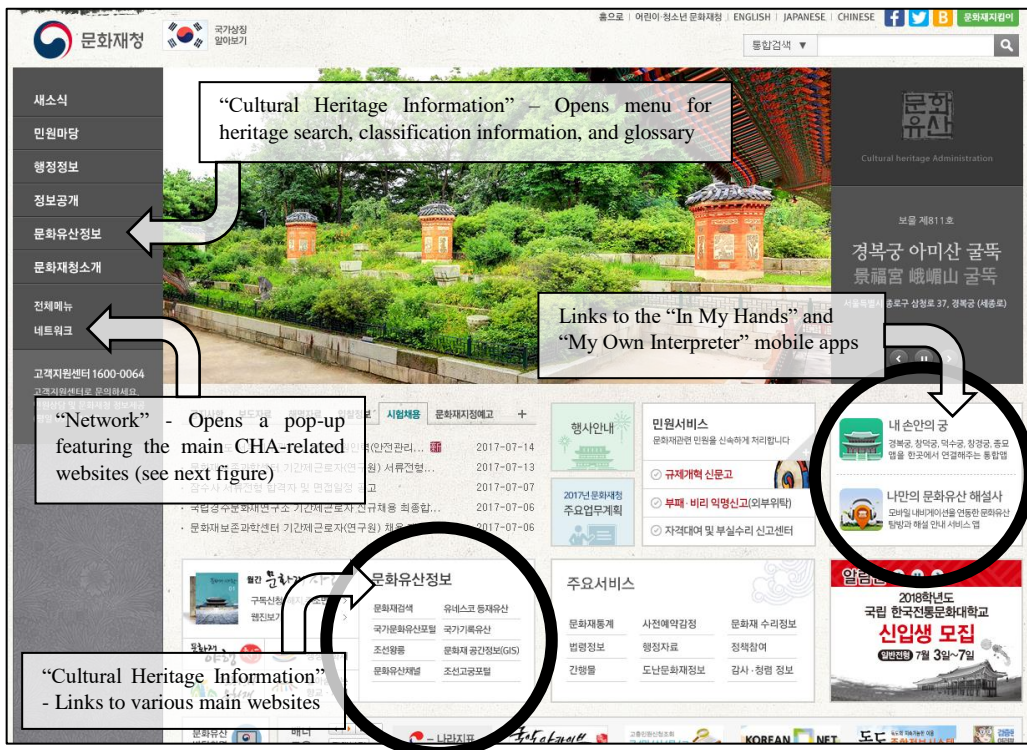


Figure 2 Screen capture of the CHA website homepage with annotations for interpretation-related information (Retrieved July 17, 2017 from <http://www.cha.go.kr/>).



Figure 3 Screen capture from the “Network” pop-up on the CHA website homepage.²⁶ This shows the network of main websites of the CHA, some of which do not provide interpretive resources; The Cultural Heritage Digital Hub is notably not included here.

²⁶ Retrieved July 17, 2017 from <http://www.cha.go.kr/>



Figure 4 Screen captures of the CHA Cultural Heritage Digital Hub website homepage and search results for Iron Flagpole at Yongdusa Temple Site²⁷

²⁷ Retrieved July 17, 2017 from <http://www.cha.go.kr/>



Figure 5 Screen capture of the Korea National Heritage Online website²⁸

²⁸ Retrieved July 17, 2017 from <http://www.heritage.go.kr/>

4) Cultural Heritage Administration Metadata

The CHA utilizes metadata in their administration of cultural heritages. This metadata can act as a kind of interpretive data, conveying interpretive information about the period, region, and type of a heritage. However, the current metadata, as shown in the figures below, is not sufficient for fully explaining the complicated context of cultural heritages. The figures and table below show three services where users can currently access metadata information about cultural heritages: the basic Heritage Search function accessible via the CHA Heritage Search, the Cultural Heritage Digital Hub, and information stored on E-Minwon site²⁹.

종 목	국보 제41호
명 칭	청주 용두사지 철당간 (淸州 龍頭寺址 鐵幢竿)
분 류	유적건조물 / 종교신앙/ 불교/ 당간
수량/면적	1기
지정(등록)일	1962.12.20
소재지	충청북도 청주시 상당구 남문로2가 48-19
시 대	고려시대
소유자(소유단체)	국유
관리자(관리단체)	청주시

Figure 6 Screen capture of metadata for Iron Flagpole at Yongdusa Temple Site, Cheongju from the CHA Heritage Search³⁰

²⁹ Accessible via the *saengaegwalli* (생애관리) button on some individual heritage information pages as accessed via the Heritage Search

³⁰ Retrieved July 17, 2017 from


http://www.cha.go.kr/korea/heritage/search/Culresult_Db_View.jsp?mc=NS_04_03_02&VdkVgwKey=11,00410000,33

청주 용두사지 철당간 (淸州 龍頭寺址 鐵幢竿) ⊗



	한국어	English	Chinese	Japanese
종목	국보 41호			
지정일	1962.12.20			
시대	고려시대			
분류	유적건조물 > 종교신앙 > 불교 > 당간			
소재지	충청북도 청주시 상당구 남문로2가 48-19			

청주 용두사지 철당간 (淸州 龍頭寺址 鐵幢竿) ⊗



	한국어	English	Chinese	Japanese
Classification		National Treasures41		
Name		Iron Flagpole at Yongdusa Temple Site, Cheongju		
Quantity				
Designated Date		1962-12-20		
Address		48-19, Nammul-ro 2(i)-ga, Sangdang-gu		
Age		King Gwangjong (962), Goryeo Period		
Owner		National Property		
Manager		Cheongju City		

Figure 7 Screen capture of Korean and English metadata of Iron Flagpole at Yongdusa Temple Site, Cheongju from the Cultural Heritage Digital Hub³¹

³¹ Retrieved July 17, 2017 from http://hub.cha.go.kr/idolsearch/culturalheritageInfoViewPop.do?ct_id=20121105000000023150

문화재 기본 정보			
문화재명	국보 제41호 정주 송루사지 철당간		
문화재 기본정보			
종 류	국보	지정번호	제 41호
한 글	정주 송루사지 철당간	한 자	淸州 鍾樓寺址 鐵幢竿
영 문			
분 야	당간지주	재 료	지주 화강석, 당간 첩제
지 정 일	1962-12-20	해 제 일	
구 조		형식/형태	당간
(재)작자		규격/크기	지주높이4.2m, 철간높이12.7m
수량/면적	1기	년대/시대	고려시대 고려 광종
소재지/보관장소	[지번] (28530) 충청북도 정주시 상당구 남문로2가		
소재시도	충북 정주시		
지정구역면적	53 m ²	지정구역지정면적	2.3 m ²
보호구역면적	13341 m ²	보호구역지정면적	1611.7 m ²
보 호 들			
부속(시설)물			
소유정보			
소유자명(구분)	국유(국유)		
점유자명		규 모	
관리단체(자)	정주시		
지정/면적 소유정보			
필지소유구분	[종합] ▼		
지정/보호구역 면적정보			
국유	7270 m ²	공유	89 m ²
사유	7599 m ²	중고	0 m ²
지정/보호구역 지정면적정보			
국유	465 m ²	공유	89 m ²
사유	1116 m ²	중고	0 m ²
사유 및 내용			

Figure 8 Screen capture of metadata of Iron Flagpole at Yongdusa Temple Site, Cheongju from E-Minwon³²

³² Retrieved July 17, 2017 from http://www.e-minwon.go.kr:8072/lfmn/CpmsmastR___01.do?p1=1113300410000&RADIO_NO=0

Table 11 CHA Korean cultural heritage metadata³³

Metadata Type	Display		
	Heritage Search	Digital Hub	E-Minwon
Manager	○	○ (En, Ch, Jp Only)	○
Owner	○	○ (En, Ch, Jp Only)	○
Quantity/Area	○	○ (En, Ch, Jp Only)	○
Period (with King)	×	○ (En, Ch, Jp Only)	○
Name (English)	×	○ (En Only)	○
Address	○	○	○
Designation Number	○	○	○
Text (Korean)	○	○	×
Name	○	○	○
Name (Chinese)	○	○	○
Text (Chinese)	×	○	×
Text (English)	×	○	×
Text (Japanese)	×	○	×
Category	■	■ (Kr Only)	○
Designation Date	■	■	○
Designation Type	■	■	○
Period	■	■	○
Region	■	■	○
K-Heritage Channel (Video)	○	×	×
Narration	○	×	×
Photos	○	×	×
Video	○	×	×
Affiliated Items/Facilities	×	×	○
City and Province	×	×	○
Text (History, Origin, Legend)	×	×	○
Creator	×	×	○
Text (Current Status)	×	×	○
Designated Zone Area	×	×	○

³³ Key: × means “not provided,” ○ means “provided,” and ■ means “provided and available in advanced search.”

Designated Zone Designated Area	×	×	○
Text (Designation Rationale)	×	×	○
Dimensions/Size	×	×	○
Form	×	×	○
Items Under Protection	×	×	○
Material	×	×	○
Misc.	×	×	○
Owner Type	×	×	○
Protection Zone Area	×	×	○
Protection Zone Designated Area	×	×	○
Structure	×	×	○

It should be noted that not all heritages have an E-Minwon metadata entry, and not all metadata fields (on any of the sites) are filled out for every heritage. As the table shows, the main Heritage Search and the Digital Hub allow for filters of period, region, categorization, designation type, and designation date. However, only one of these can be selected at a time (i.e. a user cannot search for both Joseon and Goryeo at the same time; only one can be selected).

Keyword	<input type="text"/>	<input type="radio"/> Cultural Heritage <input type="radio"/> Cultural Heritage+Content
Classification	All <input type="text"/>	<input type="checkbox"/> Canceled Cultural Heritage
Designated Number	from <input type="text"/> to <input type="text"/> (ex:1 - 100)	
Designated Year	from <input type="text"/> to <input type="text"/> (ex:1962 - 2008)	
Location	ALL <input type="text"/>	
Age	ALL <input type="text"/>	
<input type="button" value="Q Search"/>		

Figure 9 Screen capture of advanced search options in on the English CHA website (same as Korean advanced search)³⁴

³⁴ Retrieved July 17, 2017 from http://www.cha.go.kr/chaen/search/selectGeneralSearch.do?mn=EN_02_02

This method of describing heritages via metadata is clearly not designed with the objective of interpretation. It was originally designed for the purpose of managing heritages (see also Cultural Heritage Administration, 2014a, 247). Thus, one cannot expect it to fully describe all interpretive information. However, the CHA clearly aims to facilitate, at the minimum, searching for heritages, yet current metadata does not allow users to search for heritages in ways that may be helpful for them.

5) The Bridge Between Analog and Online

At a heritage site or museum, visitors usually have access to a few analog resources which could possibly connect them with digital resources: text content in the form of an information panel and sometimes a brochure, content on AV devices or mobile apps, as well as any information to further resources as advertised by tour guides. As mentioned above, AV devices are usually limited to museums, while mobile apps are also limited to the “My Own Interpreter,” “In My Hands,” and “Smart Tour Guide” apps, how well these are advertised on-site is uncertain. So, do these resources contain pathways to connect in-person visitors to digital or other analog resources?

First, let us look at the information panels. All newly installed information panels have a QR code which links to the online version of the interpretive text as provided via the Cultural Heritage Administration site. The link opens in a browser, which is almost identical the “My Own Interpreter” mobile application interface. The mobile link includes photos (as well as video and documentaries for some more well-known heritages), an option to have the interpretive text play as audio, as well as interpretive texts in English, Japanese, and Chinese when available (usually for state-designated heritages only). In some cases, like Baekje Historic Areas, the QR codes may link to interpretive texts and photos provided on the website of the institution which manages the heritage.³⁵

³⁵ In the case of Baekje Historic Areas, the content provided online is Korean only.

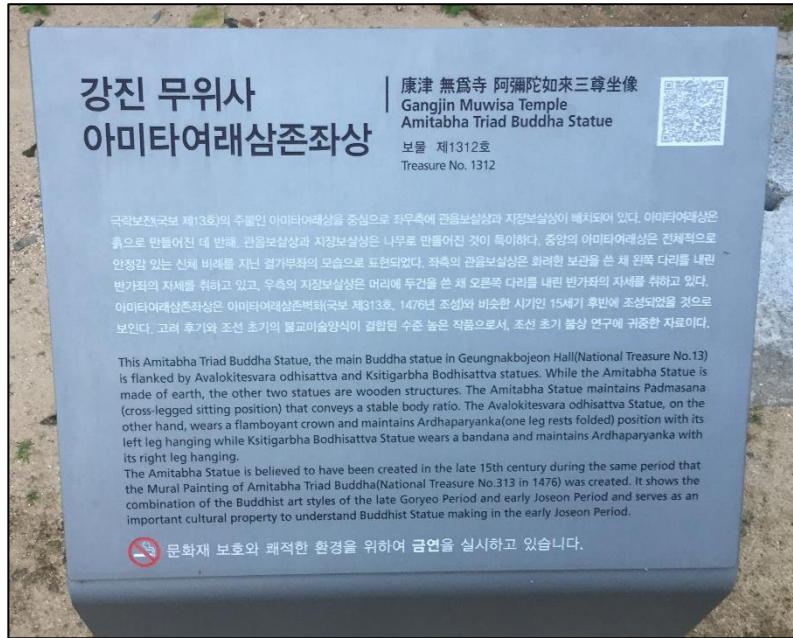


Figure 10 On-site information panel with QR code³⁶

The on-site interpretive texts and online interpretive texts usually differ. The online interpretive texts are generally slightly longer, with most of the information largely the same, just written in a different order. Therefore, whether they provide any greater detail than the on-site text varies entirely from heritage to heritage. Metadata on the heritage is provided, but in Korean only.³⁷ There is also a tab for “Related Heritages,” but these appear to be only available for the royal palaces and Jongmyo Shrine.³⁸ The only external links available on the page are to the CHA mobile homepage, a search bar, Facebook, and Twitter. The mobile search function only allows for keyword based searching and does not allow for any filtering based on metadata (such as a period, location, or heritage type), nor does it allow for results to be sorted alphabetically.³⁹ If the visitor clicks on the link to the CHA mobile homepage, they are taken to a mobile version of the CHA

³⁶ Photo taken by the author in 2016

³⁷ Some English, Japanese, and Chinese metadata is available on the Digital Hub site, but this is not available on the mobile applications.

³⁸ These lists only include the heritages within the individual palace/shrine complex as being related; for example, Donhwamun Gate (the main gate of Changdeokgung Palace) is listed as “related” to Changdeokgung, but Changdeokgung and Jongmyo Shrine are not considered “related” even though they are geographically right next to each other.

³⁹ It is automatically sorted by designation number.

homepage, which does not include any links to the terminology or diagram glossaries as provided on the desktop version of the site.

Based on this, what options does the visitor have to seek out further resources based on the information panel? The online content as accessible via the QR code does not include any links to definitions or explanations of any related people, places, events, or concepts that the visitor may have been curious about or not fully understood. There is also no way to find similar or nearby heritages.⁴⁰ The one action which is facilitated is to follow the CHA via Facebook and Twitter and check the CHA homepage. Furthermore, the mobile version of the CHA homepage does not include information about any education or volunteer opportunities, and while an event list is provided, these events are not related to the heritage the visitor is visiting.

Let us next consider the brochures. Not every heritage site has a brochure or pamphlet. Sometimes the only additional resource is a local tourist guide with maps and information about local heritage sites (including the one the visitor is currently visiting), cultural events, and restaurants and local goods. To gauge the extent to which brochures (among those brochures that are available) inform visitors about further resources, 25 brochures from major museums and various heritage sites were collected and reviewed.⁴¹ They included 11 individual heritage sites, 10 museums, and four local tourist guides. All include admission information or directions and short interpretive texts of the various heritages available to see, usually with accompanying photos. Almost all brochures contain a website link or QR code linking to a website. Many include maps which show nearby attractions, including other heritages. Only three mentioned SNS resources, and these were all museums. Only five museums, all four local tourist guides, and one individual heritage site included information on further educational or experiential opportunities. Only two local tourist guides made mention of a mobile app (one of which no longer seems to be available), and none of the brochures mentioned anything about the mobile apps provided by the CHA or the Smart Tour Guide. This shows that the main role of brochures seems to be duplicating the interpretive information on the information panels and providing admission information, rather than advertising to visitors further interpretive resources (analog or digital) - apart from some museums and local tourist guides.

⁴⁰ A nearby heritage search function is available via the “My Own Interpreter” app

⁴¹ Brochures were sampled from places the researcher had visited in the past; See the Appendix for the full list as well as a table of the informational features provided in each.

In the other direction, digital resources seem to provide significant information on analog resources, including information on events, educational programs, heritage admission information, etc. They also sometimes link to other digital resources; however, it is rarely made clear exactly what content is on those digital resources; audiences have to click the link and open the site to find out. Oftentimes, websites which should be advertised on one another are not. For example, the main Royal Palaces website and the individual palace and shrine websites, are not linked to one another, even though they are made by the same organization and are obviously related, while the Digital Hub website is not advertised anywhere on the CHA Homepage, and seems to be advertised only via the Korean National Heritage Online website. Digital resources provided by other institutions (even if they are a part of the same Ministry of Culture, Sports, and Tourism) are also rarely featured on one another. Therefore, this may cause confusion as to what resources exist online, what content is provided on each website, and how to access those websites.

3. Processes

The purpose of this section is to explain how, by whom, and based on what standards interpretive resources are composed and translated. As shown in the previous section on interpretive resources, such resources are developed and provided by a variety of institutions. However, it is difficult to ascertain the exact processes of resource development and translation for all institutions – partly because there are so many, but also because there is no public information or official guidelines on how and by whom such resources are developed. Furthermore, it is not necessary to understand how all resources are developed to gain an understanding of the general practices. Therefore, this section focuses on the composition and translation of interpretive texts found on information panels at heritage sites (and online). Such texts are available for almost all heritages and are, as such, the most widely available and utilized interpretive resource. This section focuses primarily on the methods employed by local governments, which are responsible for most interpretive text composition and translation.

There is no official process outlined by the Cultural Heritage Administration (CHA) for the composition and translation of Korean cultural heritage interpretive texts. When possible, official guidelines and documents provided by the CHA regarding interpretive text composition and translation have been referred to (Cultural Heritage Administration 2010, Cultural Heritage Administration 2014a). An official at the CHA in charge of information panels and a member of the exhibit department of the National Museum of Korea were contacted via phone in an attempt

to understand who is in charge of the interpretive text composition and translation process, however neither could say exactly who was in charge of interpretive text composition nor what their qualifications were. Due to the fact that it is nearly impossible to find official information on the composition and translation process of interpretive texts by any other means, much of the accounts in this section are written from the researcher's, and her colleagues', personal experience editing and translating interpretive texts as a part of the Korean Cultural Heritage English Interpretive Text Compilation Research Team⁴² (hereafter Research Team), which has fact-checked and translated over 130 interpretive texts on behalf of ten local governments across the country, as well as directly for the CHA, over the course of nearly two years, and whose members have had years of experience beyond this in the field of cultural heritage-related translation work. The fact that it cannot be known exactly how, by whom, and to what standard interpretive texts are composed and translated, demonstrates the shortcomings of the current process, as will be evaluated later in the thesis. Thus, this section should be seen as an overview of how the composition and translation of interpretive texts has been undertaken at various times in the recent past, but may not apply to all scenarios.

Although cultural heritages are registered with the CHA, the composition and translation of the majority of new or updated interpretive texts are under the jurisdiction of the institutions which directly own or manage cultural heritages. Included among these institutions are, of course, public and private museums and archives, historical sites such as palace complexes and UNESCO World Heritage Sites, and private collections. But, also included are local province, city, county and district governments (of which there are 250 total) which oversee most on-site heritages such as historic houses, Buddhist temples, Confucian academies, commemorative pavilions, tombs and shrines, natural monuments, fortresses, and the objects contained there within. While there are guidelines regarding the content and design of interpretive texts and information panels provided by the CHA (2010, 2014a), there are no official regulations regarding qualifications of the authors or translators, or what process should be followed. Therefore, each institution is at liberty to compose and translate interpretive texts as they wish, resulting in differences in the order of the process and the kinds of individuals or organizations to which work is outsourced.

Museums, archives, palace complexes and UNESCO sites often have staff who are professionally trained in museum or archival studies, and thus have some level of knowledge the

⁴² This research team is an unofficial research team at the Academy of Korean Studies comprised of a professor, two Ph.D. students, and the author of this thesis, which was organized to research translation best practices for Korean cultural heritage interpretive texts, including the creation of glossaries, guidelines, and online interpretive content. The team's website can be accessed at <http://dh.aks.ac.kr/~heritage>.

composition of interpretive texts as well as cultural heritages themselves and may be able to do some interpretations in-house. However, local governments are staffed only by civil officials who likely have no knowledge of cultural heritages or interpretive composition, let alone translation, staying in their position for a short period of a few years or less. Therefore, the composition and translation of interpretive texts must be outsourced. However, it is up to the jurisdiction of each local government to whom to outsource these jobs, and each local government may have different financial resources and human connections with which to work. There have been multiple cases (in the experience of the Research Team) in which the civil official in charge of overseeing the composition and interpretation process is brand new to their job and had been provided with almost no information about how to go about it.

How the Korean interpretive texts are composed varies. In the case of newly registered heritages, the texts are usually based off the reports which detail the reasons for a heritage receiving its designation, which are usually compiled by or approved by academics (as will be shown in the evaluative section, however, this information is not always accurate). However, who actually composes the interpretive text – its structure, whether terminology is explained or not, etc. – is unclear. In cases when a new information panel is being installed for an existing heritage, the same Korean text may be reused, or it may be altered in some way. Sometimes these texts are (nearly) the same as those provided on the CHA website (the authors of which are also unknown), other times they are different. Sometimes there is additional information added, but where such information is sourced from is unknown. Furthermore, though ideally the guidelines and suggestions made in the *Cultural Heritage Information Panel Guideline and Improvement Case Studies* (Cultural Heritage Administration 2010) or *Report* (Cultural Heritage Administration 2014a) are followed regarding content and stylistic choices, this seems to be more often than not, not the case, and who is responsible for making those editorial choices, and their qualifications to do so, are unknown. As a result, the structure, tone, and content of the Korean texts vary widely.

English translations are based on the original Korean texts, but there are almost no guidelines for the English translations (as is shown in the following section). How translators are recruited is also unknown. Even the Research Team does not know exactly by what means local civil officials get its contact information.⁴³ Oftentimes, the responsibility of text translation is passed on to the design company responsible for designing the information panels, and there is no way to know how they are finding translators or what those translators' qualifications are. After translations are

⁴³ It seems to be mostly word of mouth, but who is asking whom for such information is unknown.

made, they may or may not be proofread by Koreans and/or native English speakers. In cases when previous translations are found to be of extremely poor quality, they may be retranslated by different translators. After compositions and translations are finalized, they are sent to a design company, after which they are double-checked for errors in the layout process, and then made into information panels.

Very little is known about outsourced authors, translators, and fact-checkers and editors of interpretive texts. Surely some payment records may exist which show to whom the work was outsourced, however as this information is not made public, and because civil officials change so frequently, this information is quickly forgotten. When the outsourcing of translation is given to the information panel design companies, even local governments may have no record of who translated the texts. As a result, we cannot know what these authors', etc., qualifications are, how they were recruited, or what information (such as guidelines) they were provided regarding how to compose or translate the interpretive texts. This also means that new civil officials tasked with the job of getting new interpretive texts made may have difficulty finding reputable interpretive text authors and translators. Furthermore, due to a lack of cultural heritage expertise and interpretive text composition skills, along with limited time and budget, local civil officials in charge of interpretive text composition and translation may have little option but to approve the texts and their translations without fact-checking or proofreading by other experts, cultural heritage educators, or native English speakers.

The interpretive texts also do not undergo any approval process with the CHA, and neither are they sent to the CHA for further use or upload on the CHA website. The only time the CHA would be contacted about the content of the interpretive texts is if there is some specific problem discovered regarding factual information which needs to be reviewed by an expert – in which case a member of the CHA's advisory committee would be contacted. As mentioned above, the CHA does provide composition, translation, and design guidelines (2010; 2014a), it cannot be known whether these guidelines are actually provided to authors or translators, or if they are, to what extent they actually followed without surveying all organizations and individuals involved with interpretive text composition and translation, a large undertaking not within in the scope of this thesis. As will be showed in the following sections, many interpretive texts include terminology which is difficult for ordinary Koreans to understand and the content and style of the writing varies widely even among otherwise similar heritages. And, regarding English translations, it is clear that in many cases (especially outside of Seoul) interpretive texts are not proofread by a native speaker

even for basic grammar and punctuation. To those who know a bit about cultural heritages, it is also clear that the translators usually do not have any background knowledge of Korean cultural heritages. This all suggests that guidelines regarding interpretive texts and their translations are not being followed, that not all authors and translators are qualified for the job, and that the texts and translations are not edited after being received by civil officials. In other words, there is, in practice, little oversight of the content and translations of interpretive texts by local governments, and no oversight by the CHA.

In summary, based on information available on the CHA website and inquiries of the CHA and local governments, what can be known for sure is that there is no one person or division responsible for overseeing interpretive texts, including their composition, translation, presentation, and utilization. There is no standard system for creating and translating interpretive texts. The composition and translation of interpretive texts is the solely the responsibility of civil official-staffed local governments. Any fact-checking or proofreading is managed either locally or via inquiries of the advisory committee at the CHA. The installation of on-site information panels, the development of educational content, and the development and management of the CHA online search engine and apps are managed by entirely different divisions of the CHA. In the case of independent sub-organizations (such as the palaces in Seoul, museums, and archives), the management of websites and the interpretive content provided there within appears to be entirely separate from the CHA divisions mentioned above. Thus, we can see that the composition and translation of interpretive texts is not only divided by locale and discipline, but is considered as work which is entirely separate from the development of educational or digital content at the CHA.

1) On-Site Interpretive Text Guidelines

In 2010, the CHA provided guidelines for information panels, which focused mostly on the design standards for the panels, but also included a section on interpretive text composition and translation (Cultural Heritage Administration 2010). This guideline is the only official guideline provided by the CHA. It is as follows.

Content should include (39):

- history and origin of the heritage
- its historical and cultural value

- related myths, legends, and folk beliefs
- key visitor points of interest
- other things the author deems appropriate

Guidelines for English translations:

- partial translation of the original text

General Guideline Principles (41):

- 1) The objective of the central information in the informative text is to convey objective facts. However, if it serves to convey some sympathy or allow the visitor to experience greater interest in the heritage, content which may be considered subjective information may be added.
- 2) Historical facts should be based on that which is officially approved; the Cultural Heritage General Survey and reissued content on CHA homepage should be considered first.
- 3) The language and content should be easy and simple so that visitor may discern the respective cultural heritage. If necessary a drawing or photo can be included, is should be in accordance with the design and layout of the informative panel.
- 4) Sentence order can vary depending on the importance of the content, with high priority content being written in the first sentence; Apart from special circumstances, this determination of importance is left up to the author.
- 5) The first sentence should be written to include information to discern the respective heritage, with the heritage's function, origin, unique qualities, and historical and cultural value coming first.
- 6) Depending on the form, size, or scale of the panel, content may be omitted or minimized. (*Example included*)
- 7) If there are related myths or legends, these should be actively utilized; Even if they are just contemporary facts or a story, they should be included if they provide visitors with fun, emotion, or valuable information.

- 8) When possible, expert terminology or abstruse language should be avoided within the informative text; if inclusion is absolutely necessary, then an explanation of the term should accompany it. (*Example included*)
- 9) The English translation should be an interpretation, not a direct translation, of the original text; When needed, additional text can be added solely for the English text.
- 10) Any sentence which does not relate to the explanation of the cultural heritage should be omitted.

The guideline also states that heritages have artistic, historical, and academic value and provides the following tips for how to convey such values:

- Depiction of artistic value: “should strive for a balance between depicting both the heritage's universal and individual beauty, should have additional explanations of why it is beautiful, and should explain the heritage's beauty in such a way to avoid too much comparison to other heritages (40).”
- Depiction of historical value: “should focus on explaining the historical events of key figures. Explanations should focus on the facts, but should strive to make the reader feel like they are brought into the historical time and space [of the key figures and events] (48).”
- Depiction of academic value: “contains inherent difficulty in that they must use terminology to convey the expert and academic value. They should explain the unique and contrasting features of the heritage by explaining the various elements which make it up, and if necessary, should convey a time-space perspective by showing convenience or change as created by a particular construction method or technique (59).”

The guideline also includes formatting rules for dates, Chinese characters, and dimensions, but does not take into account how these may need to be formatted differently in English.

The content as prescribed in the guideline is vague in nature. It fails to discriminate in the content that should be included for heritages of different forms - for instance, the content included in an interpretive text for a painting would be much different than that of an interpretive text for a

historical site, yet the guidelines do not differentiate these different forms. It also does not clearly outline the order of the content, merely stating that the “most important” information, including “function, origin, unique qualities, and historical and cultural value” should be in the first sentences. Furthermore, the guideline provides few best practice examples for the author or translator to model, failing to show examples of a well-structured text, how to responsibly include subjective stories such as myths, or what is “too much” comparison with other heritages, or how one might “bring the reader into the historical time and space” as referenced in the tips. The guidelines for translators to “partially translate of the original text” and avoid a “direct interpretation” may not be helpful for translators in their judgment of what content is suitable for foreign audiences, i.e. specifically what kind of information should be omitted and included. There is also no mention of making sure common terms and their definitions are consistent across interpretive texts.

By leaving the content, structure, and style up to the author and translator, the CHA also assumes that the authors and translators know best what is most important, what the audience ought to know, and how it should be conveyed. Yet, as was explained above, the identities of said authors/translators and their qualification to judge what audiences “ought to” know are unknown. Furthermore, the guideline implies that the interpretive text will only be conveyed in text (as opposed to visual) and print (as opposed to online) forms – despite the fact that the interpretive texts are often provided online. Apart from suggesting the inclusion of a complex map in the case of a site with multiple structures, it does not ask the author to consider alternative ways to convey the interpretive information in a timeline, chart or diagram. It also does not mention the inclusion of links to related media, further reading, or definitions of terms or historical figures – all of which are very easy to include in online interpretive texts and could significantly aid in the reader's comprehension of the information.

To supplement the 2010 guidelines, the CHA published a report in 2014 (Cultural Heritage Administration 2014a) which detailed the extent of problems with the English translation of the interpretive texts, and suggestions for the structure a digital information system while also providing additional composition guidelines and suggested improvements for both Korean and English interpretive texts based on international standards and case studies of interpretive texts at heritages abroad (147-239). This report was completed by the Cultural Informatics Lab at the Academy of Korean Studies on behalf of the CHA. The report first includes a Korean translation of the ICOMOS standard for interpretation and presentation (147-151). It then looks at case studies

of interpretive texts abroad, from countries including six from England, two from Japan, and two from China (152-166).

The description of what content should be included in the interpretive text (167-170) is the same as the 2010 guideline, except that it also includes “human interest story; interesting storytelling elements related to the heritage such as facts, people, events, etc.” and created a category for additional information (to be included in brochures, online) in which myths, legends, and folk belief as well as the origin and history of related people, events, are included. For English interpretive texts, it suggests omitting or supplementing information in consideration of the foreign audience, creating an objective depiction that considers East Asia and the entire world, and including spatial or temporal comparison if necessary. It also outlines questions and elements which should be answered via the interpretive text, such as:

- 1) What is it?
- 2) What origin or story does it have?
- 3) What value or excellence does it have?
- 4) An explanation of how to view/appreciate it
- 5) Administrative information (i.e. dates and places of creation, relocation, restoration, designation) should be shown separately

The report goes on to outline further rules and standards for composition of both Korean and English interpretive texts.

Korean interpretive text principles (170-3):

- 1) An interpretive text with the general public as the target audience
- 2) Contextualized depiction
- 3) Organic explanation
- 4) A cultural heritage that is meaningful for today
- 5) Utilization of storytelling techniques
- 6) Exclude description of shape/form
- 7) Sources with facts that are officially approved by academia

Korean interpretive text standard in detail (173-4):

- 1) Easy terminology, easy sentences

- 2) Key value and unique features in the first part
- 3) Short text, separated sentences
- 4) Proper grammar, strong sentences
- 5) Formatting that matches official standards

English interpretive text composition principles (174-6):

- 1) The majority of foreigners do not have background knowledge on Korea.
- 2) The mere translation of a Korean interpretive text does not beget an English interpretive text.
- 3) Does not make abstract or exaggerated assertions or explanations.
- 4) Interpret with a context that connects with elements both in Korea and abroad.
- 5) Information panels are read by diverse people.
- 6) Simple language is an international trend.

English interpretive text standard in detail (176-7):

- 1) Easy terminology, easy sentences
- 2) Key value and unique features in the first part
- 3) English-like and concise sentences
- 4) Formatting that matches official standards

The report then goes into specifics about the proper style formatting for English interpretive texts (177-199).

Based on these guidelines, the report analyzes 19 sample interpretive texts in both Korean and English, outlines their specific failures based on the guidelines, and recomposes six Korean texts and five English texts to meet the guideline and serve as best practice examples (200-239). The samples include palace/shrine complexes and buildings, Buddhist temple complex, statue, painting, and stele, a royal tomb, a battlefield, a magistrate's office, a traditional house, a Confucian academy, a fortress, two folk villages, a natural monument (tree), a scenic site, and two dolmens.

This report successfully addresses some of the weaknesses of the 2010 report, namely how to compose interpretive texts in a way that considers the general public's background knowledge and interests. It also provides numerous, specific examples to help the author/translator understand exactly what is meant by the recommendations, while also adding a section for English formatting. Yet, this report falls short in outlining interpretive text content in detail (with distinctions for different kinds of heritages which would naturally include different information), specifying

exactly what kinds of omissions or supplements need to be made for English interpretive texts, addressing how to overcome the inherent bias of having a text written and translated by a single author/translator, and considering non-text, non-print forms of interpretation.

While the 2014 report is a significant improvement on this front, neither report provides specific guidelines on how to translate certain commonly occurring cultural heritage terminology, nor do they specify exactly when to omit or supplement information for foreign audiences. There are also various resources for translators, including online and print glossaries, dictionaries, and books in English relating to Korean cultural heritages. One CHA resource available is the 2014 *English Names for Korean Cultural Heritages* (Cultural Heritage Administration 2014b), which lists officially sanctioned translations for terms appearing in the names of Korean cultural heritages, as well as the English names for all nationally designated and registered cultural heritages. Translators may also reference previously composed interpretive texts available online. However, these resources significantly vary in quality and it would be difficult for the average translator, especially a non-native English speaker and non-expert on cultural heritage, to judge. Most importantly, these resources are not provided to translators by local governments or the CHA, and it would be up to the translator to seek out and/or purchase such resources themselves. Given that many current interpretive text translations do not even follow basic Romanization standards, it is unlikely that the vast majority of interpretive text translators ever referenced such resources.

In summary, both guidelines fail to acknowledge the bias and weaknesses of authors and translators, while also not considering digital applications of the interpretive resources. They also lack specificity in terms of content and fail to provide translators with sufficient resources for translating cultural heritage terminology. However, even if these were sufficient guidelines for authors and translators to work with, there is no way to know whether authors or translators were ever provided with such guidelines or resources prior to doing their work. Since it is up to each local government to outsource the work, if they fail to convey these guidelines, then the guidelines lose their meaning. And even if they are provided, it is uncertain if the author or translator will follow them. Given that the CHA does not request, let alone approve, these interpretive texts, the local government has no incentive to make sure the guidelines are followed.

4. Content

Before we can understand how we may reimagine interpretive content in a way which maximizes utilization of the full range of digital technologies – as will be discussed later – we first must clearly understand what interpretive content includes. This is necessary prior to undertaking the design of an ontology which will serve as the framework for future applications of interpretive content. The most accessible form of interpretive content is the interpretive text, as can be accessed online, can be easily reorganized and sorted through, and does not vary the way oral presentations may. The reason the content which makes up existing interpretive texts must be reviewed is that there must be a clear and precise understanding of the various elements which make it up and the ways those elements relate to one another. However, interpretive texts, as was argued in previous sections, are not complete, nor are they always successful in achieving their interpretive objectives. In this process of analyzing the interpretive texts to understand the nature of their content, both information which is unhelpful and unnecessary, as well as information which would be useful but is missing, can be identified. This also allows for gaps in previous guidelines to be filled in.

The Korean Cultural Heritage English Interpretive Text Compilation Research Team (hereafter Research Team) has reviewed the content of and developed a standard structure for interpretive texts through its translation of over 130 interpretive texts. The original Korean texts often had illogical and inconsistent organization of information, with seemingly unimportant facts being presented first, and important key points presented last. These inconsistencies are not intentional reflections of the varied values and natures of the heritages, but rather merely a consequence of a lack of oversight. If translated into English with the same structure, foreign audiences would have a hard time understanding the significance of the heritage. Therefore, the Research Team sought a standard for how to organize and structure the information in English translations which would be more effective in achieving interpretive objectives. In other words, rather than simply retranslating the sentences as found in the Korean text, the team wanted to parse out the key points the interpretive text was attempting to convey, and use these points to compose an entirely different English text in a structure that was methodological and clear. Therefore, the key kinds of information found in the original texts were broken down and organized into a standardized structure. This analysis was not necessarily done in a scientific or methodological way from the start, but was a result of trial-and-error in the process of retranslating over a hundred interpretive texts. The following guideline is based on that original structure developed by the Research Team, but more detail has been included by the author.

- 1) Definition
 - a. What kind of heritage is it?
 - b. How old is it or its legacy (date or period)?
 - c. What or who does it depict or commemorate? (if applicable)
 - d. What was it used for? (if applicable)
 - e. What kind of value does it have? For example:
 - i. first of its kind
 - ii. oldest extant of its kind
 - iii. well-preserved in its original condition
 - iv. representative of a time period or form
 - v. has unique features that different in a meaningful way from similar heritages
 - vi. provides academically valuable information
 - vii. related/dates back to an important historical figure, event, site, or object
- 2) Related People, Events, Sites, and Objects (if applicable)
 - a. Definition of the person, event, site or object
 - b. What is the relationship between the heritage and the person, event, site or object
 - c. What is the significance of the person, event, site or object
- 3) Description
 - a. Where is it held?
 - b. Of what is it comprised?
 - i. materials
 - ii. parts
 - c. What qualities do those parts have?
 - d. What do those parts and qualities have to do with its value? (if applicable)
- 4) History
 - a. How has it physically changed over time? For example:
 - i. repaired/renovated
 - ii. rebuilt
 - iii. relocated
 - iv. parts lost/added
 - v. expanded in size
 - vi. destroyed

- vii. discovered/excavated
 - b. How has its functionally changed over time? For example:
 - i. change in uses
 - ii. renamed
 - iii. changed owners
 - c. Who or what was responsible for the above changes?
- 5) Dimensions
- a. height, width, depth, weight
 - b. Korean units (i.e. *kan*)

While this guideline was originally designed as a tool to standardize the translation of interpretive texts, it also provides insight into the contextual elements of heritage interpretation and their relations, which can be used as a framework for an ontology. However, this guideline failed to go into detail about the variations in content seen in different kinds of heritages. The contextual elements, and thus interpretive text content, for a Buddhist sculpture would of course be much different than for a traditional Korean house which would be much different than a natural heritage such as a tree. However, these detailed differences must be understood if an ontology is to be composed.

While content usually differs based on heritage type, more fundamentally it has to do with the means by which the heritage gets its value. The 2010 CHA guideline briefly mentioned artistic, historical, and academic value, but this is prescriptive rather than based on any analysis of interpretive content. In reality, heritages' value is both different and more specific than the CHA guideline suggests. Based on the interpretive texts that were reviewed for the outline above, there are actually five broad categories, with various sub categories, by which a heritage can get its value:

- 1) Heritages that get value from a related historical figure or clan
- 2) Heritages that get value from their historic legacy
- 3) Heritages that have aesthetic value (i.e. relating to the physical appearance or structural composition of a heritage)
- 4) Heritages that have academic value
- 5) Heritages that have value due to some exceptional quality

Due to the nature of heritages, certain heritage types fall into certain categories more often than others. And many heritages also fall into multiple categories at once. For instance, almost all tombs gain their value as a cultural heritage for the person who is buried there – tombs of inconsequential people do not become cultural heritages. However, some tombs may have additional value for being the oldest in a certain region or for being in an exceptionally well-preserved condition. For each of these different points of value, the contextual elements of the interpretation vary.

Just as there is a standard for the kind of information that should be included in interpretive texts, for each of these points of value, there are key bits of information which is generally included. For instance, if a heritage has artistic value, a description which points out such value should be included, and this description would vary depending on if it is a painting, sculpture, or pagoda. Heritages with academic value should explain what element of the heritage provides academic value and how that academic value can be utilized. Therefore, based on the heritage's value and type, the exact contextual elements which should be included can be specified. To give a better sense of what this means, examples of heritages which commonly fall into the value categories as described above will be provided, and a bit more information about the specific contextual elements which would be therefore written about will be given. These examples are based on tangible, on-site heritages (i.e. intangible heritages, historic documents, and artifacts held in museums are excluded).

- Heritages that get value from a related historical figure or clan:
 - Historic houses (such as birthplaces, head houses, pavilions)
 - Memorial heritages (relating to interment, enshrinement, or commemoration including tombs, placenta chambers, steles, shrines, Confucian private academies and local schools, commemorative pavilions, stupas, temple halls, Buddhist statues)
 - Portraits

These figures usually have some level of historical prominence, ranging from meritorious subjects of the Goryeo dynasty to kings of the Joseon dynasty, to independence activists during the Japanese occupation, although there are exceptions to otherwise unknown individuals who did honorable deeds, such as a servant who helped raise two generations of a family who had lost their mothers. Religious or mythical figures, such as Buddhas and bodhisattvas, may also be included.

The descriptions of key historic figures usually include date of birth and death, clan, courtesy name, pen name, and posthumous titles (in Chinese characters when possible). For scholar-officials, the date they passed the civil examination and the top posts they achieved in their life are included in their description. For authors, any key works they composed are included. For those who did honorable deeds for the country or for their families, such as sacrificing their lives in battle, killing themselves in mourning for parents, of providing food and shelter to troops, the circumstances surrounding their honorable deeds and any specific honors they received, such as a posthumous title or commemorative plaque, are detailed. In the case of semi-mythical figures, the values they symbolize and their religious role are explained.

- Heritages that get value from their historic legacy:
 - Fortresses and walled cities
 - Historic institutional buildings
 - Registered heritages (often related to modern events such as the Korean War)
 - Archeological sites
 - Trees

Heritages which get their value from their historic legacy can include those involved in historical events, those referenced in historical records, or those that were a part of a historically important institution such as a magistrate's office or renowned Buddhist temple. Historical events usually include battles, visits from kings, and incidents involving natural disaster. In most cases, the heritage was the physical site of the event. Otherwise, it was used as a tool in an event (such as an aircraft being used in battle). The description of the event usually tells the type of event, who was involved, and the circumstances leading up to and following the event. Oftentimes, these descriptions mention that the heritage's role in the historic event is mentioned in a historical record, but it often fail to identify which historical record from which this information is taken. Other times, a historical record will reference a heritage, which helps to date or relocate the heritage. Heritages may also have a legacy as having been a part of a historically important institution. This is certainly the case for archeological sites of institutions such as Buddhist temples which may have no visible remains apart from the foundations of buildings. However, it is also the case for many reconstructed buildings; such buildings are modern creations, but they are a re-manifestation of a building or site which has an important legacy. A prime example would be something like

Gwanghwamun Gate, which was rebuilt just in 2010 and thus is not a historic structure in that it is well-preserved, but in that it embodies a historic legacy which dates back to the beginning of the Joseon dynasty.

It is important to not confuse the historical legacy of the heritage with the historic legacy of its related figure, site, event or object. For example, if a historical figure is related to a heritage, and in the process of telling the life accomplishments of that historic figure they mention a historical event, that historical event is not considered to be directly related to the heritage; It is not where the heritage gets its value. Furthermore, this excludes events such as the creation, renovation, destruction, etc., of the heritage unless they are a part of an otherwise larger event. For example, the destruction of a building by a random, isolated fire would not be included as its historical legacy, but its destruction by fire during the Imjin War, would be.

- Heritages that have aesthetic value (i.e. relating to the physical appearance or structural composition of a heritage):
 - Buddhist statues
 - Buddhist pagodas and stupas
 - Historic homes
 - Buddhist halls
 - Confucian private academies and local schools
 - Paintings
 - Tombs / Placenta chambers

There are various ways through which a heritage can have aesthetic value. Objective aesthetic value can come from the appearance, structure, or layout of a heritage being either highly representative of or uncommon for a particular period or style. More subjectively, a heritage can have artistic value regarding the beauty of a heritage's color, proportions, composition, etc. as judged by experts (although who these experts are is usually unknown), or environmental value, in which the natural or man-made environment within which the heritage resides influences the viewer's aesthetic experience of the heritage.

In order to convey these values, the heritage's appearance, structure (and parts), or layout is often described in the interpretive text. The descriptions point out key identifying features which demonstrate the heritage's period of creation, who or what it depicts, or the heritage type. They

may point out features which are representative, i.e. common to, of the heritage type, or, conversely, point out features that are hard to find or unusual when compared to similar heritages. Such descriptions may reference the materials and techniques used in creation, as well as if any parts are damaged, missing or have been replaced. Sometimes, a severely damaged heritage has aesthetic value in that, when it was in its original state, it would have been of high aesthetic value. However, because these are descriptions of aesthetic features, the content varies widely based on heritage type.

In the case of Buddhist statues, descriptions entail the posture and hand sign (mudra) the Buddha or bodhisattva is expressing, what they symbolize, and how that identifies which Buddha or bodhisattva it is. It also describes the protuberance on top of the head, the design of the robes, and features of the body such as the slenderness or volume of the face, nose, smile, waist, and knees. Furthermore, the halo and pedestal are usually described, including their parts, their shapes, what those shapes symbolize, and whether they were carved from a single piece of stone or multiple. Of course, any parts which are damaged or missing are also pointed out.

In the case of Buddhist pagodas, descriptions usually focus the number of stories and type of base of the pagoda, detailing any parts of the pagoda which are missing or have been replaced. They also may explain the features of the body and roof stones, including their comparative size and complexity, and if any part of the pagoda has carvings, such as lotus patterns or other Buddhist symbols.

For wood structure complexes, such as historic homes and Confucian private academies and local schools, the layout of complex is often described: i.e. what structures are included and where they are located in relation to one another. If there are courtyards, gardens, or ponds, these may be included and described as well. Some description of whether this layout is common or unusual for the particular heritage type or period may be included when relevant.

For individual wood structures, such as the men's quarters of a traditional Korean home, an individual Buddhist hall, or a commemorative pavilion, the structure's roof shape, roof bracket type, roof material, structure shape, and structure dimensions in kan are most commonly described. Unique or uncommon structural features are pointed out (these vary for each heritage). Any important objects, such as statues, steles, or plaques, contained within the structure are listed. When relevant, the layout of the rooms in the building and whether each room is wood-floored or has underfloor heating is described, while descriptions of the column or foundation shape or size are

also occasionally included. Subjective judgments of the shape of the columns or beams, or the feeling the structure gives off is sometimes included.

If a tomb or placenta chamber is described, the description usually just lists the various accoutrements at the tomb site, including stone figures and steles.

Descriptions of paintings often include the style of the painting, what is depicted, the symbolic elements in the painting, the use of color, and the painting technique. Many descriptions include subjective statements about the artistic quality of the piece.

Environmental value would be described in cases where, for instance, a pavilion's location on high ground gives it a view of a pond, river, or otherwise scenic view, or a tomb's location is in accordance with the principles of geomancy. This could also include some alteration not to the heritage directly, but to its surrounding environment, which otherwise affects its aesthetic, such as encasing it in glass to protect it from wind or rain.

- Heritages that have academic value:
 - Archeological sites
 - Trees, forests, nature reserves
 - Heritages with inscriptions (steles, Buddhist flagpoles, tiles or beams of wooden structures, plaques, etc.)

The three main kinds of heritages which have academic value are archeological sites, natural specimens, and heritages with inscriptions. Archeological sites often reveal the locations and layouts of fortresses, Buddhist temples, villages and tomb sites, including the layout of various kinds of dwellings contained there within. Various artifacts are also recovered. These all give broad insight into past eras, all the way back to prehistoric times, including the lifestyle of people who lived at that time. Natural specimens, such as trees and forests, provide scientific knowledge on the plants and animals of the Korean peninsula. Heritages with inscriptions, on the other hand, act as documents which provided historical details about people and events. They also can indirectly reveal information, such as that unique reign years were used in the Goryeo dynasty. In this way, heritages with academic value may reveal new discoveries, support existing historical arguments, or help in the understanding of historical phenomena. In interpretive texts, the specific content of the heritage and the specific way in which that has academic value is described.

- Heritages that have value due to some exceptional quality

Almost any heritage can have some exceptional quality of being old, rare, or well-preserved. Usually a heritage is the only extant or oldest extant of its kind in a particular region, although some of course are the oldest in Korea or the oldest in the world. It may be, while not the only extant of its kind, one of a relatively rare collection of similar items, or the only one with a particular feature. A heritage may also be, when compared with heritages from a similar period, considered well-preserved in terms of limited damage or alteration.

This kind of value, though seemingly straightforward, is ironically probably the most misleading of the possible values a heritage can have. This is especially the case for wood structures; the house may have been taken apart, relocated, rebuilt, renovated to include modern amenities, and more, but still considered the oldest if, for example, the calligraphy on the ridge purlin support (*sangnangmun*) says it was first built on a certain day which is older than that of any other traditional house in the region.⁴⁴ Other interpretive texts may claim a structure as being the “oldest,” when in reality, they just poorly articulated that it has the longest legacy. For example, a heritage may have the oldest extant record of the date when it was first constructed, but since then it has been destroyed by fire, rebuilt multiple times, and expanded – just in the same location and with the same name. Furthermore, standards for a heritage being “well-preserved” are usually not clearly outlined. For example, there are examples of traditional houses which have been deconstructed and relocated in a different location, but which have the same structure and layout, which are considered “well-preserved.” These kinds of situations call into question such claims of exceptionality and demonstrate a need for transparency of the heritage’s history and clear articulation of the limits of its exceptionality. By what standard do we determine if a heritage is the “oldest” or if it is “well-preserved?” How much change can be made to a heritage before it loses its claim to exceptionality?

While the general structural guideline for the content of interpretive texts and the specific explanations of the variation in content based on heritage value and heritage type generally represent the content of interpretive texts, in reality, the content and structure of individual interpretive texts for similar heritages varies widely. However, this kind of comprehensive review

⁴⁴ This is misleading because, while some of the wood which comprises the house may be older than other houses, the house as it is seen today does not resemble the house as it was at the time it was first built. Meanwhile, a house built a year later may be in almost perfect condition with very minimal repair and much more representative of houses built at that period, but cannot claim to be the oldest.

of the various kind of information presented in interpretive texts is necessary in order to understand the various contextual elements and their relationships which become the backbone for an interpretation ontology which will be discussed in Section VI.

IV. Evaluation of and Suggestions for Current Korean Cultural Heritage Interpretation

Now that we have an understanding of the processes by which interpretations, text in particular, are created and translated, we can look into the consequences of such an approach to interpretation on the quality of interpretations. This section will evaluate the quality of current interpretations based on the five interpretive criteria as explained in previous sections: clear/accurate, tailored, holistic, facilitates further engagement, and efficient/sustainable.

This evaluation will utilize prior research, examples of interpretive content, and an understanding of the interpretive content creation and translation process as described in the prior section. In particular, these four questions will be answered for each interpretive ideal:

- 1) In what ways are current resources and processes successful in meeting this ideal?
- 2) In what ways are they unsuccessful?
- 3) How do current mediums and processes limit the realization of the ideal?
- 4) What needs to be made possible for the ideal to be fully realized?

1. Clear / Accurate

The ideal of clarity/accuracy deals fundamentally with whether the message being presented represents the truth of a heritage's context and whether it is understood by audiences. On this front, the vast majority of factual information provided in Korean interpretive texts is factually correct. Since English texts are based on Korean texts, this means the facts presented in them are also mostly correct. Furthermore, because of clear guidelines on the design of information panels (Cultural Heritage Administration 2010; hereafter 2010 Guidelines), the formatting (including how to format dates, Chinese characters, etc.) on information panels is consistent, which aids in fluidity of message comprehension. The 2010 Guidelines and 2014 Report (Cultural Heritage Administration 2014a) also include many principles which aim to ensure clarity and accuracy of message.

However, there are many places for improvement. The 2010 Guideline features a survey about information panels. In it, results show that 54 percent of audiences some difficulty in understanding the text (16).⁴⁵ In addition, 39 percent of respondents said that the interpretive texts were not helpful to the heritage visit (16). This shows room for improvement in making the content of information panels easier to understand and more helpful to audiences. Furthermore, foreign audiences were not researched, so the understandability and helpfulness of English interpretive texts is entirely unknown.

The 2014 Report (Cultural Heritage Administration 2014a) shows that problems with accuracy and consistency in Korean texts include mismatches between the official heritage name and that on the panel, the wrong designation number, and multiple names for the same common term (47-64). Other examples of inaccuracies which can be found in the Korean texts include differing measurements of heritages, incorrect dates, and incorrect Chinese characters, problems regarding clarity of explanation include the use of academic terminology (see Cultural Heritage Administration 2014a), explanation of layouts of structures, and misleading representations of the quality of preservation of a heritage.

To demonstrate misleading and unintentional differences between interpretive texts, a couple representative examples will be provided. First, sentences from three different interpretive texts on Sinhangseowon Confucian Academy were selected – from Seowon Heritage⁴⁶, the CHA online interpretive text, and the interpretive text from the on-site information panel as composed by the government of Cheongju and provided on the AKS English Interpretive Text Research Team's website. The texts were translated from Korean into English so as to convey the original mismatch in terminology used, date formatting, and inclusion of information. Differences between and within texts have been underlined.

⁴⁵ The original text says that 46 percent have no difficulties in understanding, 45 percent have some difficulty but it is not uncomfortable, and nine percent had difficulty. The CHA claims that this means that 91 percent are "satisfied" with the content difficulty. However, this researcher thinks that "difficulty in understanding, though not uncomfortable" is not the same as "satisfaction."

⁴⁶ A website run by the Confucian Academy Association, which has information about Confucian academies in Korea

Table 12 Variation of information included in interpretive texts for Sinhangseowon Confucian Academy, Cheongju

Year	Seowon Heritage ⁴⁷	CHA ⁴⁸ Online Text	On-Site Info Panel ⁴⁹	Element
1871	It was <u>abolished</u>	It was <u>shut down</u>	It was <u>closed down</u>	Word Choice
	in <u>1871 (Gojong 8)</u>	in <u>Gojong 8 (1871)</u>	in <u>1871 (Gojong8)</u>	Date Format
	due to the Decree to <u>Raze</u> Confucian Academies	due to the Decree to <u>Abolish</u> Confucian Academies	following the Decree to <u>Abolish</u> Confucian Academies	Word Choice
	-	of Regent Heungseondaewongun	-	Misc. Info
1892	received permission to be restored		received permission to be restored	Word Choice
	in <u>Gojong 29 (1892)</u>		in <u>1892 (Gojong 29)</u>	Date Format
1904	<u>came to look the same as it does now</u>		<u>was reconstructed</u>	Word Choice
	in 1904 (Gwangmu 8)		in 1904 (Gwangmu 8)	Date Format
1957		but was restored	later was restored	Word Choice
		in 1957	in 1957	Date Format
		-	by Confucian scholars of Cheongju	Misc. Info
1987	<u>The current Confucian academy [is comprised of] buildings renovated</u>	was <u>newly</u> renovated		Word Choice
	in 1987 ⁵⁰	in 1987		Date Format
		and has been that way until today		Misc. Info

⁴⁷ The original text reads: “1871 년(고종 8)에 서원철폐령으로 철폐되었다가 고종 29년(1892)에 복구하도록 허가되어 1904 년(광무 8)에 지금과 같은 모습이 되었다.” Retrieved May 2017 from www.seowonheritage.org/서원위치도/178-신향서원

⁴⁸ The original text reads: “홍선대원군의 서원철폐령으로 고종 8년(1871)에 폐쇄되었다가 1957년 복원하였고, 1987년 새롭게 보수하여 오늘에 이르고 있다.” Retrieved May 2017 from http://www.cha.go.kr/korea/heritage/search/Culresult_Db_View.jsp?mc=NS_04_03_01&VdkVgwKey=23,00420000,33

⁴⁹ The original text reads: “1871년(고종 8) 서원철폐령에 따라 폐지되었다가 1892년(고종 29)에 복구가 허가되어 1904년(광무 8)에 재건하였으며 그 후 1957년에 청주의 유림들에 의해 복원되었다.” Retrieved May 2017 from http://dh.aks.ac.kr/~heritage/wiki/index.php/%EC%B2%AD%EC%A3%BC_%EC%8B%A0%ED%95%AD%EC%84%9C%EC%9B%90

⁵⁰ This section is left in grey because this fact about 1987 renovations is not included in the main summary and is instead hidden in a later section on the page, thereby not being seen by readers who only read the summary. The original text reads: “현재의 서원은 1987년에 보수한 건물로...”

It can be seen that not one text mentions all the supposed events in the history of the Confucian academy, and there is no consensus on which events are important enough to include apart from the decree of 1871 – although even in this case, the name used for the decree and the word choice regarding its effect on the academy all differ. This shows that the inclusion and exclusion of historical points was not strategic, but arbitrary. If it was strategic, there would be greater consistency. If a reader goes to some search engine to search for “Decree to Dispose of Confucian Academies,” the results may differ for if they search “Decree to Abolish Confucian Academies.” The Seowon Heritage text states that the academy “came to look the same as it does now” in 1904, yet clearly it was “restored” and “renovated” again in 1957 and 1987. This source conflicts even itself later on, saying that “the current Confucian academy [is comprised of] buildings renovated in 1987.” Then what exactly is meant by “came to look the same as it does now?” Is it referring to the layout? How extensive were the “restorations” and “renovations?” Were they rebuilt from the ground up? Were only the frames and foundation of the building reused? If someone reads only the Seowon Heritage summary, they may come to think that the buildings date back to 1904 (implying they are over 100 years old), while the on-site panel implies they date back to 1957 (60 years old), and when in reality they only date back to 1987 (30 years old). Furthermore, regarding date formatting, there are inconsistencies across texts and even within the same text. This shows that such formatting, too, is not intentional. If it was intentional, then that intention is not clear to the audience. The inclusion of local Confucian scholars and Heungseon daewongun also suggest that the authors thought these figures aid understanding or give context, yet these inconsistencies among texts suggests it is based on the interest of the authors, not the audience.

Another example, demonstrating conflicting information, can be seen in the following example regarding the date of the relocation of the tomb of Song Sang-hyeon, taken from the on-site texts and online interpretive texts from related heritages.

Table 13 Conflicting information in interpretive texts relating to the Tomb and Stele of Song Sang-hyeon, Cheongju

	On-site Info Panel ⁵¹	On-site Info Panel 2 ⁵²	CHA Online Text ⁵³
Heritage Name	Commemorative Pavilions of Yeosan Song Clan, Cheongju	Tomb and Stele of Song Sang-hyeon, Cheongju	Tomb and Stele of Song Sang-hyeon, Cheongju
Source Text	Chungnyeolgak Pavilion appears to have been erected after [Song Sang-hyeon's] tomb site was relocated and [the meritorious subject title, Chungnyeol] first was bestowed in 1594 (Seonjo 27).	The tomb site was originally in Dongnae but was moved to this location in 1610 (<u>Gwanghaegun2</u>).	[They] moved the tomb site from Dongnae to this place in <u>Seonjo 28 (1595)</u> .
Date of Tomb Relocation	Use of “and” in the sentence implies the tomb was relocated before 1594.	1610	1595

All texts are from “official” government sources, which have a responsibility to be accurate. Because no source is cited for these dates, even if someone notices the inconsistency between texts, how are they supposed to go about finding the true answer? One can also again notice the inconsistencies in date formatting in this example.

While the first example also included a non-CHA interpretive text (from the Seowon Heritage website), the problems in all the example texts shown above are representative of the unintentional (i.e. not done purposely with the aim to aid in the audience’s understanding) inconsistencies, omission of facts, conflicting information, and vague wording which leads to misunderstanding. While some small differences in date formatting or word choice may seem insignificant, they unnecessarily distract from the message and may create problems if someone wants to learn more by searching online for more information. Furthermore, these kinds of problems are magnified when they are then translated into English.

⁵¹ The original text reads: “충렬각은 묘소 이장 후 세운 것으로 보이며 1594년(선조 27) 12 월에 처음 명정되었고...” Retrieved May 2017 from http://dh.aks.ac.kr/~heritage/wiki/index.php/%EC%B2%AD%EC%A3%BC_%EC%97%AC%EC%82%B0%EC%86%A1%EC%94%A8_%EC%A0%95%EB%A0%A4%EA%B0%81

⁵² The original text reads: “묘소는 원래 동래에 있던 것을 1610년(광해군 2)에 지금의 위치로 이장한 것이다.” Retrieved May 2017 from http://dh.aks.ac.kr/~heritage/wiki/index.php/%EC%B2%AD%EC%A3%BC_%EC%86%A1%EC%83%81%ED%98%84_%EB%AC%98%EC%86%8C_%EB%B0%8F_%EC%8B%A0%EB%8F%84%EB%B9%84

⁵³ The original text reads: “28년(1595)에 묘소를 동래에서 이곳으로 이장하고...” Retrieved May 2017 from http://www.cha.go.kr/korea/heritage/search/Culresult_Db_View.jsp?mc=NS_04_03_02&VdkVgwKey=23,00660000,33

Regarding English interpretive texts, there is extensive prior research on English interpretive texts from heritage sites across Korea which demonstrate the many flaws in current English interpretive texts.⁵⁴ The most comprehensive analysis of errors and inconsistencies in English interpretive texts is the CHA Report (Cultural Heritage Administration 2014a), which found the following errors and inconsistencies in English interpretive texts (85-142):

- 1) Panel name mismatch with official heritage name
- 2) Incorrect naming convention based on the 2014 CHA Naming Guideline⁵⁵
- 3) Institution name mismatch with official name
- 4) Romanization, capitalization, spacing, typos
- 5) Incorrect Romanization for foreign places or people (ex: Dang Dynasty instead of Tang Dynasty)
- 6) Mistranslations
- 7) Direct translation of a term (ex: matbae roof)
- 8) Incorrect dates
- 9) Korean measurements without any explanation (ex: 20-pyeong)
- 10) Examples of differing translations for the same common terms
- 11) Use of uncommon terminology (70-75% of terms were uncommon)

Research by Park (2011) also demonstrates inconsistencies in the practice of omitting, adding, or altering the information provided in the interpretive texts during the translation process. In addition, it is easy to find examples of awkward phrasing in English texts which make them difficult to understand, suggesting they were not read by a native English speaker.⁵⁶

These various problems appear to stem from the process of interpretive text composition and translation. As mentioned in the section outlining the interpretive text composition and translation process, it is unclear who interpretive text creators and translators are, and, by extension, what their qualifications and expertise are. This results in a wide variety of in the quality of interpretive texts regarding accuracy and clarity. Some texts are factually accurate and very well written and translated, while others have inconsistent dates, are nearly incomprehensible, or so abstruse it is

⁵⁴ A thorough review of this prior research can be found in Kang 2014 (5-16).

⁵⁵ Cultural Heritage Administration 2014b

⁵⁶ See examples in Section IV.5 (Sustainable/Innovative).

meaningless to an ordinary person. To what extent authors and translators are provided the 2010 CHA guidelines is also unclear, and therefore, although the 2010 guideline says that the facts must come from the Cultural Heritage General Survey and reissued content on CHA homepage, it is not known if this is followed. Since the sources for interpretive texts are not listed, the information cannot be easily double-checked by an editor. Furthermore, because the CHA does not request the completed interpretive texts or oversee them in any way, there is little incentive for local government civil officials to fact-check. Because of the lack of oversight, and also because the civil officials in charge may not have expertise in editing, the Korean and English texts do not seem to be edited to ensure that difficult terminology are removed (or explained) or that the content itself is clearly organized. Because the authors, translators, and sources are not identifiable, because civil officials change positions so often, and because the CHA does not oversee the texts, no one is held accountable for the accuracy and clarity of the interpretive texts. For the same reasons, and also because composition and translation of interpretive texts is not often undertaken, the local governments in charge of the interpretive text composition and translation process have little incentive to innovate new ways of presenting information (i.e. not in text form) or researching the clearest terminology and explanations. Currently, education, digital innovation, information panel management, and interpretive text composition and translation are managed by entirely different departments in the CHA and local government, a structure which also fails to facilitate communication, collaboration, and innovation. The reliance on narrative form interpretive texts and information panels (and by extension audio, video forms) furthermore means that there is a practical limit on the extent to which concepts, events, etc. can be elaborated upon, which can affect the clarity of the information.

Based on this, the following improvements should be made in order to improve the clarity and accuracy of interpretive texts and other interpretive resources. First, systems need to be put in place to ensure accountability for the clarity and accuracy of interpretive texts. This may include publicly identifying authors and translators (and their qualifications), citing sources, and facilitating centralized oversight for fact-checking and clarity of expression. Second, there need to be incentives to for correcting and improving upon the facts, quality of presentation, and translations of interpretive resources, which relates to the sustainable/innovative ideal. Because civil officials change positions so often and local governments are isolated from one another, there is little incentive to fix or improve existing interpretive resources. Therefore, there needs to be some kind of organization with longer-term human resources to investigate ways to innovate new

ways of presenting interpretive information and improving its accuracy and clarity. Third, due to the limitations of text and information panels, new mediums for interpretive resources should be investigated. Such resources should include easy ways for audiences to look up difficult terminology or events if they need such things clarified. And fourth, value judgements of heritages (like a heritage being the oldest, well-preserved, refined) and the scope of terminology such as “restoration,” “renovation,” “repair,” as well as “its appearance” need to be explicitly defined as to avoid confusion.

2. Personal / Tailored

Currently, there are various ways in which interpretive resources are differentiated for various audiences' background, interests, or objectives. For example, interpretive texts are provided in various languages apart from Korean, including English, Chinese and Japanese. Main heritage sites also provide guided tours or digital resources in these four languages. There are also resources online in Korean that are targeted to children, in particular, as well as various educational programs at museums targeted toward different audiences. Some digital resources also present heritages based on various curated themes which audiences may have interest in, such as history, historical figures, religions, heritage types, etc. (National Heritage Online, Smart Guide App, CHA Map). There are also multiple services to facilitate the location of heritages nearby the user via GIS location tracking (various mobile apps). There are also filters on the Heritage Search and Digital Hub for period, region, categorization, designation type, and designation date to allow for more specific searching.

However, the vast majority of interpretive resources are “one-sized-fits-all” interpretive texts meant for a general audience, in particular one visiting a heritage site in person. What does a “general audience” member look like? The only distinctions that the 2010 Guideline or 2014 Report (Cultural Heritage Administration 2010 and 2014a, respectively) make is that the terminology of interpretive texts should not be too expert or abstruse (Guideline, 41), should be suitable for elementary students (Report, 170), and that the English should be easy because not all readers are native English speakers (Report, 176). From this, we can only gather that the CHA assumes that the audiences of interpretive texts are not cultural heritage academics and that they include non-native Korean and English speakers. This attempts to address, very minimally, the audience's educational and national background, but does not at all take into consideration their interest or objectives. Current interpretive resources are designed to be one-time, one-dimensional,

one-directional tools of informing visitors to heritages. This emphasis does not meet the needs of audiences seeking any other type of interaction with interpretive information – whether this involves sharing of information, creative uses of the information, or research.

One of the main limitations preventing information from being personalized to the needs of visitors and information seekers is that the vast majority of content is physical and text-based. Infinite information panels which target the interest, objective, background knowledge, and preferred form of information attainment for every kind of visitor just cannot be installed. Furthermore, there is a limit to the length of content even on a single information panel or brochure. Even online, text-based content is pre-determined, and therefore if tailored content is to be made, new texts need to be composed and translated for each potential audience member, which is beyond the scope of the CHA or local governments. Audiences cannot choose to have information displayed in anything but text (or possibly audio), even though forms such as timelines, diagrams, or tables, may better suit their objectives or learning style. Digital non-text-based resources, such as digital maps or digital touch screens may allow for some interaction on the part of the user to tailor the content shown for their needs, but these are only provided online or at museums. Even these resources, though have a limit on their interactivity and cannot be tailored in length or content.

Regarding audiences online searching of interpretive information, though some filters are available to narrow user's search, these have limitations. For example, on the Digital Hub, users can only select one option per metadata type at a time. In addition, some of the options are pre-organized in a way which may not match the needs of the user.⁵⁷ In other words, the way the CHA has categorized the heritages is not necessarily the way users may categorize them. It does not allow users to interact with the heritages in a way that is tailored to their needs.

Furthermore, there are various types of data which would be helpful to the user in searching or browsing heritages, which are not currently represented in current metadata fields. These include contextual elements such as people, events, and concepts. Some users may be searching for

⁵⁷ For example, categorization of heritages is based on form (historic site structure, artifact, documentary heritage, intangible heritage, and natural heritage) and is more narrowly categorized from there; this reflects the metadata's function as a management tool in the eyes of the CHA. However, many users looking for heritages may want to search for all heritages relating to Buddhism, regardless of form; Currently, Buddhist heritages are divided among Buddhist handicraft, sculpture and paintings (under artifacts), Buddhist temple documents (under documentary heritage), religious rituals (under intangible heritage), and Buddhist heritage sites (under historical site structure). Therefore, users cannot filter all Buddhist heritages. Furthermore, there may be cases in which it is unclear the category to which a heritage belongs, so the user does not know which category to select. Another example is period metadata. An entire dynasty or city may be too broad of a search criteria for a user's purposes. They may be looking for heritages created in a particular year, but current metadata organization does not allow for such detailed searches.

heritages related to a particular historic event or related to a historic figure in some way. They may also be looking for a particular decorative technique on a piece of art or architecture. Or, they may be interested in searching for heritages via their value, such as finding the oldest heritage in a particular region. Yet with the current metadata, it is not possible to find information on heritages this way. Therefore, even one of the few features which may allow for some personalized content in the form of filtered result is extremely limited in its scope.

Thus, the failure of current resources to be tailored to audiences so that audiences can connect personally with cultural heritages is largely due to two reasons. First, there is a lack of understanding about the background, motivations, and interests of those coming into contact with or overtly seeking interpretive information, especially non-in-person heritage site visitors. Second is the focus on physical and text-based content. It is impractical and near impossible to hope that such mediums can meet the needs of all audiences.

Therefore, to make tailored interpretive resources possible, resources other than physical information panels and text-based online resources need to be expanded. To facilitate the development of such resources, ways to organize interpretive information as data must be researched and implemented. As will be discussed in following sections, data-based organization of interpretive information is the only way to facilitate tailored content truly unique to each person. Data-based interpretive content can be displayed not only as text, but as timelines, maps, diagrams, table, and more. In the future, when augmented reality becomes commonplace and most people have augmented reality glasses or contacts, physical information panels may become redundant. Each person could have their own tailored interpretive content via such technology. Therefore, there is a great need look beyond the physical. This is of course in addition to investigating who the people interacting with interpretive resources are, rather than just categorizing them into broad groups based on the language they speak or whether they are a visitor or expert, and testing new forms of interpretive resources (both content and mediums) with such audiences to better understand their interests.

3. Contextualized / Holistic

There are various features within current interpretive resources that provide users with the meanings and relationships of a heritage's greater context. Interpretive texts themselves include a variety of information about heritages, including their origins, their history, historical events, artistic qualities, related figures, related legends, and their value and significance, although this

content varies from text to text. Some resources present multiple heritages within the context of a particular theme (National Heritage Online, Smart Guide). The Digital Hub connects users to heritages which share a similar region, period, designation type, and heritage type. Mobile apps also provide users with related heritages, though these are usually limited to main heritages.

However, there are places in which current interpretive resources do not achieve their full potential in terms of a holistic approach. First, although there is already diverse content on a variety of websites (and by various institutions) which could aid in audience's understanding of a heritage's greater context, there are no hyperlinks which connect the official interpretive resources to such content. For example, there already exist glossaries on cultural heritage terminology, tens of thousands of media elements (photo, audio, video, diagrams, etc.) on heritages and themes relating to heritages, and encyclopedia-style articles on historical figures, places, and events, etc., on various websites managed by different institutions. These are resources which would be useful to link to within the interpretive texts hosted on the CHA websites to give audiences greater context, but they are isolated from the CHA's interpretive texts. The CHA does not even link to their own terminology glossary within the body of their interpretive texts for audiences to quickly access the definition of an unfamiliar term. In addition, there are offline resources which are not available online. For example, foreign language interpretive texts for many province/city-designated heritages are available on on-site information panels, yet these are not included on the CHA homepage (with few exceptions, only state-designated translations are available). Therefore, translated interpretive texts already exist, but to someone accessing the information from online, it is as if there are no translations available. In this way, there is a failure to link among existing interpretive resources.

Second, there are limitations on how one can navigate the interpretive context. This includes things such as difficulty in browsing heritages, finding related heritages, or viewing heritages within a context of contextual elements (such as a given historical figure, event, design feature, value, reference source, etc.). Though these features exist in some way, they are either extremely limited in their function or pre-curated by experts. In other words, the audience cannot interact with and explore the context themselves and on their own terms, and the amount of possible contexts presented is limited. For example, the only related heritages on the "My Own Interpreter" mobile app are palaces and their respective buildings – even though each heritage has many other heritages related to it in some way. Currently, the Digital Hub shows heritages that share the same region, period, designation type, and heritage type. These categories are not necessarily as specific

as would be useful - for example, each period of the over 500 year Joseon dynasty reflect different trends, but all heritages from that Joseon are grouped together. There are many factors which heritages may share in common that are not reflected - including commonly shared events, people, concepts (like religions, design, material, cultural value), and more. By extension, it is also impossible to begin a search for heritages based on these factors. In other words, in the exploration of interpretive information, the audience has no way to navigate meaningful interpretive relationships from heritage to contextual element, contextual element to heritage, heritage to heritage, or contextual element to contextual element.

There are various reasons for this lack of holistic perspective toward interpretive information. First is the simple failure to utilize hyperlinks within and among existing content, which is not too difficult of a fix. Second, and less easy to address, is the fact that because of bureaucratic divisions, the job of interpretation and development of heritage-related content is divided among various institutions. This does not facilitate an understanding on the part of those in charge of interpretation at each institution to know what content is already available at other institutions and on other websites so that they can be linked together, and furthermore, does not facilitate a systematic and comprehensive approach to the organization of interpretive resources. Third is the heritage-oriented and pre-digital age perspective of interpretation. Before the Internet, the only way audiences had access to interpretive content was in person at heritage sites or museums. Furthermore, the job of institutions like the Cultural Heritage Administration is primarily the management of heritages and heritage sites. Therefore, all interpretive resources were centered around heritage management and on-site interpretation. The idea of including hyperlinks to further information or presenting various heritages from around the country under a particular theme (i.e. a contextual element like a person, event, or concept) was not possible (at least for heritage sites; Museums can hold exhibitions around such themes because their artifacts are transportable). However, with the Internet, even on-site heritages can be presented as a part of an “exhibition,” relating to any possible theme at once. This possibility has not been considered, and therefore, there have not been efforts to consider contextual elements as a key part of interpretation. As a result, there is still little way for audiences to access information about heritages from any path than the heritage itself. This results in heritages being isolated from one another and isolated from their larger contexts.

In order for these issues to be addressed, there needs to be ways to find contextual elements via heritages and vice versa, ways to filter/browse heritages in greater details, and connect

interpretive resources to one another (either by making greater use of hyperlinks or consolidating all information onto one website). There also needs to be greater content which is not just heritage-centric. This can be helped by making changes to bureaucratic organization related to heritage interpretation, or at least by improving inter- and intra-organizational communication.

4. Facilitates Engagement

There are some opportunities for further engagement in “analog” interpretive resources, such as education programs, experiences and performances, volunteering. These are usually affordable. These opportunities are usually available at museums with long-term, academic opportunities in Korean, and short-term experiential opportunities are available in English. Regarding access to further information on cultural heritages, access to slightly more detailed interpretive texts may be available via mobile apps (though this varies widely from heritage to heritage). There are also some “nearby heritage” features on mobile apps which allow users to continue their exploration of heritages in the area.

However, such analog and digital opportunities for engagement are not well advertised. Though they are advertised on some websites, they are very rarely included in on-site brochure material. In other words, audiences are not prompted to be more engaged after their visit; they must seek out opportunities for engagement on their own. Long-term educational programs are usually available only to those fluent in Korean (i.e. mostly native Koreans), therefore there is little way for non-native Korean speakers to gain any depth of knowledge on Korean cultural heritages. There are also almost no engagement opportunities available Koreans and non-Koreans abroad. There are no ways for audiences reutilize the interpretive information for their own purposes, whether this involves storytelling, content creation, self-study or analysis. As expressed in previous sections, it difficult to find further information on the people, events, or ideas referenced in interpretive texts, and there are very few links to further readings or related heritages. This makes it much more difficult for audiences to engage with the material and develop a passion for cultural heritages, limiting their potential to being the mere passive recipients of whatever information is provided to them.

The reason for these missed opportunities stems largely from the idea that interpretation is the end goal, rather than a provocation. It merely provides one-direction, one-time informative content. This mindset assumes that the audience is passive, not creative, and puts the burden on audiences to seek out more opportunities for themselves. It also fails to consider the internet as a

tool for learning, focusing instead on offline resources. It further assumes that non-Koreans have no need more long-term education resources or would not want to volunteer.⁵⁸

To facilitate further engagement, there most fundamentally needs to be a change from the current mindset to one which expects interpretation, either via in-person visits to heritage sites or initial seeking out of interpretive information online, to be the beginning of a process, rather than an end goal in and of itself. There needs to be more encouragement of further engagement via advertisement of existing interpretive resources, making the path to engagement as direct and clear as possible, and lowering the barriers for engagement. Furthermore, audiences need to be given agency in their engagement – they should be empowered to seek out further information and create their own stories and content easily. There also needs to be an acknowledgement that non-Korean language speakers need opportunities for long-term or in-depth engagement (including education and volunteer opportunities), if they are ever going to develop any deep (i.e. not surface level, fleeting, consumerist) interest in Korea's history and culture. Along with this is an acknowledgement of the many ethnic Koreans, students, and educators abroad for whom visiting heritages in person may be a challenge and, therefore, could benefit from more online resources. This all needs to be accompanied by further research by testing such engagement opportunities with the public.

5. Sustainable / Innovative

Current interpretive resources are sustainable in that physical information panels last a long time and do not have to be replaced very often. They also do not require any special technology to be viewed, and are thus accessible to most on-site audiences (apart from those who are visually impaired). Along the same lines, once an interpretive text is written and translated, it can be used for a long time because the details of interpretive information are not subject to frequent change. Regarding innovation, if we look at the development of the Cultural Heritage Digital Hub, various mobile apps, and more visual media content on the K-Heritage channel, we can see that the CHA is making efforts to approach education about cultural heritages from new perspectives.

However, this is where the sustainability and innovation reach their limit. Though physical information panels last a long time, they are extremely expensive and cannot be easily updated should information change. They must either be replaced or have stickers covering mistakes.

⁵⁸ However, this may also be due to the lack of people who can facilitate such resources in other languages.

Furthermore, as mentioned in the section on the clarity and accuracy of current interpretations, according to the 2010 CHA guideline, 39 percent of respondents said that the interpretive texts were not helpful to the heritage visit and roughly half have difficulty understanding the texts (16). If interpretive texts are not helpful to two-fifths of visitors, and half of them have difficulty understanding the texts, it raises the question of whether they are cost effective methods for interpretation. The focus on text-based content means that the material cannot be easily transformed into other forms of resources, because the meanings and relationships are trapped within the grammatical structure of the sentences. This limitation is also seen in the CHA's efforts for innovation – the content of the Digital Hub, mobile apps, and video media take the form of e-books or narrative-form visual interpretive texts, which have added visual media and maybe GIS location or SNS features, but the form of the interpretation itself is not innovative in anyway. These innovations also do not take into consideration the issues of efficiency and redundancy.

Regarding the organization and translation of interpretive content, interpretive texts about the same heritages are written and translated multiple times by different institutions, and they usually do not contain any significantly different content. Best practices are not shared, and compositions and translations (both the ITs themselves and the various terminology contained there within) that have already been undertaken in the past are not reutilized. For example, while each heritage may have information unique to it which needs to be newly organized and translated, the vast majority of explanations of contextual elements (key historical figures, events, concepts, etc.) and the translation of terminology have already been done. Yet, if these previous resources are not reutilized, the same basic work of explanation and translation is done over and over again. This leads to inconsistency in both content and quality, as not all writers or translators have the same level of expertise. This is, of course, not cost effective.

The following is an example of the redundancy of interpretive text creation and translation. The following table shows the metadata for six different versions (three of which have been translated into English) of an interpretive text about the Iron Flagpole at Yongdusa Temple Site, Cheongju (National Treasure No. 41).⁵⁹ They are taken from the on-site information panel (has English version, overseen by the Cheongju Government), the CHA Digital Hub (has English version; CHA), the E-Minwon site (CHA), the Cheongju Tourism Site (has English version; Cheongju Government), the Encyclopedia of Korean Culture (AKS), and the Digital Local Culture

⁵⁹ The texts themselves have not been included due to length, but are accessible via the hyperlinks provided in the footnotes to the table.

Encyclopedia of Korea (AKS). Each of the Korean texts and English translations differ from one another. Three of the interpretive texts do not have any public information about who composed them.⁶⁰ Only one, the Encyclopedia of Korean Culture version, cites references. None of them state when the texts were composed. This is just one example, but this is the rule, rather than the exceptions, to interpretive texts (both in Korean and English).

Table 14 Redundancy of interpretive texts for Iron Flagpole at Yongdusa Temple Site, Cheongju

Source		On-Site Info Panel ⁶¹	CHA Digital Hub ⁶²	E-Minwon ⁶³	Cheongju Tourism Site ⁶⁴ English Version ⁶⁷	Encyclopedia of Korean Culture ⁶⁵	Digital Local Culture Encyclopedia of Korea ⁶⁶
Name	Korean	청주 용두사지 철당간	청주 용두사지 철당간	청주 용두사지 철당간	용두사지 철당간	청주 용두사지 철당간	
	Chinese	淸州 龍頭寺址 鐵幢竿	淸州 龍頭寺址 鐵幢竿	淸州 龍頭寺址 鐵幢竿	龍頭寺地 鐵幢竿	淸州龍頭寺址鐵幢竿	龍頭寺址鐵幢竿
	English	Iron Flagpole at Yongdusa Temple Site, Cheongju	Iron Flagpole at Yongdusa Temple Site, Cheongju		YongdusajiCheoldanggan (Iron Flagpole at Yongdu Buddhist Temple Site) The Iron Flagpole of Yongdusa Temple		Yongdusaji Cheoldanggan (Iron Flagpole at the Yongdusaji Archeological Site)
Metadata ⁶⁸	Designation No.	National Treasure No. 41	National Treasure No. 41	National Treasure No. 41	National Treasure No. 41	National Treasure No. 41	
	Designation Date		1962.12.20	1962. 12. 20	1962. 12. 20	December 20, 1962.	
	Period		Goryeo period	Goryeo period, Goryeo Gwangjong		Goryeo	Goryeo / Early Goryeo
	Classification		Heritage Site	Flagpole Base			

⁶⁰ These are also the ones with translations, so it is also unknown who translated them.

⁶¹ Cheongju City

⁶² Cultural Heritage Administration. Cultural Heritage Digital Hub. Retrieved May 2017 from http://hub.cha.go.kr/idolsearch/culturalheritageInfoViewPop.do?ct_id=20121105000000023150

⁶³ Cultural Heritage Administration. E-Minwon. Retrieved May 2017 from http://www.e-minwon.go.kr:8072/lfmn/CpmsmastR___01.do?p1=1113300410000

⁶⁴ Cheongju City. Cheongju City Homepage. Retrieved May 2017 from <http://www.cheongju.go.kr/tour/selectClturCntntsView.do?key=6905&clturCntntsNo=532&clturCntntsCode=14&pageUnit=5&pageIndex=1&searchCnd=all>

⁶⁵ Academy of Korean Studies. Encyclopedia of Korean Culture. Retrieved May 2017 from http://encykorea.aks.ac.kr/Contents/Index?contents_id=E0039446

⁶⁶ Academy of Korean Studies. Digital Local Culture Encyclopedia. Retrieved May 2017 from http://www.grandculture.net/ko/Contents?dataType=01&contents_id=GC00202280

⁶⁷ Cheongju City. Cheongju City Homepage. Retrieved May 2017 from <http://www.cheongju.go.kr/english/contents.do?key=717>

⁶⁸ Translated from Korean to English; Inconsistencies in the formatting are intentional

			Structure > Religion and Spirituality > Buddhi sm > Flag pole				
Address		48-19 Nammun- no 2-ga, Sangdang- gu, Cheongju- si, Chungche ongbuk-do	48-19 Nammun-no 2- ga, Sangdang- gu, Cheongju- si, Chungcheongbu k-do (28530)	48-19 Nammun- no 2-ga, Sangdang-gu	48-19 Nammun-no 2-ga, Sangdang-gu, Cheongju-si, Chungcheon gbuk-do	48-19 Nammun- no 2-ga, Sangdang-gu, Cheongju-si, Chungcheongbuk- do	
City		Cheongju	Cheongju-si, Chungbuk				
Owner		State- owned	State-owned				
Manager			Cheongju				
Designated Area			53m2				
Designated Area Designated Area			2.3m2				
Protection Area			13341m2				
Protection Area Designated Area			1611.7m2				
Field					Art and Sport / Architecture	History / Traditional Period, Cultural Heritage / Tangible Heritage	
Form			Flagpole		Heritage Site	Artifact / Artifact (General)	
Character					Flagpole		
Creation Year					962		
Quantity			1				
Material			Base: Granite, Flagpole: Iron				
Size/Dimen sions			Base height 4.2m, Iron flagpole height 12.7m				
Flagpole				Height 13.1m, 20 iron cylinders (originally 30)			
Base				Granite, height 4.2m, width 40cm			
Iron Cylinders				Diameter 43cm, height 65.2cm			
Inscription				Regular script (character size 2.8cm)			
Author					Jeong Myeong-ho	Na Gyeong-jun	
English Text	Y	Y		Y			

If we look at the individual English interpretive texts for these sources, we can see that they differ entirely in regard to content, structure, and tone. Though not listed in the table above (because the metadata is the same), the English CHA website interpretive text and the Cultural Heritage Digital Hub interpretive text differ, despite both being on official CHA websites. This shows that rather than reutilizing and improving upon existing interpretive resources, new interpretive resources are being composed and translated again and again both within the CHA and local governments. It is also worth noting that among these four English interpretive texts, two of them (the Cheongju Tourism Website and Cultural Heritage Hub) have texts which have clearly not been proofread by a native speaker and feature awkward and unclear phrasing.



Figure 11 Screen capture of English interpretive text for Iron Flagpole at Yongdusa Temple Site, Cheongju as found on the on-site information panel⁶⁹

⁶⁹ Cheongju City. Uploaded to the Academy of Korean Studies English Interpretive Text Research Team Wiki. Retrieved July 17, 2017 from http://dh.aks.ac.kr/~heritage/wiki/index.php/청주_용두사지_철당간

In Buddhist tradition, a flagpole was used to hoist a huge flag or banner called dang at the entrance to a temple during an important event such as a ceremonial ritual.

The site at Nammun-ro, Sangdang-gu in Cheongju, where this iron flagpole stands, was originally occupied by Yongdusa Temple, which was founded in 962 (the 13th year of the reign of King Gwangjong of the Goryeo Dynasty).

Sadly, the temple was destroyed as a result of the frequent warfare and political turmoil of the late Goryeo Period.

The flagpole, however, has been preserved in its original form complete with its pedestal and flagpole supports.

Nowadays, this area is one of the busiest areas in the city. The two supports feature protruding vertical lines in the middle of the outer face, creating some variation on the otherwise plain surface.

Between the two supports, there are twenty cylindrical iron tubes geared into each other and a fastening device like a crossbar at the top of the supports which served to firmly fasten the flagpole.

Notably, there is an inscription on the surface of the third iron tub which explains the purpose and process of establishment of this flagpole.

According to the inscription, the flagpole originally consisted of thirty iron tubs, and was erected at the time of the temple's construction in 962.

It is considered a precious heritage as its production date has been clearly identified, and it is one of only three remaining flagpole in Korea, along with those at Gapsa Temple in Gongju and Chiljangsa Temple in Anseong.

According to a local legend associated with this flagpole, the people in Cheongju had suffered numerous disasters caused by flooding ever since ancient times.

One day, however, a fortune-teller said that the people of Cheongju would be able to avoid disaster if they built a large mast, because the area would assume a ship-like shape.

After all, the area actually avoided disaster by building a flagpole like a mast, and Cheongju came to be named Juseong (meaning 'Ship Town').

Figure 12 Screen capture of English interpretive text for Iron Flagpole at Yongdusa Temple Site, Cheongju from the English CHA website⁷⁰

When there is an event in a temple, they hang a flag called dang at the entrance of the temple. Two posts support the flagpole. Nammul-ro, Sangdang-gu in Cheongju City where the flagpole stands is where Yongdusa Temple used to be situated. The temple was founded in the 13th year (962) of King Gwangjong in Goryeo Period, but it was shut because of frequent warfare and fighting during the late Goryeo Period. Now the road has changed to the busiest one in the city of Cheongju. The flagpole remains as it used to be with the supporting stone and two posts. The two posts have protruding vertical lines in the middle of the outside face, making some variation on the monotonous surface. Between the two posts, twenty cylinder-like iron tubs gear into each other, making up the flagpole. There is a fastening device like a crossbar at the top of the stone posts to firmly fasten the flagpole. Especially, there is a record about the motivation and process of building iron flagpole at the face of the third iron tub. It says that they cumulated thirty iron tubs at first. The flagpole was set up together with the temple in the 13th year (962) of King Gwangjong in Goryeo. It is considered as a precious relic because we can know the exact time. The case that flagpoles remain is rare in Korea and we can see flagpoles only at three places of Gabsa Temple in Gongju, Chiljangsa Temple in Anseong, and here. So this is one of rare and precious flagpoles. There is a legend concerning this relic in Cheongju. The story is as follows. From the old times, the people in Cheongju suffered from a lot of disasters due to floods. Then an astrologer said that they would be able to avoid the disaster if they built a large mast, because the area would take a ship-like shape. After all, they say, the area avoided the disaster by building a flagpole as a mast. From this, Cheongju came to be named Juseong (ship castle).

Figure 13 Screen capture of English interpretive text for Iron Flagpole at Yongdusa Temple Site, Cheongju from the Cultural Heritage Digital Hub⁷¹

⁷⁰ Cultural Heritage Administration. English Homepage. Retrieved July 17, 2017 from <http://www.cha.go.kr/chaen/search/selectGeneralSearchDetail.do?sCcebKdcd=11&ccebAsno=00410000&sCcebCtcd=33>

⁷¹ Cultural Heritage Administration. Cultural Heritage Digital Hub. Retrieved July 17, 2017 from http://hub.cha.go.kr/idolsearch/culturalheritageInfoViewPop.do?ct_id=20121105000000023150

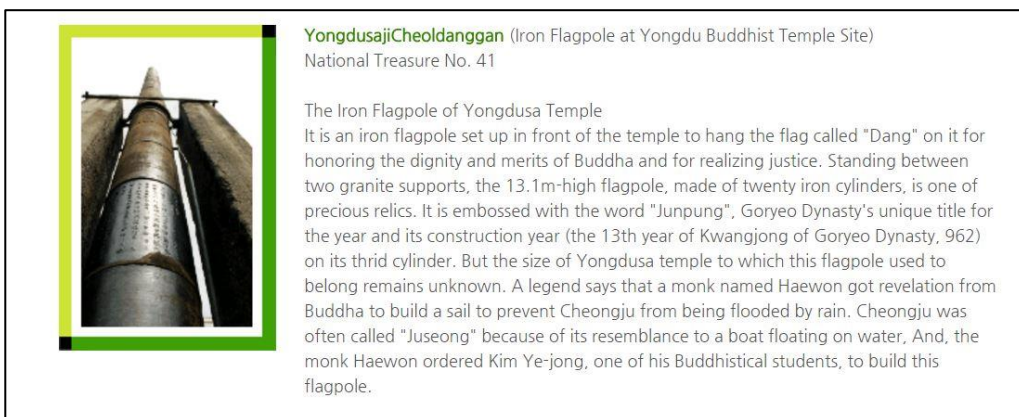


Figure 14 Screen capture of English interpretive text for Iron Flagpole at Yongdusa Temple Site, Cheongju from the Cheongju Tourism Site⁷²

However, more importantly, if basic translations and explanations are being done over and over again, this takes away from focusing on testing and improving existing translations and explanations. For instance, to improve the quality of interpretations, there needs to be testing with audiences as to which explanations and translations are the most effective in conveying interpretive information and stimulating further action. Yet if financial and human resources are being spent on re-explaining and re-translating the same interpretive information over and over, this research cannot take place. If such research does not take place, innovation will not occur.

The main reasons for this lack of efficiency and sustainability are due to the 1) division of labor (i.e. no centralized oversight), 2) frequent rotation of human resources, and 3) reliance on text and analog forms. Division of labor and frequent rotation of human labor lead to those working on interpretation-related tasks (usually at local government) being unaware of existing resources, which leads to redundant work. This also means those responsible for interpretive texts at each institution may have difficulty locating skilled authors and translators. Because of the reliance on and expense of physical information panels, there is little incentive to invest in the research and innovation of best practices of the content of the interpretive texts or other non-text interpretive resources. This is further compounded by the fact that, by leaving interpretation up to small local government who only have a select number of heritage under their charge, there is little incentive

⁷² Cheongju City. Cheongju English Tourism Website. Retrieved July 17, 2017 from <http://www.cheongju.go.kr/english/contents.do?key=717>

to develop and test new forms of interpretive resources. Regarding composition and translation, because the work is outsourced to authors and translators, they have little incentive to research and compile the best translations and explanations for various terms.

In order to solve these systematic problems, there needs to be centralized oversight of interpretative resources. This needs to ensure that the resources that already exist are not recreated, but rather reutilized and improved upon. Otherwise, local governments do not have incentive to innovate. There also needs to be ways to update content more easily, automatically if possible, to encourage innovation. Furthermore, there needs to be ways to reutilize existing definitions, explanations, and translations of terms/contextual elements not just for interpretive texts, but for various objectives and purposes - content creation, education, research, for kids and for foreigners, be shown in various forms on and offline, etc.

V. A Data-based Perspective on Heritage Interpretation

There are many possible ways to address the limitations of current Korean cultural heritage interpretation which have nothing to do with a digital or data-based perspective. However, without fundamentally breaking out of the “old-media” and “traditionalist” mindsets, which conceive of heritage interpretation as a one-directional process in which experts educate an unknowledgeable, general public at on-site heritage sites or museums via text or guided tours, there is a limit to the extent to which the ideals of interpretation can be maximized. Even if there is an overhaul in the bureaucratic structure which oversees interpretive resource creation, even if best practices for the interpretive text creation and translation process are researched, even if in-depth research with test audiences into the more effective and understandable content for particular demographics is undertaken, and even if current online resources and engagement opportunities are better linked to one another and advertised, the available resources will remain limited to narrative text, video, and audio. These have limits on 1) the personalization of resources for the interests and motivations of each individual, 2) the ability to reuse the interpretive information for multiple purposes including research and content creation, and 3) the ability to navigate through and organize the context of interpretive information in nuanced and multivalent ways. A data-based perspective toward heritage interpretation not only has the potential to address those problems which can be solved via non-digital approaches, but allows for new and improved functionality that is simply impossible with an old media, traditionalist mindset. Therefore, this thesis proposes such a data-based model to address the current limitations of Korean cultural heritage interpretation.

However, before the model and its functions are presented, there is a need to understand how heritage interpretation has been approached from a digital perspective thus far, and look more specifically at the significance of databases – graph databases in particular – and the ontology which makes the graph database possible. Exactly how this data-based perspective addresses the current limitations or Korean cultural heritage interpretations regarding the five ideals of interpretation must also be outlined. These will be presented in the following sections.

1. Digital Perspectives on Heritage Interpretation

Heritage interpretation scholars have discussed the role of technology in heritage interpretation for over half a century. Even Tilden, in 1950, addressed the place of technological “gadgets” in heritage interpretation (133). Until the late 2000s, most of the discourse revolved only around the use of the kind of offline digital technologies discussed in Section III.2.2 – touch screens, AV devices, video displays, etc. – as tools to further the same traditionalist, old-media framework of heritage interpretation. While some scholars continue to limit themselves to this conception of the role of technology (see Ham 2013, Shaliginova 2012, Beck and Cable 2011), other scholars have begun to grapple with the way the computers and the internet are fundamentally altering the way in which we understand heritage, as well as and the public’s expectations around and possibilities for heritage interpretation. Volumes such as *Heritage: Critical Approaches* (2013), *New Heritage: New Media and Cultural Heritage* (2008), *Heritage and Social Media* (2012), and *Cultural Heritage Information: Access and Management* (2015), are filled with articles by scholars who are researching the changing meaning and role of heritage and heritage interpretation in the digital age.

Among such contemporary scholars, Staiff (2016) best summarizes way digital technology, including digitization and the Internet, has fundamentally altered the possible ways we might conceive of heritage interpretation:

“Digitalization has reunited physical sources that have been hitherto kept separate by the silos of government bureaucracy and by the different missions and professional practices of geographically separate institutions like libraries, museums (private and public), archives (private and public) and universities. Now all digital users have the capacity to do what twentieth-century historians and archaeologists had to do professionally: that is, re-unite sources artificially separated in the

collection/preservation process whether print, visual or material in order to make coherent analyses and narratives. This democratization of knowledge practices gives the visitor unprecedented opportunities to make their own heritage, to participate in the processes once confined to specialists... It allows the user/visitor to bring together for themselves an explanation that draws upon the patchwork of fragments, snippets and layers of information available on the Web; to create (provisional) meaning in the matter of doing a jigsaw puzzle, a temporary assemblage of parts that is a product of, but which contributes to, the constantly evolving digital environment” (loc. 2960).

However, there is still uncertainty as to what kind of resources “digital” users of heritage information need and how they would use such resources (Stiller 2013, Chowdhury S. 2015). While most of the current research has centered around the development of resources suited to the management needs of heritage institutions, some scholars have attempted to implement and test various digital resources which are geared toward non-institutional use (Stiller 2013, Stiller and Petras 2015, Staiff 2016, Clough et al 2015, Shiri 2015). However, even without specific platforms or resources for heritage interpretation, the Internet itself facilitates modes of heritage interpretation which are simply not possible with old media, and gives unprecedented creative agency to those who have traditionally been in the passive “receiving” position of interpretations.

Staiff gives an example of this in action, describing a class project he led in which he instructed students to “navigate through The Rocks⁷³ as a ‘heritage tourist’ using only the resources available on a smart phone” and students were only told in advance to familiarize themselves “with what was available online” (2016, loc. 2979). Students came up with a variety of different interpretation activities, including replication of historic photos, creating themed itineraries, making videos, attempting to locate the sites of various difference historic events and buildings, “touring” places which no longer exist, and more. This shows that greater personalization of and engagement with the heritage interpretation process is indeed possible with a digital approach.

In the Korean context, the CHA is also not entirely a stranger to such digital approaches to heritage interpretation. In the 2014 Report (Cultural Heritage Administration 2014a), a large section is dedicated to a recommendation of a digital-based cultural heritage information system. The recommendation calls for the development and operation of an independent cultural heritage interpretive text portal, compilation of digital cultural heritage information content for each

⁷³ The “site of the first British settlement on the continent of Australia” according to Staiff

heritage site, development of multimedia augmented reality content creation and related services, the design of a cultural heritage knowledge information network, and making cultural heritage site information panels digital, among other more detailed recommendations. Below is a translated summary of the Report's key tasks for a digital-based cultural heritage information system design (252-261):

1. Development and operation of an independent cultural heritage interpretive text portal
 - a. Independent cultural heritage interpretive text portal
 - b. Cultural heritage wiki design strategy
 - c. Measures to improve the quality of user generated content
2. Compilation of digital cultural heritage information content for each heritage site
 - a. Interpretive text content creation for a digital cultural heritage information system
 - b. Provision of extended interpretive information linked to offline information panels
3. Multimedia AR content creation and service
 - a. AR cultural heritage information service
 - b. Ubiquitous digital cultural heritage information service
4. Cultural heritage knowledge information network design
 - a. Centralized management of cultural heritage
 - b. Design of cultural heritage knowledge information network via the connections of relevant cultural heritage information
 - c. Relevant data amalgamation service which coincides with the aims of Government 3.0
5. Project to improve cultural heritage sites information panels on a digital basis
 - a. Digital information panel
 - b. A structure for a digital heritage site information system

Despite the seeming embrace of a digital perspective on heritage interpretation by the CHA as presented in the report, it should be noted that the report itself was commissioned by the CHA to the Cultural Informatics Lab at the Academy of Korean Studies, and reflects the opinions of the research team; Therefore, to what extent the CHA actually has any intention to implement such suggestions is uncertain.

While the Internet and digital technology in general can, in part, facilitate realizations of the interpretive ideals and the 2014 Report suggestions for a cultural heritage information system, they have a limit to what they can accomplish. For example, how adaptive augmented reality or text

content is for each user depends on the extent to which the cultural heritage information within the system is broken down into detailed parts which can be manipulated and rearranged in real time. Text or photo content, merely presented via a digital medium, alone cannot accomplish such nuanced personalization nor contextualization, nor can it be easily utilized for the secondary purpose of research as each text is imbued with its own bias from the author. Although a digital approach may allow for the inclusion of some metadata, it also cannot solve existing problems with redundant content creation and translation. Furthermore, although the Internet allows for access to information by many, from many locations, if this information is not well organized and thoroughly connected, it cannot be fully utilized. This is where the need for a data-based approach to heritage interpretation comes into play.

2. The Unique Capabilities of the Database

Data-based heritage interpretation can be understood as the practice of organizing, storing, managing, and accessing interpretive information and facilitating the creation of interpretive resources, through the utilization of data, the database, algorithms and interfaces. By extension, interpretive data is a manifestation of abstract interpretive information in a medium which can be processed by computers (or humans) and can be used in the creation of digital interpretive content and resources.

Databases facilitate organization and utilization of information which is simple not possible in the “real world.” Weinberger (2011) explains this by presenting an analogy about the way information was stored traditionally, and now what is possible with digital technology. He uses the example of a physical store, how it organizes the products it holds, and how customers can find the products they are looking for or browse for products if they do not have a specific item in mind. He explains how the physical world has limitations regarding information access, such as “in physical space some things are nearer than others,” “physical objects can be in only one spot at any one time,” “physical space is shared” (i.e. there is only one layout which can be used), “human physical abilities are limited,” “the organization of the store needs to be orderly and neat,” and that because each customer has different needs, the store must stock many more items than any individual customer may need, getting in the way of accessing what they are looking for (5-6). However, in the digital world, these limitations are removed. Weinberger says:

“Instead of atoms that take up room, it’s made of bits. Instead of making us walk long aisles, in the digital world everything is only a few clicks away. Instead of having to be the same way for all people, it can instantly rearrange itself for each person and each person’s current task. Instead of being limited by space and operational simplicity in the number of items it can stock, the digital world can include every item and variation the buyers...could possibly want. Instead of items being placed in one area of the store, or occasionally in two, they can be classified in every different category in which users might conceivably expect to find them. Instead of living in the near, ordered shelves... items can be jumbled digitally and sorted out only when and how a user wants to look for them” (6).⁷⁴

This “shopping at a store” analogy can also be applied to interpretive resources. While some Korean cultural heritage interpretive resources are presented digitally, they fail to fully realize the potential which Weinberger speaks of - namely because they do not utilize a database.

Manovich (2002) discusses the phenomenon in slightly different terms. He argues that, “historically, the artist made a unique work within a particular medium. Therefore the interface and the work were the same; in other words, the level of an interface did not exist. With new media, the content of the work and the interface are separated. It is therefore possible to create different interfaces to the same material” (227). He further states that “in general, creating a work in new media can be understood as the construction of an interface to a database. In the simplest case, the interface simply provides access to the underlying database...But the interface can also translate the underlying database into a very different user experience” (226). Such interfaces can take many forms, including a more traditional narrative, which “creates a cause-and-effect trajectory of seemingly unordered items (events)” (225). Though a database inherently rejects such predetermined trajectories, but can nonetheless recreate them in the user's experience via algorithms and interfaces.

⁷⁴ Weinberger uses the term “digital,” which is not incorrect, however is misleading to assume the functions he discusses are available via any digital technology or webpage. He is referencing functions that go beyond mere provision of text and hyperlinks via webpages, and going on to discuss websites like Amazon which are just interfaces to large databases. Therefore, although he mentions a “digital” world, he is in actuality discussing the functions of a database in particular.

In other words, the information stored within the database remains the same, but it can be accessed in countless juxtapositions and forms via various algorithms and interfaces. In the context of interpretive information, this means the work of developing interpretative content, in terms of translation, definitions, and descriptions of relationships, only needs to be done once, yet multiple interpretive resources can be created from it. Furthermore, if information in the database is changed (either because it was incorrect or needed to be improved), this is reflected in all the resources created via algorithms and displayed via interfaces. Such interfaces can take many forms, from personalized interpretive texts, to network graphs, timelines, and even virtual or augmented reality. These could be pre-curated by experts, or explored/generated organically by users. In sum, data-based interpretation allows nearly endless tailoring of content and media of interpretation, facilitating both prescribed and exploratory interaction with the interpretive information, while also allowing this information to be updated and improved instantly.

Staiff (2016) discusses how this is the kind of interpretive resource today's generations want, stating:

“Web 2.0 and the generation of users who inhabit this experience...are not interested in pre-packaged information that is passively received; rather they want open access to databases so that they, as visitors, can share the content and be co-authors of the interpretation. The digital savvy visitor wants to be a creator of meaning as well as a consumer of meaning. This indicates that the old authoritarian structure will not work because visitors of the Web 2.0 generation are already part of a series of interlocking networks of information flows where they are both producers and consumers, and often both simultaneously....The 'new' generation of visitors will not be satisfied with what is provided on signs because the information on the signs may not relate to the visitor's question or context of experience and it will increasingly become easier, as the new technology becomes an indispensable personal accessory, to use Google to find the answer while walking around the site” (loc. 2880).

Another potential benefit of conveying information via data and a database is that it can be incorporated into the larger Semantic Web. The Semantic Web is an idea presented by the creator of the World Wide Web, Tim Berners-Lee. While the World Wide Web connects documents, the

Semantic Web would connect contextual elements in ways which demonstrate their relationship to one another, thus theoretically mapping the relationships among all people, places, events, things, concepts., etc. imaginable. Although the Semantic Web has yet to be fully realized, storing interpretive information via the logic of the semantic web facilitates the relationships of contextual elements within the realm of Korean cultural heritages, but also allows it to be connected to other heritages and other databases around the world.

3. What is a Graph Database?

There are various kinds of database models, which each take a different approach to storing data. Among these are graph databases. Robinson et al (2005) defines graphs as “...a set of nodes and the relationships that connect them. Graphs represent entities as nodes and the ways in which those entities relate to the world as relationships” (1). When connected together, this network of nodes and relationships forms a web of information which can be analyzed and easily visualized. According to Robinson et al, there are several kinds of graph databases, including [labeled] property graphs, hypergraphs, and triples (206). Each of these graph database types have different structures and therefore various strengths and weaknesses in regard to data analysis. However, the general concept behind them is the same.⁷⁵

In a graph database, nodes are connected to one another via relationships. Nodes and relationships in graph databases can have labels and properties. Labels serve as a way to classify nodes and relationships into types, while properties describe various details of individual nodes or relationships. Nodes and relationships are categorized into labels depending on the nature of the node/relationship within the framework of the database. These labels naturally vary depending on the nature of the information being described within the database. Such labels can be useful when to filtering nodes and relationships, and also to easily distinguish nodes and relationships of different types in a visualization. Properties are used to convey details like the ID of the node of relationship, and other details about the node or relationship itself. These details, too, depend on the nature of the node and relationship being stored; different properties are useful in describing

⁷⁵ The terminology used to describe these nodes, relationships, labels, and properties varies from model to model. In other graph database frameworks such as RDF/OWL, nodes are referred to as entities or individuals, labels are referred to as classes, node properties are referred to as attributes or datatype properties, and relations are referred to as object properties. However, since the ontology presented later in this thesis is implemented via a labeled property graph as presented in Robinson et al (2005), the terminology of labeled property graphs will be used.

different kinds of nodes and relationships. In a visualization (such as Neo4J), these properties can act as display names for nodes and relationships.

There are various benefits to graph databases when considered within the context of heritage interpretation. Unlike relational databases, which are organized around tables of data (the relationships between which can be accessed via keys in each table), graph databases are centered around relationships. As Tilden (1950) said, interpretation “aims to reveals meanings and relationships” (33). Heritages do not have value in and of themselves, but gain such value from their larger context, which, in other words, are the relationships the heritage has with various historical and cultural concepts, people, events, etc. Graph databases allow such contextual relationships to be organized, analyzed, and clearly conveyed. Also, because of this emphasis on relationships, the pathways between nodes can be easily traversed, which makes finding related heritages or related contextual elements (people, concepts, etc.) easier. Graph databases are well-suited to visualization, and therefore, the relationships between a heritage and its context can be displayed in this way.

The current CHA heritage database is not based on the concept of a graph database. In fact, the information provided could be easily stored as a simple spreadsheet. Each heritage has metadata (as shown in section III.2), but there are no relationships between these heritages, nor are there any non-heritage contextual elements included. This consequentially means that there are various limitations to how information about heritages can be presented. For example, heritages can only have one “heritage type” shown in the metadata (for example, only “Buddhist sculpture”) which is categorized hierarchically (under “artifact”).

Graph databases are a possible solution to the current limitations of CHA heritage data storage. In a graph database, the heritage could be connected via relations to two different “heritage types” which are stored as their own nodes (“Buddhist” and “sculpture”) which can be accessed non-hierarchically (“Buddhist” via religions and “sculpture” via art forms), allowing the heritage to be accessed via multiple pathways and connected in more nuanced ways to other similar heritages. Furthermore, a graph database would allow the database to go beyond just storing data about heritages, but also about their contextual elements (such as “Buddhist” and “sculpture,” along with specific historical figures, places, events, and more) and their relations to one another, which would facilitate navigation among concepts and heritages, as well as easier translation of contextual elements (as translations can be stored as node properties).

4. What is an Ontology?

As mentioned in the previous section about graph databases, nodes and relationships have labels and properties. These labels serve as ways to categorize the data stored in the database, while properties aid in providing useful information about the data. However, in order to be able to functionally utilize the database, there needs to be some strategy for the database organization - deciding what kinds of labels and properties are included, which nodes and relationships should be categorized with which label, and which properties certain nodes or relationships need. However, this depends on the nature of the information which will be stored in the database, therefore, there is a need to make sense of the various elements of the information attempting to be stored in the database, as well as the nature of their relationships to one another and their various properties. Making sense of the nature of the information in this way is the objective of an ontology.

According to the Kim et al (2016), an ontology (in the realm of information technology) is a agreement made regarding the technological language used in [linked] data for the purposes of facilitating communication across the Web (163). Before putting Korean cultural heritage interpretive information into a database, the nature of Korean cultural heritage interpretive information needs to be understood. What elements of interpretive information should become nodes, what relationships they have with one another, how these nodes and relationships should be categorized, and what properties are needed to describe such nodes and relationships needs to be determined before interpretive information can be turned into data and stored in a database. This challenge of creating an ontology to describe Korean cultural heritage interpretive information so that it may be stored as data in a graph database (and, by extension, overcome the limitations of current Korean cultural heritage interpretation by living up to the ideals of heritage interpretation) is the main undertaking of this thesis.

5. The Ideals of Heritage Interpretation from a Data-based Perspective

The possibilities of a data-based perspective on heritage interpretation in consideration of the five ideals of heritage interpretation are numerous. Because information must be stored as discrete entities and relationships, the various interpretive elements must be clearly defined, which reduces the likelihood of vague or wordy phrasing. The separation of the data (i.e. content) and interface (i.e. medium) means that data (including relations, definitions, translations, etc.) need to be made

just once, and they can be reutilized to a variety of ends and forms which are tailored to the needs of users. This separation and reusability also reduces the likelihood of typos or other basic errors when new resources are created; while the initial data must be proofread and fact-checked, it can be reused with confidence. Information can be easily updated or added because it is stored as just one node or relationship within a database (as opposed to hidden in the middle of sentences in many different texts), and any updates or improvements to the data can be immediately reflected in the resources because they are presented to audiences via automated algorithms and interfaces. Also, due of the separation between content and medium, data compilation can begin now, yet this content will not go to waste, even as technology advances in ways we cannot not now anticipate, as it can be drawn upon by multiple, new interfaces far into the future. Depending on the interfaces developed, diverse audiences can potentially be involved in data input, storytelling, research and more. This also means that one user can use the database to create content in one language, and it can be displayed in another, which allows the content can reach greater audiences.

The division of content and medium also facilitates the continual growth of the database. While narrative-form resources must be confined to a certain length before they become unwieldy, each user of a database can select to see whatever collection of nodes and relationships in the database they desire. This ability for continued enrichment of content means that, in addition to being a tool for interpretation, such a database has the potential to become a significant tool for scholarly research.

Furthermore, because graph databases are not in narrative form, they facilitate access to information from a variety of starting points – not just heritages, as is the case with most current interpretive resources. Via interfaces, the database can be presented in a narrative form, but this narrative form can be centered around contextual elements rather than heritages alone. Based on the relationships within the database, related information can be discovered via a variety of factors, including contextual elements, with a level of nuance just not possible without a graph database approach. This approach also facilitates the incorporation of links to engagement opportunities which are directly connected to contextual elements in which the audience has an interest.

The following table shows these various benefits of data-based heritage interpretation in comparison with the shortcomings of existing interpretive resources, as discussed in section IV.

Table 15 Overview of the benefits of data-based heritage interpretation

Interpretive Ideal	Existing Interpretive Resources' Shortcomings	Graph Data-based Perspective
Clear / Accurate	<ul style="list-style-type: none"> ● Lack of transparency of sources, authors, translators ● Typos, mistranslations, other basic errors ● Information (descriptions of layout, series of events, etc.) is sometimes unclear when explained in text 	<ul style="list-style-type: none"> ● Because information has to be stored as discrete entities and relationships, the various interpretive elements must be clearly defined which reduces the likelihood of vague or unclear phrasing. ● Separation of “content” and “medium” means that the interface can reuse existing data, which means there are fewer chances for typos or other basic errors with the creation of new resources - the initial data must be proofread, but it can be reused with confidence. ● The separation of content and medium also mean that the same data can be displayed in a variety of forms, not just text
Personal / Tailored	<ul style="list-style-type: none"> ● One-size-fits-all interpretive texts (apart from language, children's content) ● Only in narrative form - usually interpretive text, tours, or some video content - or maps ● Limitation to the depth and length of information presented 	<ul style="list-style-type: none"> ● Multiple interfaces to the same data means that the same content can be displayed in many ways, which can potentially be used for the purpose of creating more personalized content and media of interpretive materials for audiences.
Contextualized / Holistic	<ul style="list-style-type: none"> ● Most information only organized around heritages ● Little information on contextual elements (if there is, it is not linked to) ● Cannot discover related heritages (or other related contextual information) based on anything other than designation, broad periods, location, and type (as determined by the CHA) 	<ul style="list-style-type: none"> ● Because they are not in narrative form, databases, especially graph databases, facilitate access to information from a variety of starting points. ● They can be turned into narrative form via an interface, but this narrative form can be centered around contextual elements other than heritages alone. ● Based on the relationships within the database, related heritages can be discovered via a variety of factors.
Facilitates Engagement	<ul style="list-style-type: none"> ● Few audience-directed opportunities for engagement ● Existing opportunities are not well advertised ● Lack of in-depth opportunities for non-Korean speakers 	<ul style="list-style-type: none"> ● Depending on the interfaces developed, diverse audiences can potentially be involved in data input, storytelling, research and more. ● Data-based content (as opposed to both analog and narrative content) facilitates easier translation (as explained in the following sections), which means that it can be engaged with by a wider variety of audiences. ● The database can potentially incorporate links to existing off-line engagement opportunities which are directly connected to contextual elements in which the audience has an interest.
Sustainable / Innovative	<ul style="list-style-type: none"> ● Multiple versions of the same interpretive texts being written and translated over and over again ● Lack of innovation of content and medium ● Difficulty in updating information 	<ul style="list-style-type: none"> ● The separation of data and interface, as well as the lack of an inherent narrative, means that data (including relations, definitions, translations, etc.) need to be made just once, and they can be reutilized to a variety of ends (including narrative content). ● Information can be easily updated because it is stored as just one node or relationship within a database (as opposed to hidden in the middle of sentences in many

		<p>different texts), and any updates or improvements to the data can be immediately reflected in the resources because they are based on an interface.</p> <ul style="list-style-type: none"> • Because the data and interfaces are separate, in the future as technology advances in ways we cannot yet fully anticipate, various interfaces which make use of the data can be developed (for example, an personalized and real-time augmented reality on-site interpretation experience via a “smart contact lens”) • Because there is no limitation in size, as there is with narrative-form resources, the database can be continually enriched with more relations and nodes, which means that, in addition to being a tool for interpretation, it has the potential to become a massive database for academic research.
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VI. Ontology Design

This section presents existing ontologies or data models relating to cultural heritages, the strategy for the ontology design, and the design itself - including node labels, node properties, relationship labels, relationship properties, and relationships.

1. Existing Heritage Ontologies

Other scholars and institutions have previously created ontologies for cultural heritage information, some of which are applicable to a graph database. As mentioned by Doerr (2009), the main ontologies dealing with cultural heritages are the CIDOC Conceptual Reference Model (CIDOC-CRM), Functional Requirements for Bibliographic Records (FRBR), ABC, DOLCE, as well as the Europeana Data Model (EDM) (not mentioned by Doerr as it was released in 2013). These data models were designed with a variety of purposes in mind – some more conceptual and broad, like the CIDOC-CRM, which is closer to an ontology than a practical data model, or the FRBR, which facilitates documentation of a variety artistic and literary works, while others are more functional and specific, like the EDM, which was designed specifically for documentation of items in the Europeana collections.

There have also been explorations of ontologies or data models about Korean cultural heritages, in particular using the models referenced above as a framework, including the work of Kang (2016), Kim (2016), Kim et al (2013), Kim et al (2016), Lee et al (2014), Seo (2014), and kadhlab103 (2017). However, none of these have been geared directly toward an end-goal of facilitating interpretation or the generation of interpretive resources.

Related to cultural heritage graph database models are databases which depict the relationships of historical figures in Asia (such as the China Biographical Database and Wagner-Song Munkwa Project). While these databases are not about cultural heritages, historical figures play a key role as contextual elements of cultural heritage interpretive information, and therefore, these databases could become meaningful resources for data on historical figures and their relationships to one another.

All of these ontologies and data models were designed with the objective of describing cultural heritage-related information. However, their scopes and objectives differ. Many of the ontologies or data models were designed from the perspective of managing institutions, and, as such, are designed for experts who already know what they are looking for (Stiller 2013) and focus on providing metadata information on the heritages themselves, rather than as a way to describe the relationships between heritages and their greater contexts. Some of them have very specific scopes that cannot describe the broad range of cultural heritage information. The CIDOC-CRM does attempt to facilitate a broad description of cultural heritage contexts, but it is too abstract and broad, and not practically applicable to Korean cultural heritage interpretation. Furthermore, none of the existing ontologies are optimized for future use in interpretive resources (in other words, data stored via these ontologies could not be reutilized in various interpretive interfaces, such as an automatically generated, personalized interpretive text). These various limitations of existing ontologies when it comes to the description of Korean cultural heritage interpretive information necessitate the development of a new ontology, designed to convey Korean cultural heritage information in particular, and optimized for future use in various interpretive resource interfaces.

2. Ontology Scope

This ontology was developed based on a review of the content of the interpretive texts of on-site cultural heritages were translated by the Academy of Korean Studies Korean Cultural Heritage English Interpretive Text Compilation Research Team between fall 2015 and spring 2017 (as discussed in section III.4). The various potential contextual elements, as well as their relationships to the heritage and one another, were extracted from the texts. These were then reviewed and organized, and this has been presented as the following ontology. These texts cover over 130

heritages of 27 different types,⁷⁶ thus providing a diverse range of cultural heritage information which reflects the diversity of on-site cultural heritages and their contexts at large.

3. Design Strategy

This ontology is designed to be applicable to a labeled property graph, such as that facilitated by Neo4J, due to the benefit of being able to more fully incorporate labels and properties of relationships, which is not possible in RDF/OWL ontologies.

As mentioned in the previous section, the utilization of a database – a graph database, in particular – in and of itself has the potential to address many limitations of current heritage interpretation practices in regard to the five ideals of heritage interpretation. However, this ontology attempts to take these ideals into particular consideration, while also improving on existing shortcomings in Korean cultural heritage interpretative resources, in the following ways as demonstrated in the following table.

Table 16 Summary of the ontology's features

Interpretive Ideal	This Ontology's Features
Clear / Accurate	<ul style="list-style-type: none"> ● Transparency of information sources, creators, and editors ● Maximum reutilization of nodes so there is less need for data input and translation, which means fewer typos and easier proofing/consensus on information ● Contextual elements and relationships are clearly defined which minimizes vagueness, and these can later be displayed in timelines, diagrams, etc.
Personal / Tailored	<ul style="list-style-type: none"> ● Options for selection of the kind of content displayed ● Options for the quantity (i.e. length, depth) of information to be displayed ● Options for language display, measurement units, calendars (including mixed display) ● Options for inclusion of additional helpful information for those with less background information, such as definitions of terms ● Data can be displayed as a network graph or in a table; Can be displayed in the future in a countless variety of forms when interfaces are developed (timelines, diagrams, automated texts, games, virtual or augmented reality, etc.)

⁷⁶ Archeological sites, bird habitats, bridges, Buddhist halls, pagodas, paintings and statues, Confucian academies and local schools, forests, fortresses, government offices, nature reserves, palaces, pavilions (private, governmental, and commemorative), placenta chambers, portraits, royal edicts, shrines, steles, tombs, traditional Korean houses, trees, watchtowers, and wells

Contextualized / Holistic	<ul style="list-style-type: none"> ● Includes information not just on cultural heritages, but on their contextual elements and the relationships among contextual elements, as well (people to people, concepts to concepts, etc.) ● Can approach information on any kind of heritage contextual element (not just heritages) from any starting point (concept, historical figure, event, year, dimension, color, value, etc.)
Facilitates Engagement	<ul style="list-style-type: none"> ● Inclusion of “engagement” relationships between contextual elements and various related digital resources, events, and other materials to make users aware of opportunities for more in-depth, self-directed learning on areas of interest ● Content from the database can be selected (i.e. someone can do “storytelling”) in one language and that content can be displayed automatically in another language even if the original “storyteller” does not know that language, which has potential for more in-depth learning opportunities for non-Korean audiences
Sustainable / Innovative	<ul style="list-style-type: none"> ● Minimization of redundant information input, explanation, and translation which saves time, effort and money and allows for more focus on enriching the database by adding new nodes and relation, or adding more source citations or engagement opportunities, or improving the translations/definitions of existing nodes ● The same data can be used over and over again in multiple interfaces, which can be developed and improved on separate from the “content” itself ● Because it is digital, it can be continually updated and accessed from all over the world, and can always be turned into analog form (developed into interpretive texts or brochures, etc.) if needed

These various features were achieved by taking the following approaches to the ontology design:

1) Minimization of node properties in favor of relationships with other nodes

In the existing CHA metadata, for example, the time period of a particular heritage is stored as text. This means that for each heritage, the name of the time period has to be re-inputted by hand. This increases the likelihood of errors and inconsistencies, and increases work - including repetitive translation of the term. However, if a heritage is just connected to the time period via a relationship, the information (including translation) about that time period does not need to be reinputted again and again. Included in this are measurements, dates, and addresses, for example, which are all their own nodes rather than as properties. This minimizes redundant translation work and facilitates personalization of display and visualization.

- 2) Utilization of node IDs in relationship properties to convey more detailed information about the relationship

Unlike nodes, relationships cannot have relationships to nodes. Therefore, if additional information about a relationship is needed, this needs to be included as a property. By utilizing the IDs of other nodes in the relationship properties, such the node along with its properties can be accessed and reutilized in an explanation of a relationship, while the number of total relationships in total is minimized. This minimizes graph clutter and redundant information input, and while facilitating richer detail of relationships.

- 3) Minimization of event nodes in favor of relationships with properties

In CIDOC-CRM event nodes are used for even relatively simple actions. However, this makes the path between nodes unnecessarily long. This ontology uses relationship properties to convey additional information about relatively simple actions (such as retiling, renovation, etc.), and only includes complicated events with many actors and sub-events in the event label (such as a war or political event). This minimizes redundant translation work and shortens the path between related nodes.

- 4) No separate label for cultural heritages

Although this database is designed around Korean cultural heritages, cultural heritages are not given their own label. This is because they are not fundamentally different from other tangible objects. However, their status as a CHA-designated cultural heritage is trackable via designation relationships which connect a tangible object to its heritage designation, if it has one.

- 5) Facilitation of multi-language (measurement, calendar system) display via node properties

Included in node properties are various languages (Korean, English, and Chinese characters), measurement systems (metric or imperial), and calendar systems (solar, lunar, and reign years) to allow for searching and display of information in diverse ways suited to the needs of the user. With measurements and dates/years stored as nodes themselves, this minimizes redundant translation work of simple things like dates and measurements. This also allows for one user to search for and present information in a particular language (or measurement/dating system), and display it in another, even if they do not know that language

themselves. Simple definitions of difficult terminology are also included as properties to allow users with less background knowledge to understand the terminology.

- 6) Inclusion of objective and subjective value judgments (such as oldest, first), quality judgments (such as refined, grandiose)

The reason cultural heritage become cultural heritages is that experts deem they have some particular value which warrants preservation. However, often these claims are not clearly conveyed in current interpretive texts, or they are subjective (such as saying a painting is “refined” without any specific reason for such a claim or any clear definition of what “refined” means). By including value judgement in the ontology, heritages which have similar value will be able to be searched for. In addition, we will be able to see how often heritages are described with vague or baseless subjective descriptions, so that we can research more specific and meaningful ways to express the subjective value of heritages and minimize unhelpful filler words all so common in current interpretive texts.

- 7) Tangible object parts described as nodes

It is useful to have parts of heritages – such as the rooms of a building or the various body parts of a Buddhist statue – as their own nodes so they, too, can have type and quality relationships which can be compared to other similar heritage parts and so that users can search/browse for heritages via the characteristics of its parts.

- 8) “Meta” labels for transparency of data and data management

Meta labels for relationships, as well as a user label for nodes, allows for information on the creation, translation, editing, and source citation for information within node properties and relationships to be included in the database, but also easily excluded from search results if necessary. This allows for searching for relationships which do not have any cited evidence and may be less reliable. There is also a relationship property, “veracity,” which can identify “presumed” relationships which do not have any specific source (such as guesses about the time period of a heritage). This addresses current problems of lack of responsibility and oversight for information and translation in interpretive texts and gives users the power to judge the evidence behind claims.

9) Inclusion of resources for further engagement via an “engage” relationship label

In order to facilitate user's discovery of further reading and educational opportunities related to heritages, an “engage” relationship label was included so that users can easily access to further information about the heritages, concepts, historical figures, places, etc., in which they are interested.

These features will be explained in greater detail in the following section on the ontology design itself and via the ontology examples in section VII.

4. Design

This section outlines the ontology design itself, including node labels and properties, relationship labels and properties, as well as the relationship types themselves. In other graph database frameworks such as RDF/OWL, nodes are referred to as entities or individuals, labels are referred to as classes, node properties are referred to as attributes or datatype properties, and relations are referred to as object properties. However, since the ontology presented here is implemented via a labeled property graph as presented in Robinson et al (2005), the terminology of labeled property graphs will be used instead of RDF/OWL terminology.

1) Node Labels

The node label design took inspiration from the classes of the CIDOC-CRM. However, the CIDOC-CRM is more complex than is needed to convey interpretive information, and furthermore, its event-based perspective is uncondusive to providing content in multiple languages. More simple ontologies which use just actor, event, place, object, and concept are intuitive and can be used broadly for many purposes, but lack systematic rational and nuance, failing to take into consideration the differing node properties and relationships for the kinds of entities which would fall into those labels (for instance, person, institution, and group, are all “actors,” but would each have very different attributes and relations). Therefore, the ontology presented here strives to find a middle point on this spectrum, such that the ontology is not too specific that a wide variety of users can use it to various objectives, but also not so general that nodes with different property and relational needs are grouped together.

The ontology proposed here has six main labels: tangible object, intangible object, person, concept, digital resource and value. These labels were determined based on the ideas of tangibility

and whether or not it can have more than one existence. For example, tangible object and person are tangible, digital resource is digital, and intangible object, concept, and value are intangible. Tangible object, person, intangible object, and value can only have once instance, while concept and digital resource can have multiple instances. Value and concept were differentiated because the definition of value is permanent, while concepts can change meaning over time. Person was differentiated from tangible object, partially on the basis of being alive (although in this case, plants and animals would also need to be differentiated from tangible objects), but mostly out of usefulness for the user.

Table 17 Rationale for node label design

Label	Tangibility	Instances	Note
Tangible Object	Tangible	1	
Person	Tangible	1	Living/Useful to differentiate
Intangible Object	Intangible	1	
Concept	Intangible	1+	Changing definition
Value	Intangible	1+	Permanent definition
Digital Resource	Digital	1+	

In addition to these six main labels are 22 sub-labels, making 28 labels in total, as shown in the visualization below. These labels, their super-labels, and their definitions outlined in the table which follows.

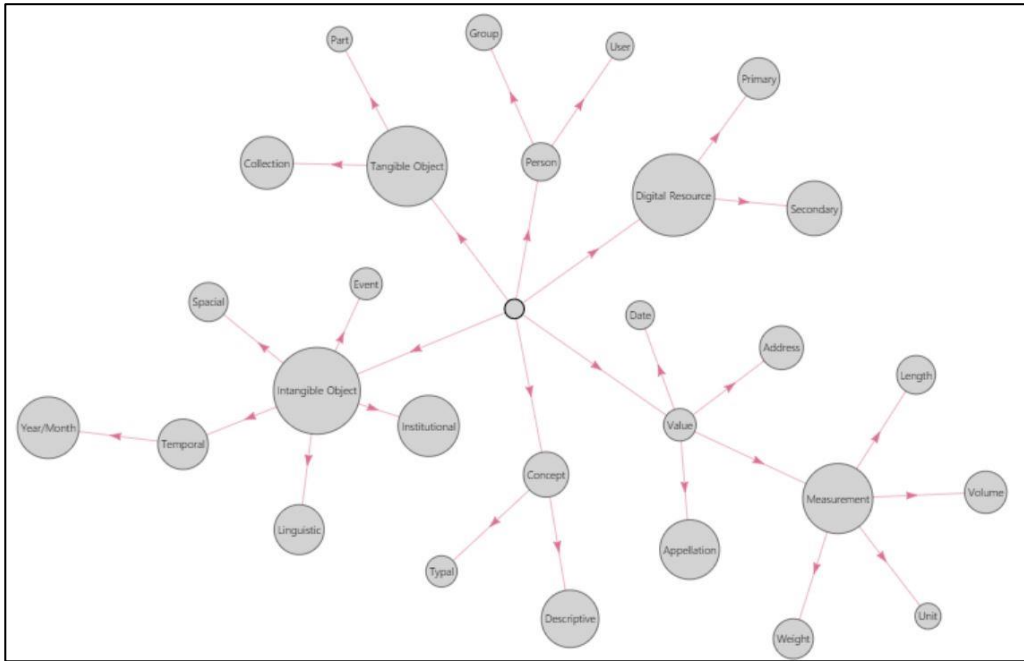


Figure 15 A network graph-style representation of the node labels

Table 18 Node labels

Super-label	Label	Definition	Examples
-	Concept	an entity with a definition that can be applied to many instances of other nodes	Confucianism, maintenance
-	Digital Resource	an entity that exists in digital form and are referents to other entities	See below
-	Intangible Object	an entity that has a singular manifestation, but which is not physical	See below
-	Person	an individual human being	Sin Suk-ju
-	Tangible Object	an entity that has a singular, tangible manifestation, and that is not a human	See below
-	Value	an entity that is singular, can be used to describe multiple entities, and has a single interpretation	See below
Value	Address	a specific geo-spatial location that can be described by a single GIS coordinate pair or a street address	323 Haogae-ro Bundang-gu Seongnam-si, Gyeonggi-do; 37.391792, 127.054396
Value	Name	an entity that is a simple string that refers to a name (pen names, posthumous names, re-naming of buildings, etc.)	Hyewon, Jiseonjeong,

Value	Date	an individual day	17-May-17
Value	Measurement	an entity used to express dimensions	2 feet, 2 meters, 200 centimeters, 4 kan by 2 kan
Concept	Descriptive Concept	an entity which describes the quality or nature of another entity (i.e. adjectives)	Simple, ornate, strong, refined
Concept	Typal Concept	an entity which can describe the form or type of other entities	Men's quarters, three-story stone pagoda, portrait
Digital Resource	Primary Resource	a digital media entity in their direct form (i.e. the file itself, .jpg, .mp3, etc.)	Sinsukjuchosang.jpg
Digital Resource	Secondary Resource	a compilation of digital media (web page, database, etc.)	CHA Cultural Heritage Digital Hub
Intangible Object	Event	an entity comprised of various actions by various actors that occurs over a period of time	Imjin War, the Battle of Cheongju; the Civil Service Exam of 1492, the Independence Movement
Intangible Object	Institution	an entity which is popularly or legally recognized and has agency, but which need not necessarily have physical manifestation	Joseon, the Academy of Korean Studies, the Empire of Japan, the Korean army
Intangible Object	Linguistic Object	an entity composed of linguistic content; not the physical or auditory manifestation of the content, but the content itself	The text of the Gwanggaeto Stele; the content of the Jikji
Intangible Object	Spatial Object	an entity with geographic coordinates, either a specific location or a range of land/sea/space	Unjung-dong, the site of Heungdeoksa Temple
Intangible Object	Temporal Object	an entity which is a span of time with a start and end	The early Joseon period, the turn of the 20th century, the 15th century
Person	Group	a group of people	Goryeong Sin Clan, the four civilian military commanders of the Imjin War; the kings of Joseon
Person	User	a user of the database	user101
Temporal Object	Year/Month	a month or year	2017, May 2017
Tangible Object	Collection	an entity which is a group of multiple tangible entities	A traditional Korean house (with multiple quarters), a temple, a group of Buddhist statues
Tangible Object	Part	an entity which is a section of a tangible object which, while can be described in isolation, cannot exist apart from the tangible object	The head of a particular Buddha statue, and roof brackets of a particular wooden structure
Measurement	Length	a measurement entity for height, width, depth, diameter, and circumference	12 cm
Measurement	Weight	a measurement entity for weight	12 kg
Measurement	Area	a measurement entity for area	12 sq meters
Measurement	Unit	a measurement entity for miscellaneous units, such as "kan"	4 (kan)

As mentioned in the previous section, an effort was made to facilitate the node-ification of items typically stored as properties, such as appellations, dates, addresses, and dimensions. This allows for equivalent information to be conveyed via multiple languages, calendar systems, measurement systems, etc. Furthermore, address and spatial objects, as well as date and temporal object, were differentiated rather than grouped as “place” or “period.” This is because addresses and dates are permanent, while spatial and temporal objects can change over time. Furthermore, events and temporal objects were distinguished from one another in that events must involve various actors engaging in a variety of connected actions, while a temporal object can be just a general period of time.

2) Node Properties

As explained in the section on design strategy, node properties were minimized in favor of more discrete nodes which are connected to via relationships whenever possible to minimize redundant translations and other data input. Therefore, the node properties were limited to the following as shown in the table below.

Table 19 Node properties

Domain Node Labels	Property	Data Type	Description
address	GIS_lat	gis	latitude and longitude coordinates
address	GIS_lon	gis	latitude and longitude coordinates
ALL	ID	string	id
ALL (except measurement, date)	kr	string	main node name in Korean
ALL (except measurement, date)	en	string	main node name in English (translation)
ALL (except measurement, date, year/month, address)	ch	string	main node name in Chinese (hanmun)
ALL (except measurement, date, year/month, address)	rr	string	main node name in Revised Romanization
ALL (except measurement, date, year/month, address)	mr	string	main node name in McCune-Reischauer
ALL (except value, year/month)	URI	string	link to a webpage describing the node
ALL (except measurement, date, year/month, address)	def_kr	string	definition, summary, explanation in Korean
ALL (except measurement, date, year/month, address)	def_en	string	definition, summary, explanation in English
linguistic object	def_ch	string	the original Chinese character text of a linguistic object
date	date_sol	date	date in the solar calendar
date	date_lun	date	date in the lunar calendar
length	cm	number	centimeter

length	in	number	inch
weight	kg	number	kilograms
weight	lbs	number	pounds
area	sqm	number	square meters
area	sqft	number	square feet
area	pyeong	number	Korean pyeong
unit	no	number	a simple number to describe other units
year/month	reign_kr	string	Korean reign year in Korean
year/month	reign_en	string	Korean reign year in English
year/month	reign_ch	string	Korean reign year in Chinese (hanmun)
digital resources	source	string	ID of the institution or individual from which a resource was taken
secondary resources, linguistic objects	lang	string	the language of a secondary digital resource or linguistic object

Some limitations of these node properties are that there can be only one main title for each language. For example, the primary name that will show when the node is displayed in Korean or English will need to be decided. For example, “pagoda body” is referred to by many names in Korean, while events such as “Imjinwaeran” are translated variously in English as the 'Japanese Invasions of Korea,' the 'Imjin War,' etc. Which term appears as the primary title of the node in each language should be determined based on research of 1) how it has been most commonly referred to or translated as, and 2) what is easiest for most audiences to understand. However, all equivalent terms or translations can be saved as appellation nodes, which allows for users to search for and find the nodes via these alternate names.

3) Relationship Labels

Relationships were also given labels. These were based on the kind of relationships found within on-site interpretive texts, as well as the property needs of each relationship type. There are 15 labels as follows. Including these relationship labels will be helpful later when users want to find specific kinds of relationships among the many relationships; For instance users can sort for information about the value of the heritage, the history of the heritage, the history of related historical figures and events, related concepts, the various elements of the heritage and their artistic qualities, related multimedia or reference materials, etc., depending on their areas of interest.

Table 20 Relationship labels

Label	Definition	Domain Node Labels	Range Node Labels
action	actions done by humans	Person, Institution	Person, Tangible Object, Intangible Object (the direct object)
address	the specific GIS coordinates of an object	Tangible Object, Spatial Object	Address
des	information about cultural heritage designations	Tangible Object, Intangible Object	Date, Spatial Object, Typal Concept
dim	connect dimensions	Tangible Object	Measurement
end	ends (death, destruction)	Person, Tangible Object	Date, Temporal Object
layout	directional/spatial relations of tangible objects or its location	Tangible Object, Spatial Object	Tangible Object, Spatial Object
meta	information about creation, editing	ALL	User, Date
name	relations to appellations	ALL (except value)	Appellation
occur	relationships between temporal events	Temporal Object	Temporal Object
part	part and collection objects	Tangible Object, Intangible Object, Concept	Tangible Object, Intangible Object, Concept
rel	relations between people and groups	Person	Person
start	beginnings (birth, foundation, creation)	Person, Tangible Object	Date, Temporal Object
trans	transformations (repair, relocation)	Person, Tangible Object	Date, Temporal Object
type	classifications to explain what something is or describe it	Person, Tangible Object, Intangible Object	Concept
use	how something was used	Tangible Object, Intangible Object	Concept
value	cultural heritage value	Tangible Object, Intangible Object	Concept, Spatial Object, Person, Event
engage	connections to engagement opportunities	ALL (except value)	Digital Resource, Linguistic Object, Event

4) Relationship Properties

In addition to labels, relationships were given properties. Which properties a relationship has depends on the label it has, just like nodes. All relationships have some basic properties. These allow the relationships to be displayed in various languages and to identify the creator, creation date, and reference material of the relationship. However, relationships with action, start, end, transformation, value labels also have additional properties as follow. These utilize the IDs of other nodes which can be drawn upon to describe information about additional factors of the relationship – including when, where, why, and by whom it happened. Examples of how this feature can be used is explained in the next section.

Table 21 Relationship properties

Property	Domain	Definition	Example	Same As ID For
id	ALL	an id for each relationship	rel21023	another relationship
type	ALL	the relation code	Birth	
en	ALL	the display name in English	was born on	
kr	ALL	the display name in Korean	~에 태어났다	
user	ALL	the ID of the user who created the relation	ID	User
date	ALL	the ID of the date on which the relation was created	20170518	Date
ref	ALL (except des)	the ID of the reference which supports the relation	ID	Digital Resource, Linguistic Object, Tangible Object
bc	action, end, start, trans, type, rel, name, dim, value	because; the rationale behind or cause of the relation	ID	Concept, Event
by	end, start, trans, name	actor; who was the actor who initiated or oversaw the start/end/trans	ID	Person, Group, Institution
on	action, name, des	time; when a specific date is known	ID	Date
in	action, end, start, trans, name, value	time; when a specific year/month is known	ID	Year/Month
before	action, end, start, trans, name	time; when an exact date is unknown, but it is known to have had happened before a certain date, event, or temporal object	ID	Date, Event, Temporal Object
after	action, end, start, trans, name	time; when an exact date is unknown, but it is known to have had happened after a certain date, event, or temporal object	ID	Date, Event, Temporal Object
during	action, end, start, trans, name	time; when an exact date is unknown, but it is known to have had happened during a certain event or temporal object (excluding year/month)	ID	Date, Event, Temporal Object (excluding Year/Month)
at	action, end, start, trans, des	location; the spatial object (like neighborhood) or tangible object (like building) in which the start/end/trans occurred	ID	Spatial Object, Tangible Object
nearby	action, end, start, trans	location; the spatial object (like neighborhood) or tangible object (like building) nearby where the start/end/trans occurred	ID	Spatial Object, Tangible Object
to	action, trans	location; the spatial object to which the trans occurred (i.e. where a building was relocated to, where a person was exiled to)	ID	Spatial Object, Tangible Object
from	action, trans	location; the spatial object from which the trans occurred (i.e. where a building was relocated from)	ID	Spatial Object, Tangible Object
with	action, end, start, trans	concurrence; when a trans occurred concurrently (like two buildings relocated together at the same time, two people who died together)	ID	Person, Group, Institution, Tangible Object, Concept, Intangible Object
attribute	meta	for identifying the attribute of the node which was edited	def_kr	

veracity	ALL (except meta, des)	to denote if the relationship is just presumed	presumed	
no	des	the designation number	56	
start	action	time; start of an action	ID	
end	action	time; end of an action	ID	
for	action	whom or what the action is done for	ID	

5) Relationships

The following is a list of the relationships and their inverses for the ontology. The relationship label determines the possible domains and ranges for the relationships, which can be found in the previous section on relationship labels.

Table 22 Relationship types and their inverses

Label	Relation	Inverse Relation
address	hasAddress	isAddressOf
des	hasDesignation	isDesignation
dim	circumference	isCircumference
dim	depth	isDepth
dim	height	isHeight
dim	kan_front	isKan_front
dim	kan_side	isKan_side
dim	volume	isVolume
dim	weight	isWeight
dim	width	isWidth
layout	Facing	Facing
layout	hasInMiddle	hasInMiddle
layout	ismade_TogetherWith	ismade_TogetherWith
layout	inEachDirection	inEachDirection
layout	intheMiddleOf	intheMiddleOf
layout	made_Separately	made_Separately
layout	isNearby	isNearby
layout	NextTo	NextTo
layout	Above	Below
layout	Behind	inFrontOf
layout	Between	hasBetween
layout	hasInEast	totheEastWithin
layout	hasInNorth	totheNorthWithin
layout	hasInSouth	totheSouthWithin
layout	hasInWest	totheWestWithin
layout	hasToEachSide	toEachSideOf
layout	isLeftPath	hasLeftPath
layout	In	Within

layout	Inside	Outside
layout	isLocatedTopOf	Underneath
layout	totheLeftOf	totheRightOf
meta	meta_created	meta_wasCreated
meta	meta_edited	meta_wasEdited
name	alt	isName_alt
name	alt_en	isName_alt_en
name	Courtesy	isName_courtesy
name	Former	isName_former
name	Pen	isName_pen
name	Personal	isName_personal
name	Posth	isName_posth
name	Temple	isName_temple
name	Name	isNameOf
occur	Concurrently	Concurrently
occur	After	Before
occur	During	hasContainedEvent
occur	hasRecurrentEvent	Recurrent
part	hasManifestation	isManifestationOf
part	part	isPartOf
part	part_missing	isMissingPartOf
part	part_remnantof	isRemnantPartOf
part	partlyremaining	isOnlyRemainingPartOf
ref	AcademicResource	isRefOf_AcademicResource
ref	Evidence	isRefOf_Evidence
ref	FurtherReading	isRefOf_FurtherReading
ref	hasRef	isRefOf
ref	Media	isRefOf_Media
rel	Colleague	Colleague
rel	Daughter	isDaughterOf
rel	isDescendant	isAncestor
rel	Father	isFatherOf
rel	Husband	isHusbandOf
rel	isMemberOf	hasMember
rel	isMemberOf_Clan	hasClanMember
rel	isFounderOf_Clan	hasClanFounder
rel	MatGrand	isMatGrandOf
rel	Mother	isMotherOf
rel	Owner	isPropertyOf
rel	Son	isSonOf
rel	Wife	isWifeOf
type	hasColor	isColor
type	hasCondition	isCondition
type	hasFormation	isFormation
type	hasMaterial	isMaterial
type	hasMethod	isMethod

type	hasQuality	isQuality
type	hasType	isTypeOf
use	hasUse_Main	isUse_Main
use	hasUse_Secondary	isUse_Secondary
value	Best	hasBest
value	Commemorates	isCommemorativeOf
value	DocumentsHistoryOf	hasHistoryDocumentedBy
value	Enshrines	isEnshrined
value	hasBuried	isBuried
value	hasCraftsmanship	hasExampleOfCraftmanship
value	hasFirst	isFirst
value	hasHistory	isHistoryOf
value	hasIndicator	isIndicatedBy
value	hasOldest	isOldest
value	hasUncommonExample	uncommonFor
value	hasValueAs	hasValuedExample
value	hasWellKnownExample	wellKnownFor
value	TypicalExampleOf	TypicalOf
value	isRelatedTo	hasRelated
value, engage	aidsInTheUnderstandingOf	UnderstandingIsAidedBy
value, engage	Depicts	isDepictedIn

However, it was found that the potential relationships and inverses for action, start, end, and transformation relationships were more complicated than basic standard-inverse relationships. This is because the domain and range of the relationship can depend on the nature of the relationship. Therefore, there are four columns - active, passive, date, and place. Passive, date, and place can all be inverses of active. However, date and place can also be the inverse of passive as well. This depends on whether the relationship is centered around a human action, or a passive effect on a person or heritage object in which the actor of that effect is insignificant. For example, if a building is renovated, it is usually the date of renovation which is important, and who renovated it is secondary. In this case, the relationship would be between the heritage and the date via the “wasRenovated” relationship, and who renovated it would be stored as a property. However, there are also cases in which who did the action is more important than when it was done - for example, who created a piece of art. In this case, the relationship would be between the creator and creation, with the date saved as a property. This allows for flexibility in deciding which should be the target (range) of a particular relationship, but also may prove to be problematic as the range type is then selected based on the subjective judgment of the relationship creator. However, regardless, all the important information about the relationship - actor, place, date, reason, etc., can be stored as a property.

Table 23 Complex start-trans-end-act relationships⁷⁷

Action Types	Label	Active	Label	Passive	Date	Place
abolishment	act	shutdown	end	wasShutDown	shutdown_on	shutdown_at
destruction	act	destroyed	end	wasDestroyed	destruction_on	destruction_at
end	act	ended	end	wasEnded	end_on	end_at
death	act	killed	end	died	died_on	death_at
execution	act	executed	end	died	execution_on	execution_at
patrioticdeath	act	killed	end	died_patriotically	died_patriotically_on	died_patriotically_at
calligraphy	act	calligraphed	start	wasCalligraphed	calligraphy_on	calligraphy_at
carving	act	carved	start	wasCarved	carving_on	carving_at
composition	act	composed	start	wasComposed	composition_on	composition_at
construction	act	constructed	start	wasConstructed	constructed_on	construction_at
contribution, resource	act	contributed	start	wasContributed	contribution_on	contribution_at
creation	act	created	start	wasCreated	created_on	creation_at
erected	act	erected	start	wasErected	erected_on	erected_at
foundation	act	founded	start	wasFounded	foundation_on	foundation_at
naming	act	named	start	wasNamed	naming_on	naming_at
painting	act	painted	start	wasPainted	painting_on	painting_at
printing	act	printed	start	wasPrinted	printing_on	printing_at
start	act	started	start	wasStarted	start_on	start_at
birth	act	birthed	start	wasBorn	born_on	birth_at
addition	act	added	start, trans	wasAdded, hadAddition	addition_on	addition_at
copy	act	copied	trans	wasCopied	copy_on	copy_at
damage	act	damaged	trans	wasDamaged	damaged_on	damage_at
discovery	act	discovered	trans	wasDiscovered	discovery_on	discovery_at
enlargement	act	enlarged	trans	wasEnlarged	enlargement_on	enlargement_at
excavation	act	excavated	trans	wasExcavated	excavation_on	excavation_at
public presentation	act	presentedPublically	trans	wasPresentedPublically	public presentation_on	public presentation_at
receiving award	act	receivedAward	trans	wasReceived	receiving award_on	receiving award_at
reconstruction	act	reconstructed	start	wasReconstructed	reconstruction_on	reconstruction_at
relocation	act	relocated	trans	wasRelocated	relocation_on	relocation_at
removal	act	removed	trans	wasRemoved	removal_on	removal_at
renaming	act	renamed	trans	wasRenamed	renaming_on	renaming_at
renovation	act	renovated	trans	wasRenovated	renovation_on	renovation_at
repair	act	repaired	trans	wasRepaired	repair_on	repair_at
research	act	researched	trans	wasResearched	research_on	research_at
restoration	act	restored	trans	wasRestored	restoration_on	restoration_at

⁷⁷ Relationships highlighted in green can be used with an actor (person, group, or institution) as the domain, blue can have an intangible or tangible object as its domain, and yellow can be either actor or intangible/tangible object as the domain.

retiling	act	retiled	trans	wasRetailed	retiling_on	retiling_at
robbery	act	robbed	trans	wasRobbed	robbery_on	robbery_at
visit	act	visited	trans	wasVisited	visit_on	visit_at
passing examination	act	passed	trans	wasPassed	passing_on	passing_at
arrest	act	arrested	trans	wasArrested	arrest_on	arrest_at
award	act	awarded	trans	wasAwarded	award_on	award_at
bestowal	act	bestowed	trans	wasBestowed	bestowal_on	bestowal_at
discharge	act	discharged	trans	wasDischarged	discharge_on	discharge_at
exile	act	exiled	trans	wasExiled	exile_on	exile_at
failure in defense against	act	failedToDefendAgainst	trans	wasNotStopped	failInDefenseAgainst_on	failInDefenseAgainst_at
fighting against	act	foughtAgainst	trans	wasFoughtAgainst	fightAgainst_on	fightAgainst_at
imprisonment	act	imprisoned	trans	wasImprisoned	imprisonment_on	imprisonment_at
holding office	act	heldOffice	trans	wasHeldBy	holdingOffice_on	holdingOffice_in
asylum	act	soughtAsylum		-	asylum_on	asylum_at
praise	act	praised	act	wasPraised	praised_on	praised_at
burial	act	allowedRespectfulBurial	act	hadRespectfulBurial	respectfulburial_on	respectfulburial_at
homage	act	paidHomage	act	hadHomagePaid	homagepaid_on	homagepaid_at

VII. Examples of Data-based Heritage Interpretation

This section demonstrates various functions made possible by data-based heritage interpretation through the utilization of the ontology presented in the previous section. The examples presented here are grouped by five ideals of interpretation. The examples will include a description of the nodes, relations and properties as appropriate for each example, screencaps of the Neo4J graph data visualization program into which the data was inputted. Cyphers used to query the example in Neo4J will be provided in the footnotes. The data used for these examples can be accessed online.⁷⁸

1. Improving Accuracy and Clarity

First, measures were put in place to facilitate greater transparency in who is creating and translating the information and what the sources of the information are. Ideally this means that 1) creators and translators feel a greater sense of responsibility for their work (compared to now, when

⁷⁸ Excel files of the data which was used for these examples is available at dh.aks.ac.kr/~lyndsey/wiki. Should there be any problems with accessing the data, please contact the author at lyndseytwining@gmail.com.

they are nameless and unable to be identified), which will improve the accuracy and quality of the information. By including sources, audiences can see where the information came from and draw their own conclusions on the quality of that source, or, if not source is cited or if a relationship is considered “presumed” and not certain, they can be made aware of the fact that the information they are receiving may not be accurate.

If, at the time of node editing or relationship creation, a “meta” relationship is created, which shows who did the editing, when it was edited, which attribute of the node was edited, the ID for the source for the information added or changed in the node (underlined and in bold), then such additions and changes of meanings, relationships, and translations in the database can be tracked.

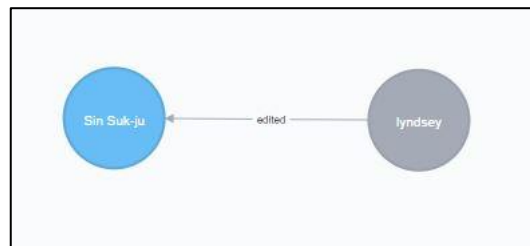


Figure 16 Meta label relationships for transparency⁷⁹

	Domain	Relationship	Range
Label	user	meta	person
Properties	id: lyndsey + others	type: meta_edited, kr: 수정하였다, en: edited, attribute: def_en , ref: RS000001 , user: lyndsey , date: 20170522	en: Sin Suk-ju + others

Unfortunately, it is not possible to create a “meta” relationship to describe the relationships themselves. Therefore, only one source of information for the relationship can be stored as an attribute of relationship, and each time a relationship is edited, the relationship creator and creation date should be updated to reflect the most recent edit.

⁷⁹ Cypher: MATCH (a{ kr:'신숙주'}) MATCH (b{id:'lyndsey'}) CREATE (b)-[r:meta{type:'meta_edited', kr:'수정하였다', en:'edited', attribute:'def_en', ref:'RS000001', create_user:'lyndsey', create_date:'20170522'}]->(a) RETURN r

The following example shows how, using the veracity attribute, one can query any relationships which are considered presumed. Though not shown here, relationships or attributes missing cited sources can also be compiled in a similar way. In this example, it shows that “Cheongjuhyangyo Confucian Academy was founded during the reign of King Taejo,” but that this relationship is presumed and not known for certain. This example also shows the possibility of querying relationships based on relationship properties.

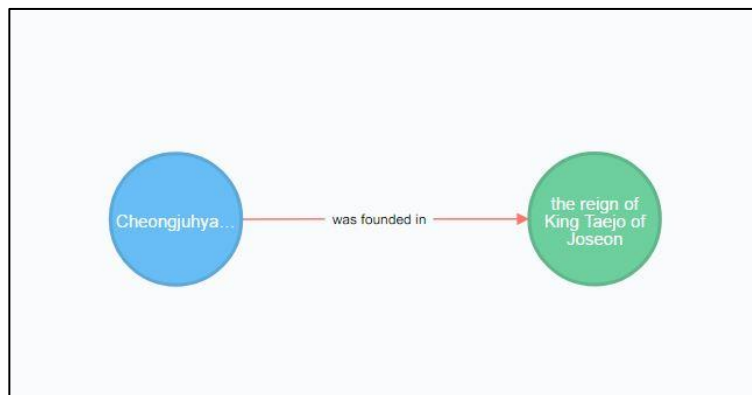


Figure 17 Use of relationship properties to demonstrate veracity of claims⁸⁰

	Domain	Relationship	Range
Label	tangibleobject	start	tempobject
Properties	en: Cheongjuhyanggyo Confucian Academy + others	date: 20170601, ver: <u>C000027</u> , en: was founded in, type: wasFounded, id: rel11035, user: lyndsey	en: the reign of King Taejo + others

Label	concept
Properties	id: <u>C000027</u> en: presumed

⁸⁰ Cypher: MATCH ()-[r]-() MATCH (a{en:'presumed'}) WHERE a.id = r.ver RETURN r

The next example shows a case where there is conflicting information – as shown the example in Section IV.1 The data shows that three different dates are listed for the relocation of Song Sang-hyeon’s tomb from Dongnae to Suui-dong in Cheongju. Since the original texts referenced do not include the primary source from which the information was included, the institution which presented the information was listed instead (CHA or the government of Cheongju). As such, users can only make the determination of which institution is more trustworthy. If the original source had been cited, then users could go and check to see which date is correct, and the incorrect relationships could be deleted.

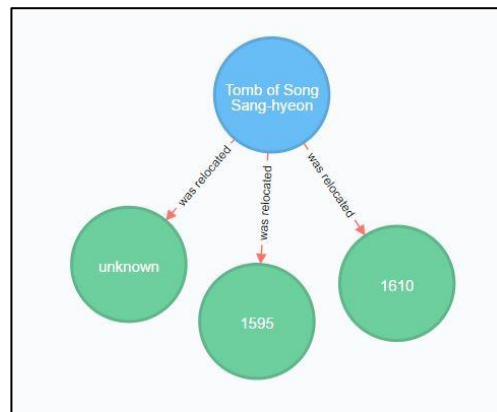


Figure 18 Visualization showing three different dates for the relocation of the Tomb of Song Sang-hyeon⁸¹

```

$ match (a{id:'T000017'})-[r:trans]->(b:tempobject) OPTIONAL match (c) where c.id = r.before OPTIONAL match (d) where d.id = r.ref OPTIONAL match (e) where e.id = r.from

```

HERITAGE	ACTION	FROM	TO	DATE	REF_SOURCE
Tomb of Song Sang-hyeon	was relocated	Dongnaeseong Fortress	Suui-dong	1594	null
Tomb of Song Sang-hyeon	was relocated	Dongnaeseong Fortress	Suui-dong	1610	the government of Cheongju
Tomb of Song Sang-hyeon	was relocated	Dongnaeseong Fortress	Suui-dong	1595	Cultural Heritage Administration

Figure 19 Inconsistencies in dates of events and their source institutions⁸²

⁸¹ Cypher: MATCH (a{id:'T000017'})-[r:trans]->(b:tempobject) OPTIONAL RETURN r

⁸² Cypher: MATCH (a{id:'T000017'})-[r:trans]->(b:tempobject) OPTIONAL MATCH (c) WHERE c.id = r.before OPTIONAL MATCH (d) WHERE d.id = r.ref OPTIONAL MATCH (e) WHERE e.id = r.from OPTIONAL MATCH (f) WHERE f.id = r.to OPTIONAL MATCH (g) WHERE g.id = d.source RETURN a.en as HERITAGE, r.en as ACTION, e.en as FROM, f.en as TO, CASE WHEN b.en = 'unknown' THEN c.en ELSE b.en END as DATE, g.en as REF_SOURCE

	Domain	Relationship	Range
Label	tangibleobject	trans	tempobject
Properties	en: Tomb of Song Sang-hyeon + others	date: 20170601, before: 15940000 , en: was relocated, type: wasRelocated, from: IS000010, to: IS000012 , id: rel11013, user: lyndsey	en: unknown + others
Label	tangibleobject	trans	tempobject
Properties	en: Tomb of Song Sang-hyeon + others	en: was relocated, type: wasRelocated, ref: RS000008, from: IS000010, to: IS000012 , id: rel11015, user: lyndsey	kr: 1595 년, en: 1595, id: 15950000
Label	tangibleobject	trans	tempobject
Properties	en: Tomb of Song Sang-hyeon + others	en: was relocated, type: wasRelocated, ref: RS000007, from: IS000010, to: IS000012 , id: rel11014, user: lyndsey	kr: 1610 년, en: 1610, id: 16100000, reign_en: Gwanghaegun 2, reign_kr: 광해군 2

Relationship Property Above	before	from	to	ref	ref
Label	tempobject	spatialobject	spatialobject	secondaryref	secondaryref
Properties	id: 15940000 en: 1594	id: IS000010 , en: Dongnaeseong Fortress	id: IS000012 , en: Suuidong	id: RS000008 , source: II000005	id: RS000007 , source: II000008

Label	institution	institution
Properties	id: II000008 , en: the government of Cheongju	source: II000005 , en: Cultural Heritage Administration

One of the common messages by heritage interpretation scholars and the CHA is that the message must be understandable to the audience. However, not all audiences have the same background knowledge or learning styles. This ontology allows for the inclusion of explanations for concepts, historical figures, and events as needed (as can be tailored by the audience themselves;

see Figure 5). The ontology also includes, of course, information on dates of creation, transformation, and destruction of heritages, births and deaths, events, etc., which can be conveyed in traditional narrative form via an automatically generated text, or alternatively, in the form of a timeline. This is shown in Figures 2 and 3. Though an example is not presented here, the ontology also includes the ability to convey the layout of buildings and relationships between parts of structures so that in the future this information could be conveyed via automatically generated diagrams (which could be presented in various languages with various labels depending on the settings).

2. Making Interpretation Personalized

This ontology allows for extensive tailoring of the content which is displayed and personalization of how it is displayed. First, because the ontology allows for nodes and relationships to have attributes in in Korean, English, and Chinese characters, users can choose the language in which to display the information or even have a combination of languages (shown below). This extends to choosing to display information on dates (i.e. whether to show solar or lunar calendar dates, whether to include or omit information on reign years like “Taejo 1”), and measurement units (metric versus imperial).

The following example shows how, by utilizing the various properties stored within nodes and relationships, the same information can be conveyed in different languages, including/excluding definition to matching the audience’s needs for understanding, and have said information presented in various forms (text or visualized, for example) so that each audience member has a greater chance of understanding the interpretive information.

Table 24 Domain, relationship, and range for “Cheongjuhyanggo is a Confucian Academy”

	Domain	Relationship	Range
Label	tangibleobject	type	typalconcept
Properties	ch: 淸州鄉校, kr: 淸州향교, en: Cheongjuhyanggyo Local Confucian School, id: TC00002	date: 20170601, kr: ~이다, en: is a, id: rel14176, type: hasType, user: lyndsey	kr: 향교, rr: hyanggyo, mr: hyanggyo, ch: 鄉校, def_en: a local, public Confucian school with a shrine for famous Confucian sages

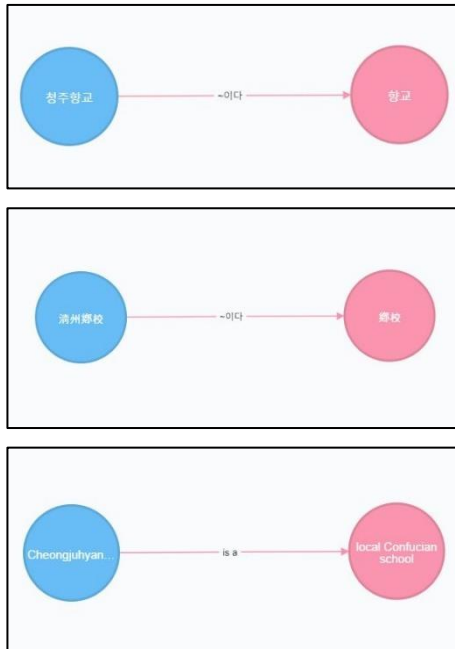


Figure 20 The same nodes and relationships visualized in Korean, Chinese characters, and English⁸³

HERITAGE	'('	CHINESE1	)'	'는'	HANGEUL	RELATION
청주향교	(	清州鄉校	)	는	향교	-이다

HERITAGE	RELATION	ROMANIZATION	'('	HANGEUL	)'	'i.e.'	DEFINITION
Cheongjuhyanggyo Local Confucian School	is a	hyanggyo	(	향교	)	i.e.	a local, public Confucian school with a shrine for famous Confucian sages

HERITAGE	RELATION	DEFINITION
Cheongjuhyanggyo Local Confucian School	is a	a local, public Confucian school with a shrine for famous Confucian sages

Figure 21 Various ways to generate text for different audience needs using the same data⁸⁴

⁸³ Cypher: MATCH (a{kr:'청주향교'})-[r{type:'hasType'}]->(b)

Languages are toggled in the CSS of the page

⁸⁴ Cypher: MATCH (a{kr:'청주향교'})-[r{type:'hasType'}]->(b) RETURN a.kr as HERITAGE,'(', a.ch as CHINESE1,')','는', b.kr as HANGEUL, r.kr as RELATION

Cypher: MATCH (a{kr:'청주향교'})-[r{type:'hasType'}]->(b) RETURN a.en as HERITAGE, r.en as RELATION, b.rr as ROMANIZATION,'(', b.kr as HANGEUL, ')', 'i.e.', b.def_en as DEFINITION

Second, because relationships have labels, users can choose the type of relationships they want to be shown. Maybe someone is interested in history, so they choose to show only the history-related “start,” “trans,” “end,” and “act” labels. Maybe they are only interested in conceptual information and a heritage’s value, and show only “type,” and “value” relations. The ontology also allows for the same tailoring via node labels. Maybe someone is only interested in how this heritage relates to a historical figure, and chooses to show only the relationships between the heritage and the historical figure. This ability to tailor the content which is displayed will be useful for research as well, as academics can choose the kind of relationships between nodes that they which to analyze.

In the following example, we see the network of relationships and nodes connected to the historical figure Sin Suk-ju. The breakdown of the labels of these relationships and nodes are as follows:



Figure 22 All interpretive information on Sin Suk-ju in English⁸⁵

	Domain	Relationship	Range
Label (Quantity)	person	name (3), start (1), end (1), rel (1), type (2), act (2), value (2)	name (3), tempobject (2), group (1), tangible object (2), typal concept (4)

Cypher: MATCH (a{kr:'청주향교'})-[r{type:'hasType'}]->(b) RETURN a.en as HERITAGE, r.en as RELATION, b.def_en as DEFINITION

⁸⁵ Cypher: MATCH (a{kr:'신숙주'})-[r]->(b) RETURN r

However, using different queries, we can choose what information is shown. For example, we can exclude information on the various names Sin Suk-ju had:



Figure 23 Interpretive information on Sin Suk-ju excluding his appellations⁸⁶

	Domain	Relationship	Range
Label (Quantity)	person	start (1), end (1), rel (1), type (2), act (2), value (2)	tempobject (2), group (1), tangible object (2), typal concept (4)

Or, we could alternatively choose to display only the various names he had:

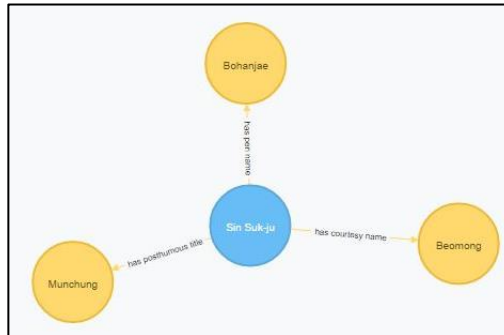


Figure 24 Interpretive information only on Sin Suk-ju's appellations⁸⁷

	Domain	Relationship	Range
Label (Quantity)	person	name (3)	name (3)

⁸⁶ Cypher: MATCH (a{ kr:'신숙주'})-[r]->(b) WHERE not (a-[name]->(b) RETURN r

⁸⁷ Cypher: MATCH (a{ kr:'신숙주'})-[r:name]->(b) RETURN r

Even though the information shown is different, all the data remains – it is just hidden from the sight of the user. This is helpful in creating tailored interpretive texts so that they feature the kind of relationships the user is most interested in – history, artistic qualities, concepts, historical figures, etc., and would also be useful for research.

Third, because graph databases allow for searching of information via relationships, the user can choose the amount of information to be show; they may only want to see the nodes directly connected to a heritage, or they may want to see the nodes related to the nodes related to the heritage. A graph database model allows the user to expand outward to related concepts, which means people who want short interpretations get short interpretations, and those who want detailed ones, get detailed ones.

In the following example, we can see how this depth of information can be tailored. The first example shows the nodes which are connected to Sucheonam Ritual House, Cheongju by just one relationship (node-relationship-node).



Figure 25 Contextual information on Sucheonam Ritual House, Cheongju, alone⁸⁸

⁸⁸ Cypher: MATCH r=(a)-[]-(b) WHERE a.kr = '청주 수천암' RETURN r

However, there are certain elements of the context of Sucheonam Ritual House, Cheongju which would be useful to learn more about in depth – in particular, value-label relationships, which connect heritages to the other nodes which give them their “value” as a cultural heritage. These “value” relations have been made bold blue in Figure 25. In the case of Sucheonam Ritual House, Cheongju, the main value is that it is related to Bak Hun, Buddhist Monk Seonjeong, and other nearby tangible objects. When these secondary value relationships are also included (i.e. the addition of node-value-node-relationship-node), the context is broadened as such:

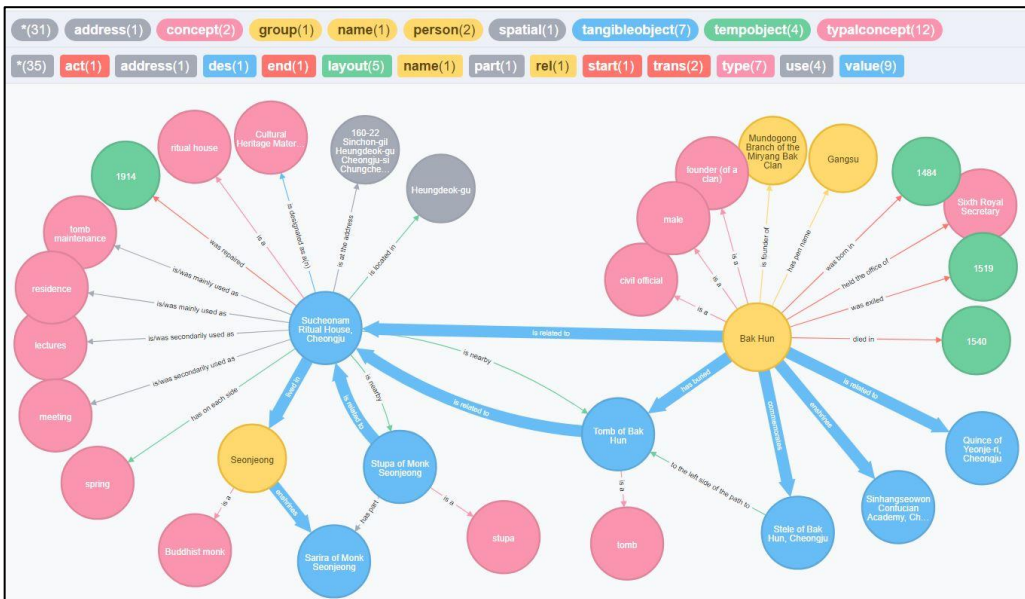


Figure 26 Context of Sucheonam Ritual House, Cheongju and nodes with which it has a value-labeled relationship⁸⁹

As Figure 26 shows, we can also have easy access to further information on the specific contextual elements which give a heritage its value. This could be used not only for heritages, but also depicting the significance of historical figures and historical events. While the examples presented above are visualizations, this ability to control the depth and length of information in text form would also be possible.

⁸⁹ Cypher: MATCH r=(a)-[]-(b) WHERE a.kr = '청주 수천암' OPTIONAL MATCH s=(b)-[]-(c) WHERE (a)-[:value]-(b) RETURN r, s

While the program used for these examples, Neo4J, only facilitates tables (which can mimic automated text) and graph visualization, if other interfaces are developed, the data could be displayed in a variety of ways to meet the learning style and objective of the user. This is especially useful because we cannot know exactly what technology mediums will become popular in the future – these interfaces can be generated when needed as the time comes, while the data can be enriched starting from today.

3. Conveying Not Just the Heritage, But Its Context, Too

This ontology allows for the inclusion of not just heritages, but related contextual elements, including places, historical figures, events, concepts, institutions, and more. Furthermore, it allows for the inclusion of information about the contextual elements themselves. As shown in the examples above with Sin Suk-ju and Sucheonam Ritual House, the ontology can describe and connect contextual elements to one another, regardless of whether they are a heritage or not. In this way, the focus truly becomes the contextual world of Korean cultural heritages, and allows information on heritages to be organized around these contextual elements, not just around physical heritages.

This means that users can search for heritages via very nuanced facets if desired, which is useful in research and in finding related heritages. For example, if users are visiting a heritage and they find a particularly beautiful design on the heritage (maybe a window frame or a painting or a piece of pottery) interested in a particular design on the heritage, they could search for other nearby heritages which feature that design, and be provided with more information on the design itself, as well as information on the location of other heritages which feature that design.

The following example shows all heritages which have the umbrella type “shrine” (i.e. they may have the type “portrait shrine” but that is a subtype of “shrine” in general) and located in Cheongju, with the heritage in which they are located, what kind of shrine they are, their name, and their address listed.

```
$ match (a:tangibleobject)-[:type*1..3]->(b) where b.kr = '사당' match (a)-[*1..4]-(>)
```

	PLACE	TYPE	NAME	ADDRESS
Rows	Gubongyeongdang Shrine	portrait shrine	구봉영당	49-4 Incha3-gil Gadeok-myeon Sangdang-gu Cheongju-si Chungcheongbuk-do
Text	Mukjeongyeongdang Shrine, Cheongju	portrait shrine	청주 목정 영당	71-29 Gwanjeong-gil Nangseong-myeon Sangdang-gu Cheongju-si Chungcheongbuk-do
Code	Cheongjuhyanggyo Local Confucian School	Hall of Achievement	청주향교 대성전	67 Daeseong-dong Sangdang-gu Cheongju-si Chungcheongbuk-do
	Sinhangseowon Confucian Academy, Cheongju	shrine	신향서원 구현사	115-8 Ijeonggol-lo Sangdang-gu Cheongju-si Chungcheongbuk-do

Figure 27 Tangible objects with super type “shrine” in Cheongju⁹⁰

The next example shows a search for heritages which end in ‘-gak 각,’ which is usually translated as pavilion, with their dimensions in *kan*⁹¹ also listed. They are then organized by the heritage of which they are a part, with their type and address included.

```
$ match (a:tangibleobject)-[:type]->(b) where b.kr ENDS WITH '각' match (c)-[:part|:1..
```

	HERITAGE	TYPE	TYPE_KR	FRONT	SIDE
Rows	Commemorative Pavilions for the Yeosan Song Clan, Cheongju	filial pavilion	효열각	1	1
Text	Commemorative Pavilions for the Yeosan Song Clan, Cheongju	filial pavilion	효부각	1	1
Code	Commemorative Pavilions for the Yeosan Song Clan, Cheongju	commemorative pavilion	정려각	3	1
	Stele for Sinhangseowon Confucian Academy, Cheongju	stele pavilion	묘정비각	1	1
	Tomb of Song Sang-hyeon and Stele, Cheongju	stele pavilion	신도비각	1	1
	Stele of Bak Hun, Cheongju	stele pavilion	신도비각	1	1

Figure 28 Tangible objects with ending ‘-gak’ and their dimensions in *kan*⁹²

⁹⁰ Cypher: MATCH (a:tangibleobject)-[:type*1..3]->(b) WHERE b.kr = '사당' MATCH (a)-[*1..4]-(>{kr:'청주시'}) MATCH (a)-[r{type:'hasType'}]->(c) MATCH (a)-[*1..2]->(e:address) RETURN a.en as PLACE, c.en as TYPE, a.kr as NAME, e.en as ADDRESS UNION ALL MATCH (a:tangibleobject)-[:type*1..3]->(b) WHERE b.kr = '사당' MATCH (a)-[*1..4]-(>{kr:'청주시'}) MATCH (a)-[r{type:'hasType'}]->(c) MATCH (f)-[:part]->(a) MATCH (f)-[*1..2]->(e:address) RETURN f.en as PLACE, c.en as TYPE, a.kr as NAME, e.en as ADDRESS

⁹¹ *Kan* 칸 refers to the section between pillars of a structure, and is commonly used as a way to describe the dimensions of wooden structures. Three *kan* across and two *kan* deep would mean a structure with four pillars when seen from the front, and three pillars as seen from the side.

⁹² Cypher: MATCH (a:tangibleobject)-[:type]->(b) WHERE b.kr ENDS WITH '각' MATCH (c)-[:part|:layout]->(a) MATCH (c)-[:des]->(d) MATCH (a)-[t{type:'kan_side'}]->(e) MATCH (a)-

This example is of interest because the on-site interpretive text of the Commemorative Pavilions of Yeosan Song Clan, Cheongju⁹³ makes the claim that one of the pavilions is unique because it is ‘*ilmunsamnyeo*’ – literally ‘one gate, three commemorations.’ This means that three commemorations are included together in one structure, rather than each having their own structure. This pavilions is three *kan* across, and one *kan* deep – while most are one-by-one. By being able to look at the dimensions, we can indeed see that that pavilion stands out as being different from the rest. If the database was enriched with the dimensions of all “-*gak*” pavilions (not just of those of the few included for the sample), we could indeed see in numbers just how uncommon this structure actually is. Though not shown in this example, one could also potentially search for commemorative structures which have more than one commemoration in them (as these are included in the ontology as ‘parts’ or the structure. In other words, by providing information on a single heritage in the context of other similar heritages, claims of being “unique,” or the “oldest” can really be put to the test. Furthermore, if too many of a particular type of heritage are described as “refined” or “exquisite,” we can begin to acknowledge that these words are actually quite meaningless in conveying the value of the heritage and find more useful ways to describe a heritage’s unique artistic qualities.

4. Facilitating Further Engagement

The following examples demonstrate how this ontology can allow for further engagement with Korean cultural heritage interpretive information.

First and foremost, the very nature of the database means that even the general public could potentially contribute to the enrichment of the data, which is one source of potential engagement not currently available. A main target of this kind of engagement are high school and university students who could use the database to search for or analyze existing information and draw new conclusions, or input their own data for their own research purposes. In addition, because of the options for personalization as mentioned above, the public, by tailoring their interpretive resource themselves, are empowered to become more involved with the information itself and are forced to reflect on the information they are receiving, which is not currently possible.

[u {type:'kan_front'}]->(f) RETURN c.en as HERITAGE, b.en AS TYPE, b.kr as TYPE_KR, f.id as FRONT, e.id as SIDE

⁹³ Cheongju City. As uploaded on the Academy of Korean Studies English Interpretive Text Research Team Wiki. Retrieved May 2017 from http://dh.aks.ac.kr/~heritage/wiki/index.php/청주_여산송씨_정려각

In addition to this, there are also particular features of this ontology which directly encourage users to be creative with the interpretive information and seek out further opportunities for engagement – including academic sources, events, or other educational opportunities. For example, one can search for photos (or other mediums such as video, diagrams, etc.) based on a particular concept, time period, etc., and also recall specifically what it depicts and the name of the heritage to which it is related. For example, someone could search for photographs of all wooden structures built in the 17th century and put them in order of date of construction – and literally be able to see the changes in architectural style over time via the photos. Or, if someone does not understand a particular concept (such as a part of a statue or architectural feature), they can pull up all photos which depict that concept in an attempt to better understand it – great for visual learners. This could also be particularly useful for content creators who need to search for photographic references for their work, or academics or educators looking to research or explain differences in features over time or across regions in a visual way.

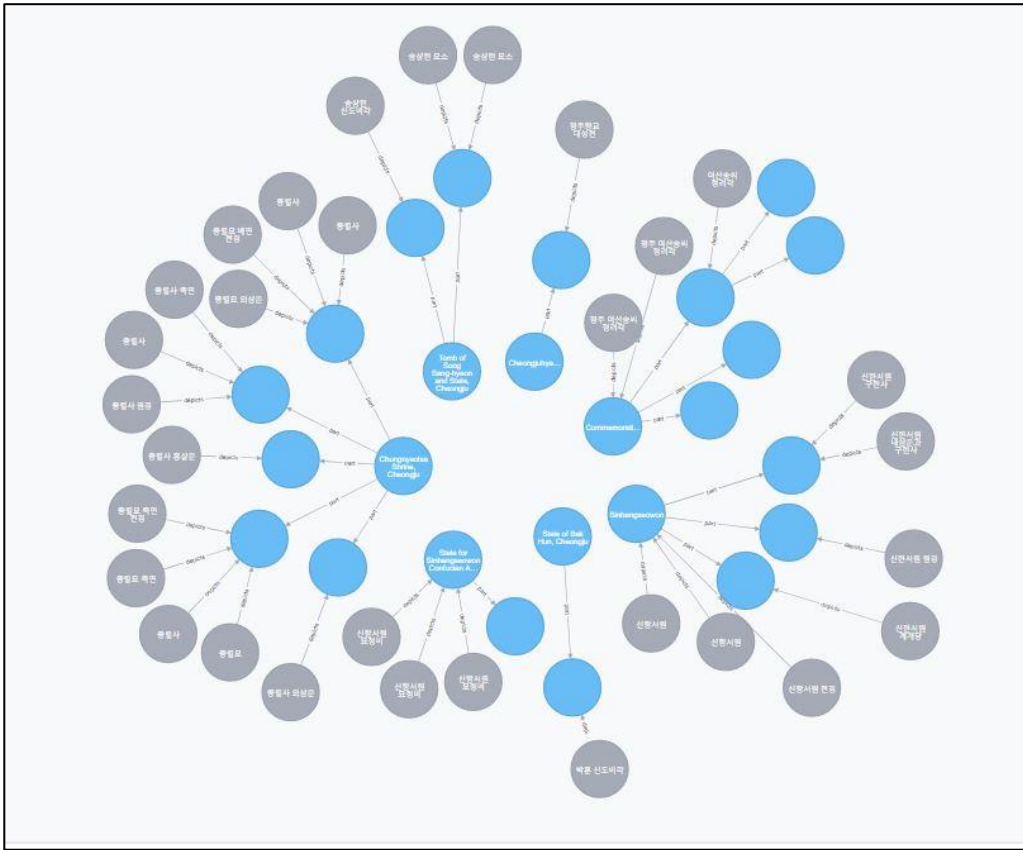


Figure 29 Visualization of all photos and the tangible objects they depict⁹⁴

	Domain	Relationship	Range
Label	primaryres	engage	tangibleobject
Properties	type: CT000142 + others	type: Depicts + others	+ others

Label	typalconcept
Properties	id: CT000142 , en: photo

⁹⁴ Cypher: MATCH p=(n)-[:engage]->(m) MATCH r=(m)-[:part]-(!:tangibleobject) MATCH (q{en:'photo'}) WHERE q.id= n.type RETURN p, r

```
$ match (n)-[p:engage]->(m) match (l:tangibleobject)-[r:part]->(m) match (q{en:'photo'}) where q.id= n.type return l.en as SUPER, m.kr as SUB, n.URI as URL UNION ALL MATCH (n)-[p:engage]->(m) MATCH (m)-[r:part]->(l:tangibleobject) MATCH (q{en:'photo'}) WHERE q.id= n.type RETURN m.en as SUPER, l.kr as SUB, n.URI as URL
```

SUPER	SUB	URL
Stele of Bak Hun, Cheongju	백훈 신도비각	http://www.cha.go.kr/unisearch/images/tangible_cult_prop/1638679.jpg
Cheongjuhyanggyo Local Confucian School	청주향교 대성전	http://www.cha.go.kr/unisearch/images/tangible_cult_prop/1638459.jpg
Sinhangseowon Confucian Academy, Cheongju	신항서원 구현사	http://www.cha.go.kr/unisearch/images/monument/2016012113585504.JPG
Sinhangseowon Confucian Academy, Cheongju	신항서원 구현사	http://www.cha.go.kr/unisearch/images/monument/2016012113585502.JPG
Sinhangseowon Confucian Academy, Cheongju	신항서원 마당	http://www.cha.go.kr/unisearch/images/monument/2016012113585603.JPG
Sinhangseowon Confucian Academy, Cheongju	신항서원 계강담	http://www.cha.go.kr/unisearch/images/monument/2016012113585501.JPG
Tomb of Song Sang-hyeon and Stele, Cheongju	송상현 신도비각	http://www.cha.go.kr/unisearch/images/monument/1649908.jpg
Tomb of Song Sang-hyeon and Stele, Cheongju	송상현 묘소	http://www.cha.go.kr/unisearch/images/monument/1649892.jpg
Tomb of Song Sang-hyeon and Stele, Cheongju	송상현 묘소	http://www.cha.go.kr/unisearch/images/monument/1649900.jpg
Commemorative Pavilions for the Yeosan Song Clan, Cheongju	여산송씨 정려각	http://www.cha.go.kr/unisearch/images/monument/1651624.jpg
Chungnyeolsa Shrine, Cheongju	충렬사 구사당 외삼문	http://www.cha.go.kr/unisearch/images/monument/2016012113585101.JPG
Chungnyeolsa Shrine, Cheongju	충렬사 구사당 외삼문	http://www.cha.go.kr/unisearch/images/monument/2016012113585100.JPG
Chungnyeolsa Shrine, Cheongju	충렬사 구사당 외삼문	http://www.cha.go.kr/unisearch/images/monument/1649296.jpg
Chungnyeolsa Shrine, Cheongju	충렬사 구사당 외삼문	http://www.cha.go.kr/unisearch/images/monument/1649280.jpg
Chungnyeolsa Shrine, Cheongju	충렬사 홍살문	http://www.cha.go.kr/unisearch/images/monument/2016012113585201.JPG
Chungnyeolsa Shrine, Cheongju	충렬사 신사당	http://www.cha.go.kr/unisearch/images/monument/2016012113585202.JPG
Chungnyeolsa Shrine, Cheongju	충렬사 신사당	http://www.cha.go.kr/unisearch/images/monument/2016012113585200.JPG
Chungnyeolsa Shrine, Cheongju	충렬사 신사당	http://www.cha.go.kr/unisearch/images/monument/2016012113585106.JPG

Figure 30 List of heritages, their parts which have photos depicting them, and the photo's URL⁹⁵

	Domain	Relationship	Range
Label	tangibleobject	part	tangibleobject

	Domain	Relationship	Range
Label	primaryres	engage	tangibleobject
Properties	type: <u>CT000142</u> URL: <u>www.example.com</u> + others	type: Depicts + others	+ others

	Domain	Relationship	Range
Label	tangibleobject	type	typalconcept
Properties	+ others	type: hasType + others	+ others

⁹⁵ Cypher: MATCH (n)-[p:engage]->(m) MATCH (l:tangibleobject)-[r:part]->(m) MATCH (q{en:'photo'}) WHERE q.id= n.type RETURN l.en as SUPER, m.kr as SUB, n.URI as URL UNION ALL MATCH (n)-[p:engage]->(m) MATCH (m)-[r:part]->(l:tangibleobject) MATCH (q{en:'photo'}) WHERE q.id= n.type RETURN m.en as SUPER, l.kr as SUB, n.URI as URL

The ontology also allows for discovery of further reading based on topic (which could be a concept, heritage, historical figure, etc.) and language. Because a graph database allows for searching via relationships, even if a further reading resource is directly connected to the “Such-and-Such a Confucian academy” node, not the node for the general concept of Confucian academies, it can still be pulled up when looking for information about Confucian academies in general (and vice versa – further reading on Confucian academies in general can be brought up in relation to a specific heritage). While the examples below show only further reading, if educational events such as lectures or classes are also included, then users could be prompted with information about events related to the heritage they are visiting or researching (for example, a visitor to a Buddhist statue could be linked to events about Buddhist statues or Buddhist art in general).

TOPIC	LANG	URL
Portrait of Sin Suk-ju	English	https://www.khanacademy.org/humanities/art-asia/korea-japan/joseon-dynasty/a/sin-suk-ju
Sinhangseowon Confucian Academy, Cheongju	Korean	http://blog.daum.net/_blog/BlogTypeView.do?blogid=0FRIR&articleno=11295562&categoryid=696631&regdt=20100728075245
Sinhangseowon Confucian Academy, Cheongju	Korean	http://www.cha.go.kr/korea/heritage/search/Culresult_Db_View.jsp?mc=NS_04_03_02&VdkVgwKey=23.00420000.33
Sinhangseowon Confucian Academy, Cheongju	Korean	http://www.seowonheritage.org/%EC%84%9C%EC%9B%90%EC%9C%84%EC%B9%98%EB%8F%84%178-%EC%BB%A0%ED%95%AD%EC%84%9C%EC%9B%90
Chungnyeolsa Shrine, Cheongju	Korean	http://cafe.daum.net/_c21/_bbs_search_read?gpid=1H5X&fidid=K2g&datanum=822&q=%BC%DB%BB%F3%7%F6&_referer=V7ktJwkeLEGMZxGlgqzEmcJAwH12A57KGJCN
Tomb of Song	Korean	http://dh.aks.ac.kr/~heritage/wiki/index.php/%EC%B2%AD%EC%A3%BC_%EC%86%A1%EC%83%81%ED%98%84_%EB%AC%98%EC%86%8C_%EB%B0%8F_%EC%8B%A0%

Figure 31 Example showing further reading sorted by language⁹⁶

	Domain	Relationship	Range
Label	any	engage	digital resource
Properties		type: hasFurtherReading	URI: www.example.com lang: C000031 OR C000032

Label	concept	concept
Properties	id: C000031 , en: Korean	id: C000032 , en: English

⁹⁶ Cypher: MATCH (n)-[p{type:'isFurtherReading'}]->(m) MATCH (l) WHERE l.id = n.lang RETURN m.en as TOPIC, l.en as LANG, n.URI as URL ORDER BY LANG

```
$ match (n)-[p{type:'isFurtherReading'}]->(m) match (l) where l.id = n.lang match (m)-[:type]->(r) where r.kr = '서원' return m.en as TOPIC, l.en as LANG, n.URI as URL ORDER BY LANG
```

TOPIC	LANG	URL
Sinhangseowon Confucian Academy, Cheongju	Korean	http://www.cha.go.kr/korea/heritage/search/Culresult_Db_View.jsp?mc=NS_04_03_02&VdkVgwKey=23,00420000,33
Sinhangseowon Confucian Academy, Cheongju	Korean	http://blog.daum.net/_blog/BlogTypeView.do?blogid=0FFR&artid=11295592&categoryId=69631®dt=20100728075245
Sinhangseowon Confucian Academy, Cheongju	Korean	http://www.seowonheritage.org/%EC%84%9C%EC%9B%90%EC%9C%84%EC%B9%98%EB%84%178-%EC%8B%A0%ED%95%AD%EC%84%9C%EC%9B%90

Figure 32 Example showing further reading related only to heritages which are Confucian academies⁹⁷

	Domain	Relationship	Range
Label	any	engage	digital resource
Properties		type: hasFurtherReading	lang: <u>C000031</u> OR <u>C000032</u>

	Domain	Relationship	Range
Label	any	type	any
Properties		type: hasType	en: Confucian academy

Label	concept	concept
Properties	id: <u>C000031</u> , en: Korean	id: <u>C000032</u> , en: English

In these ways, this ontology goes beyond merely conveying interpretive information itself, but also puts such information into a context of current media and resources which make it much easier for non-experts and non-Koreans, too, to learn more about Korean cultural heritages. The inclusion in the database of media such as dramas and film which depict certain historical figures, places, or events could also be a way to bring Hallyu fans into contact with more academic information related to their media interests, and doing so in their own language (thanks to the translation and explanation features of the ontology), thus creating a bridge between media consumption and meaningful learning and academic research.

⁹⁷ Cypher: MATCH (n)-[p{type:'isFurtherReading'}]->(m) MATCH (l) WHERE l.id = n.lang MATCH (m)-[:type]->(r) WHERE r.kr = '서원' RETURN m.en as TOPIC, l.en as LANG, n.URI as URL ORDER BY LANG

5. Ensuring Long-term Sustainability and Innovation

This section does not include any additional examples from the ontology because the sustainability and innovation functions have been shown through the prior examples. As shown above, the data and the interface are separate. Therefore, various interfaces can be developed to access the data in a way which does not affect the data itself, while the database can be continually enriched with more nodes, relations, translation, definitions, etc., so that the content as presented via the interface is more in depth. Furthermore, nodes, relationships, and the information contained there within can be reutilized, which means that the creation of the node and its attributes (translation, Romanization, definition, etc.) need be created only once, which reduces work in the long run. For the same reason, resources can be focused on enriching the data – adding more translations, more sources, more definitions, more relationships – rather than re-defining or re-translating nodes, or re-explaining relationships between nodes. However, unlike interpretive texts and other narrative-based interpretive mediums, because it is a database and accessed via an interface, even if data is enriched with hundreds of thousands of nodes and relationships, it does not mean that the user will be overwhelmed with too much data, because the user can select the depth and type of content they are shown.

Another benefit of this model is that information can be searched for in Korean, and displayed in English, and vice-versa. If one takes a look at the Cyphers shown in for the examples in this section, there are times when data was queries in Korean, but returned in English. If the terms have been translated once, then Korean educators, for example, can curate countless contextual “stories”– particular collections of nodes and relations - using visualization or automated text, and these can be displayed for English-speaking audiences, even if the creator of the story themselves does not speak English. This is shown in the various examples above where the query includes a term in Korean, but the results appear in English. This means more content about Korean cultural heritages can be made by Koreans for people who do not speak Korean. Furthermore, Koreans can see what areas interest non-Korean speakers by looking at the “stories” non-Koreans create.

In addition, the database plus interface design allows for potential contributions from the public – both in terms of database enrichment and interface design. For example, even university students who are not native Korean speakers could use the database as a platform to input, analyze, and display data from English-language academic sources on a particular Korean cultural heritage related topic they are interested in for a class project. Students could also engage in learn-by-doing educational activities by researching existing definitions and translations, citing them, and adding

them to the database. Korean academics can also input information for their own research purposes, and since they are likely reusing nodes which have already been translated before and which have definitions, non-experts and non-Korean speakers can better understand the academic's contributions without the academic having to make separate efforts to do so. The database could also be used simply as a glossary for translation. In this way, even personal uses of the database which lead to enriched data will benefit other users and the public. The information might have been initially added for the purpose of interpretation of heritages, but researchers can later use that information for these kinds of research purposes. Or vice-versa, information added for academic purposes can later be used for interpretation. In this way, you get more 'bang for your buck' when compared to current interpretive resources which can only be consumed passively. This approach to heritage interpretation allows for interpretive resources (in the traditional sense), plus a platform for research, plus a platform for translation, plus a platform for education. In this way, the heritage interpretation becomes more sustainable in that it minimizes redundant effort and allows for innovation – both in terms of data enrichment and interface design.

VIII. Conclusion

This thesis has presented a schema for evaluating and improving heritage interpretation in the form of the five ideals of heritage interpretation, surveyed, evaluated and suggested improvements for current Korean cultural heritage interpretation resources, processes, and content, and demonstrated the possibilities of data-based heritage interpretation as a solution to the weaknesses of current Korean cultural heritage interpretation through the design and implementation of an ontology suitable to a labeled property graph. It contributes to the fields of heritage interpretation, digital humanities, and Korean studies in various respects.

First, the ideals of heritage interpretation presented in this thesis, though founded in prior scholarship, consider a broader conception of heritage interpretation than existing definitions and principles, and therefore can be used as evaluative yardsticks for a wider variety of interpretive resources. They are not specific prescriptions of how heritage interpretation must be done, and therefore can be realized in a variety of ways which take into consideration the unique circumstances (i.e. the nature of the interpretive information, financial and human resources available, current technological infrastructure, etc.) of each institution and individual implementing them as evaluative criteria. Therefore, these ideals will be useful for continued innovation of heritage interpretation resources and processes, not only in Korea, but anywhere in the world.

Second, this thesis surveyed and evaluated current Korean cultural heritage interpretive resources, processes and content to a greater extent than prior research. Prior research had investigated grammatical errors, inconsistencies, in the content and translations of interpretive texts, surveyed some online interpretive resources, or made prescriptive and broad suggestions for the content of interpretive texts. This thesis went beyond such research – analyzing with greater depth a wider variety of available interpretive resources, breaking down by heritage type the specific elements and structures commonly found in interpretive texts, as well as explaining the process by which interpretive texts are created and translated by local governments. The thesis also presented an abbreviated translation of the guidelines of heritage interpretation as provided by the CHA.

This research will be useful to the CHA and local governments, which may be able to more clearly understand the nature of the interpretation work they are attempting to do, as well as the fundamental changes in structure and mindset which need to be made to solve current shortcomings and make future improvements. It may also put greater pressure on the organization to make such changes if the public and scholars abroad are made aware of the many problems with current interpretive resources. In addition, though but a byproduct of the process of evaluating the current status of Korean cultural heritage interpretations, the overview of currently available interpretive resources and the breakdown of content in interpretive texts will aid those interested in traditional Korean culture and history – be they tourists, content creators, students, or scholars – in gaining a better understanding of the kind of resources available. As mentioned in the thesis, these resources (both online and offline) are unfortunately separated by institution, and not well linked to, advertised, or explained, which are speedbumps in the discovery and utilization of such potentially useful resources.

Third, the development of an ontology and examples of its implementation demonstrate how interpretive information can be turned into data yet still convey its full context. In this researcher's anecdotal experience, there is a general perception that somehow the complexity of the historical and cultural content contained in interpretive resources could not possibly be conveyed through data, nor could such data be used as the basis of meaningful interpretive resources. As will be discussed below, there are still many improvements which need to be made to the ontology, as well as further research into the way to use algorithms and interfaces to turn data into interpretive resources, in order to create an ontology – and by extension, data-based interpretive resources – which convey the context with the highest fidelity possible. However, even the crude, preliminary examples shown in this thesis demonstrate that complex concepts, events, objects, and their

relationships to one another can be stored as data and transformed into various presentation forms which convey nearly the same nuance seen in interpretive texts, while facilitating a level of personalization of content and display which is simply not possible with interpretive texts written by humans. Previous ontologies as introduced in this thesis had only developed ontologies or data models with the objective to describe the interpretive information and use it as data, not reutilize it in interpretive resources. In this respect, this thesis makes unique contributions to the investigation of how to design a database which does not exist merely as a database, but can be reutilized into a variety of resources. Thus, this ontology opens doors for future Korean studies research, education, content creation, etc. resources, while also more broadly aiding other digital humanities scholars in non-Korea, non-heritage interpretation areas in the development of ontologies which can be reutilized in resource generation.

However, there are, of course, various limitations of this research. First, although the researcher thoroughly reviewed existing heritage interpretation definitions and principles to the best of her ability distill the five ideals of interpretation presented in this thesis, there may be other ideals, or other ways of conceptualizing such qualities interpretation should strive to embody. Further research on this front may help to develop better criteria with which to review and improve interpretive resources. In particular, the conceptualization of heritage and heritage interpretation is limited to Western sources, while there is no consideration given to the influence of Japanese or industrialization-era conceptions of heritage in Korea today. In the future, further investigation should also be made regarding Joseon-era ideas of cultural heritage and historical sites.⁹⁸

Second, while this thesis surveyed various interpretive resources, the process by which interpretive texts in particular are created and translated, and the content of select on-site interpretive texts, this review could have been more extensive in regard to the scope of heritages types and resource types reviewed. As mentioned, there was particular difficulty in getting verifiable information on the interpretive resource creation process, and this could be an area of further investigation. There is also a need to investigate the status of interpretive resources for a wider variety of heritages, including museum artifacts and intangible heritages.

Third, the ontology presented in this thesis has various weaknesses which needs to be improved before it can be realistically implemented. Most urgently, there needs to be further research on how to represent more complex relationships via a graph database, which are not simple “A has type B” relationships, but are “A visited B sometime between C1 and C2 with D

⁹⁸ Thanks to Prof. Milan Hejzmanek for insight into this shortcoming.

because of E which led to F” and so on. The ontology presented in this thesis does successfully utilize relationship properties and node IDs to convey these various prepositional modifications to actions in ways which allow the node properties to be reutilized in query results. However, this information is currently very difficult to query due to the fact that the particular prepositional properties and the labels of their contents stored in each relationship vary from case to case; there is no single straightforward query to cover all relationships. Furthermore, there is no way to include a reference or meta information (i.e. who added/edited it, when it was added/edited) for each of the various prepositional properties in a relationship; Currently, only one reference and one meta-information can be stored for each relationship. These prepositional properties could be stored each as separate relationships, but that raises the question of how to link together those various relationships to show that they are related to the same central relationship. Furthermore, this adds to the number of relationships in the database, which may avoidably add to the size of the database. Therefore, further testing of the ontology to uncover the most data-efficient and easily query-able model must be undertaken.

In addition, further research of interpretive resources for a broader range of heritages should be undertaken to better grasp the nature of the contextual elements and their relationships to one another. Following this, testing with test users regarding what kind of information they would want to filter would also help refine labels and relationship types to maximize real-world usability.

Furthermore, a key potential benefit of such a data-based heritage interpretation is the incorporation of the various contextual elements and relations into the larger Semantic Web. However, since the Semantic Web is based on RDF/OWL, research to see if this ontology can be represented in RDF, not just as a labeled property graph, is needed. Furthermore, identification and reutilization of equivalent properties and relationships in other widely used data models and ontologies, such as EDM and LIDO, will further facilitate the incorporation of such a database’s contents into the larger world of cultural heritage data.

Fourth, some features of data-based heritage interpretation and the ontology presented in this thesis which had been mentioned in the thesis do not have examples in Section VII due to limited space in an already lengthy thesis. In future research, additional examples should be included to demonstrate the full range of ways in which these approaches specifically address the current weaknesses of Korean cultural heritage interpretations and more fully realize the five ideals of interpretation.

In addition to addressing the weaknesses in this thesis, there are various steps that must be taken looking forward in order to bring the ideas presented in this thesis into reality. One of the main downsides of data-based heritage interpretation is that it requires large-scale, long-term oversight by an institution which has the financial resources to facilitate it – unlike interpretive texts which can be created in a relatively short time and then forgotten about (see Kim et al 2016, 189). An institution in charge of such a database would need the authority to establish standard process which could be followed by all the other organizations that would contribute to and utilize the database. This likely means that such an institution would need to be a government institution, though possibly academic or private. As mentioned throughout this thesis, the South Korean government’s rotational bureaucratic system does not lend itself to successfully seeing-through such long-term projects which require skilled human resources. Therefore, figuring out what kind of institution could successfully spearhead such a project and what relationship said institution has with the South Korean government will need to be considered in-depth before actually beginning such an undertaking. Otherwise, the dream of data-based heritage interpretation may be doomed to meet an early death – not due to any fundamental problem with the concept of data-based heritage interpretation itself, but due to a mishandling of its implementation.

While the financial and authoritative capabilities for the facilitation of data-based interpretation lie in the hands of such institutions, without preliminary research such as that presented in this thesis, such innovations in heritage interpretation would not be developed, precisely because of the bureaucratic divisions which lead to a lack of innovation in heritage interpretation as discussed in Sections III.2. and IV. However, this researcher believes that a mere ontology or database model will not persuade such institutions to see the benefits of data-based interpretation. To persuade such institutions, the development of a functioning and visually pleasing interface that allows non-tech-savvy individuals to input, filter, search, analyze and transform the data into interpretive resources of various forms (visualizations, text, timelines, tables, diagrams and more) will be crucial. The development of such interfaces also naturally requires research of potential users, their motivations, and the way they actually use such interfaces.

Another issue which will need to be settled will deal with standardizing the process by which information is added to the database. This issue is related to questions raised by Staiff (2016) in the context of the democratization of heritage:

“Will [democratization of heritage] empower the powerless or does it marginalize professional expertise? Does it rupture the continuum between the knowledge generated by archaeologists, historians, art historians, ecologists and conservators, on the one hand, and the interpretation/experience of visitors on the other hand? Who ‘owns’ the content of the interpretation? How will we deal with ‘authoritative’ narratives and the unauthorized narratives that Web-shrewd visitors... may generate and that may or may not have veracity?” (loc. 2892).

While government or academic institutions have the obligation and financial/bureaucratic power to develop better interpretive resources for the public, it is the very people in charge of such organizations – bureaucrats and academics – who may have the most resistance to the idea of data-based heritage interpretation. They may see such an approach as a direct challenge to “the authorized voices of heritage specialists and the highly regulated and controlled canons of masterworks subject to protection regimes,” and be “concerned about not ‘letting go,’...more interested in protecting their professional practices,” (Staiff 2016, loc. 2960; 2892). These parties, even if not oppositional due to a desire to protect their authority and control messages, may also be simply unfamiliar with digital technology, rendering them unable to imagine the benefits of digital and data-based methods. Therefore, navigating this kind of opposition and ignorance may become a key task in the realization of data-based heritage interpretation.

By extension, such individuals may have strong opinions regarding the qualifications of those who can manipulate and access the data in the database, as well as processes for fact-checking information and proofing translations. Despite the fact that current heritage interpretations have abysmal quality control, such a database model where information is centralized may lead some to argue that only academics and professionals should be able to enter data. There is also a risk of possible censorship of certain facts which run counter to the desired narrative of the government or private owners of heritages. In an effort to empower non-experts (such as civil officials and local citizens, both of Korea and other countries) to input diverse data that is meaningful to them while also ensuring the accuracy and quality of said data, the ontology presented in this thesis includes features to identify the creators and editors of information in the database, as well as ways to include references and inform users when information is not verified but merely presumed, so that users are empowered to make their own judgements on veracity. Furthermore, whether data is immediately added to the database (and fixed later if there are problems), or whether data

undergoes a basic fact-checking and proofreading protocol first before being officially added to the database, etc., also would need to be decided upon.

However, any difficulties in navigating such details and convincing overprotective authorities will be worthwhile in the long run. Data-based heritage interpretation will provide new pathways to meaningful and creative engagement with Korean traditional culture for an active, diverse, and global public. As alluded to in Section II.2, data-based heritage interpretation is not meant to be a complete replacement for “analog” pathways to interpretive information, such as personal introductions to Korean cultural heritages and experiencing them in “real life” – whether that be at a heritage site or a museum. An algorithm-based suggestion for a heritage site may not have the same emotional impact as the recommendation of a dear friend, and the experience of a heritage via a virtual reality medium cannot (yet) compare to the visceral experience of seeing and experiencing both tangible and intangible cultural heritage in person. Instead, we must remember that the data-based perspective toward heritage interpretation is not a direct substitute for traditional (i.e. analog, one-directional, narrative) interpretation methods, but rather meant to 1) address the otherwise un-addressable shortcomings of such methods (such as access for people who cannot visit in person, physical limitations of content length, depth, and personalization, multi-functional usability of interpretive information, etc., as mentioned throughout this thesis) and 2) simultaneously act as a platform not only for heritage interpretation in its traditional sense of “educating the public,” but also for academic research, student-led research and exploration, and creative content sourcing and creation.

Data-based heritage interpretation is aimed at minimizing redundancy while maximizing automation where possible, which can then free up human resources to focus on those elements of interpretation which need a human touch - such as methodology research, fine-tuning of content and processes, and person-to-person connections. In this way, the database (and the algorithms and interfaces via which it is manifested into content) serves not only to facilitate more personalized and contextualized content which can be used for multiple purposes and can adapt to changing technology, but more fundamentally to improve efficiency for more sustainable and innovative heritage interpretation. Indeed, by minimizing redundancy and automating content creation, a data-based approach to heritage interpretation may, in the long run, ultimately free up more time and energy to spend in improving the analog heritage interpretation experience than is currently available.

Though the upfront investment to develop a database and the interfaces to go along with it may be significant, the database can be enriched far into the future, ultimately becoming key resource for scholarly research in addition to its use as a tool of heritage interpretation, while new interfaces with which to access and present the data can continue to be developed as technological trends change. In the future, such a database could, and should, be expanded to include not just heritage of South Korea, but that in North Korea, China, and other sites of Korean diaspora. Combined with virtual or augmented reality technology, such a database could allow us to step back into time and venture into ‘physical’ places we cannot access in real life for practical or political reasons. Through the connections stored within the database itself, we can render and make accessible the past as a part of the present rather than relegating it to the confines of archives and museums, allowing us to better understand how it matters to our contemporary, everyday life. By minimizing the gap between the superficial consumption of “traditional Korean” culture and the complex, ever-negotiated context of Korean heritages, data-based heritage interpretation not only prompts audiences to reflect upon how Korean tradition and heritage has a place in their lives today, but brings non-academics closer to the world of Korean studies. It is by bridging these kinds of divides in ways that are relevant to the present and considerate of the future that Korean tradition and Korean studies will continue to be meaningful to people long into the future.

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한국학중앙연구원 한국학대학원
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본 논문은 디지털 시대에 문화유산 해설의 가능성을 어떻게 극대화할 수 있는지에 대해 답변하고자 한다. 한국의 문화유산 해설이 현재 어떻게 이루어지고 있는지 살펴보고 해설의 목적을 더 잘 달성하게 하는 미래의 모델을 제시함으로써 이 질문에 응답하고자 한다. 구체적으로, 본 논문에서는 문화유산 해설의 개념을 정의하고 해설의 중심이 되는 다섯 가지의 기준을 선정한다. 이 다섯 가지 기준으로 현대의 한국 문화유산 해설 콘텐츠를 평가하고 데이터 기반의 관점으로 이 기준들을 바라보았을 때 접근하는 방법들을 고려한다. 마지막으로 현재 한국문화유산 해설의 약점과 한계를 고려하고 해설의 목적을 더 잘 달성하게 하는 디지털 기술의 가능성을 고려함으로써 링크드 데이터 온톨로지를 설계하여 제시한다.

수년 간 많은 전문가들이 문화유산 해설(heritage interpretation)을 정의해 왔다. 이 여러 정의에 대한 검토를 바탕으로 본 논문에서 해설문 콘텐츠의 적절성을 평가하기 위하여 콘텐츠가 명확한지(clear/accurate), 맞춤형이 가능한지(personalized/tailored), 맥락화된·전체론적인지(contextualized/holistic), 이차적

행위를 가능하게 하는지(facilitates engagement), 그리고 지속·혁신이 가능한지(sustainable/innovative) 등 다섯 가지의 기준(interpretive ideals)을 선정하였다.

현재 한국의 국가지정문화재, 시도지정문화재, 등록문화재 등에 속하는 문화유산은 약 13,000 여 개에 달하고 한국은 44 개의 문화유산이 유네스코에 등재되어 있다. 따라서 문화유산 현장에 설치된 물리적 안내판 외에도 온라인 해설문이나 문화유산해설사 투어, 모바일 앱, 체험 행사 등 한국의 문화유산을 소개하기 위한 다양한 유형의 콘텐츠가 지속적으로 만들어지고 제공되고 있다. 그러나 이 해설과 해설의 번역은 상당한 비판을 받고 있다. 선행 연구에서는 이 비판할 점들이 지적되었지만 더 나은 방법론을 제시하는 연구가 미흡하다. 따라서 본 논문에서는 한국 문화유산 해설 문제의 본질을 이해하기 위해 현재 제공된 해설 자원과 해설문 작성·번역 과정, 해설문 내용을 소개하고 다섯 가지의 해설 기준으로 평가하였으며 평가 결과, 현재의 해설 방법과 형태는 위의 다섯 가지 기준에서 보았을 때 모두 매우 부족한 것으로 나타났다.

이러한 문제를 해소하기 위하여, 본 논문은 데이터에 기반을 둔 방안을 제안한다. 이 방안은 디지털 인문학(digital humanities)과 시맨틱웹(semantic web)의 개념들에 기반을 둔다. 문화유산에 대한 정보를 각 유물에 대한 설명문으로 저장하기보다는 모든 문화유산들의 문맥요소(즉, 문화유산과 관련한 인물, 장소, 개념, 사건 등)와 그 요소들의 관계들을 링크드 데이터로 저장하는 방법의 가능성을 고려한다. 이러한 데이터 기반의 방식이 해설의 목적을 제대로 달성하였는지 평가하고 기존 방식과의 차이를 비교하기 위하여, 문화유산과 관련한 주제에 대한 링크드 데이터 모델 사전 사례들을 검토하며 이 방안을 다섯 가지의 기준으로 평가한다.

이러한 해설 방법이 실제적으로 작동되는 사례를 보이기 위하여 분류된 속성 그래프(labeled property graph) 기반으로 한 온톨로지를 설계한다. 이 온톨로지는 현장 문화유산과 관련한 해설문 내용의 검토를 바탕으로 한다. 설계 전략은 다섯 가지의 해설 기준과, 현대 해설 과정의 한계, 데이터의 잠재적 미래 응용을 고려한다. 예를 들어 중복 번역·설명을 완화시키고 검색·분석 기능을 향상시키기 위해

노드속성(node property)보다 관계(relationship)를 선호하는 것과 출처와 기여자에 대한 명료성을 가능하도록 데이터를 정리하는 것, 개념 간의 관계를 강화시키는 것과 같은 전략들을 포함한다.

마지막으로는 본 논문에서 제시된 온톨로지를 바탕으로 각 해설 기준에 대한 예시를 보여준다. 이 예시들을 통해 데이터 기반으로 문화유산 해설을 접근하는 것은 현재 한국 문화유산 해설 콘텐츠가 지닌 약점과 한계에 대한 해결책을 제시하고, 디지털 환경의 가능성을 문화유산 해설의 기본 목적을 달성하기 위해 이용할 수 있다는 것을 보여주는 것이다.

주제어 : 문화유산 해설, 해설문, 문화유산, 문화재, 문화재청, 한국문화유산, 한국학, 국제한국학, 온톨로지, 디지털 인문학, 번역, 콘텐츠

Appendix

Table 25 Descriptions of and links to Korean cultural heritage online interpretive resources

Site Name	Org	Description	URL
3D Content	KCI SA	603 3D renderings of cultural heritage related items; searchable by keyword or browsable by the following categories: fashion, lifestyle item, interior design, tourism or exhibit, stationary, kitchen, education; includes rendered file and information on origin/period, material, use, owner, and a description.	http://www.culture.go.kr/industry/content3dList.do
Bulguksa Temple in my hands	CHA	In My Hands Mobile App Series; Includes basic information on sightseeing, cultural treasures, the local area, and a gallery; Includes three options for an AV guide - normal mode, time travel, and experience travel, which includes tour courses shown on an interactive map, animations, photos, audio, text, navigation, and image tracking; Includes options for posting to SNS, saving favorite cultural heritages, and making reports.	https://itunes.apple.com/us/app/bulguksa-temple-in-my-hands/id948488678?mt=8
CHA Cultural Heritage Search	CHA	Search can be sorted by title, date, and relevance. Can only search by keyword and can only filter by designation type.	http://search.cha.go.kr
CHA Digital Library	CHA	Portal to the various CHA institution library pages; the main CHA library includes 62,501 materials; searchable and browsable alphabetically, by material type, and by material topic; some are available for viewing online	http://library.cha.go.kr/
Changdeokgung	CHA	Theme service on Changdeokgung Palace including tourist information, information on events, educational content on history and buildings, links to related publications.	http://www.cdg.go.kr
ChangDeokGung in my hands	CHA	In My Hands Mobile App Series; Includes basic information on sightseeing, cultural treasures, the local area, and a gallery; Includes three options for an AV guide - normal mode, time travel, and experience travel, which includes tour courses shown on an interactive map, animations, photos, audio, text, navigation, and image tracking; Includes options for posting to SNS, saving favorite cultural heritages, and making reports.	https://itunes.apple.com/us/app/changdeokgung-in-my-hands/id476526280?mt=8
Changgyeonggung	CHA	Theme service on Changgyeonggung Palace including tourist information, information on events, educational content on history and buildings, links to related publications.	http://cgg.cha.go.kr
ChangGyeongGung in my hands	CHA	In My Hands Mobile App Series; Includes basic information on sightseeing, cultural treasures, the local area, and a gallery; Includes three options for an AV guide - normal mode, time travel, and experience travel, which includes tour courses shown on an interactive map, animations, photos, audio, text, navigation, and image tracking; Includes options for posting to SNS, saving favorite cultural heritages, and making reports.	https://itunes.apple.com/us/app/changgyeonggung-in-my-hands/id1077231845?mt=8
Children and Youth Cultural Heritage Administration	CHA	Educational information on various themes relating to cultural heritage targeted at children	http://kids.cha.go.kr/depart/KidsIndex.action
Comprehensive Information System of Korean Historical Figures	AKS	A digital encyclopedia of historical figures throughout Korean history; Some search results are hosted directly on the service while others links to entries in the Encyclopedia of Korean Culture; Can search and browse by various names (pen names, courtesy names, posthumous names, etc.); Additional glossaries of surnames and clans, government positions, civil service examinations, etc.; While the content is not directly related to cultural heritages, many cultural heritages gain their value from their relation to historical figures, and therefore, the information provided on this site serves as key contextual element information.	http://people.aks.ac.kr

Cultural Heritage Administration English Site	CHA	This is the English site for the CHA. It is entirely different in design and content from the main CHA site (and the Japanese and Chinese language sites which are different from the main CHA site, but the same as each other). It includes a heritage search feature for state-designated cultural heritages which bring up interpretive texts in English along with photos; The search feature includes the following filters: Location, Age (Period), and Designation Type, Number, and Year; There is basic interpretive information on the royal palaces, royal tombs, and UNESCO World Heritages.	http://www.cha.go.kr/cha/idx/SubIndex.do?mn=EN
Cultural Heritage Digital Hub	CHA	This service is mainly an improved version of the CHA Heritage Search, allowing for advanced search with filters, displaying search results for cultural heritages, photos, videos, diagrams and 3D, survey and research materials, and results from external institutions. Searches can be filtered by designation type, heritage type, region, and period and also automatically generates related heritages based on how many of these categories are shared in common. It presents the search and filter options in a more visual format. It also provides theme content, including articles and e-books, on various representative regional cultural heritages and “storytelling travel,” and more. The interface is entirely in Korean, but the metadata and interpretive texts are pulled from each of the Korean, English, Japanese, and Chinese CHA websites when available; It may also be useful to note that as of publication, this service is not promoted on the CHA homepage.	http://hub.cha.go.kr
Cultural Heritage GIS Service	CHA	Searchable map service of cultural heritages; Also includes pre-curated theme maps	http://gis-heritage.go.kr/
Cultural Heritage Research Knowledge Portal	NRI CH	Can search by medium, topic, or cultural heritage; Includes academic resources, 3D, diagrams, maps, video, audio, photo content on a wide range of topics relating to cultural heritages;	http://portal.nrich.go.kr/kor/index.do
Cultural Heritage Survey National Treasure Smart App	CHA	This app includes photo, text, and audio content on national treasures; Can be searched by keyword or browsed by heritage type.	https://apkpure.com/%EB%AC%B8%ED%99%94%EC%9E%AC%E B%8C%80%EA%B4%80-%EA%B5%AD%E B%B3%B4-%EC%8A%A4%EB%A7%88%ED%8A%B8%EC%95%B1/gov.cha.heritage
Culturing	KOC CA	“History and Culture Portal for Creators;” Tag-based contents library of image (317,146), video (15,829), audio (13,401), and text (?) content available for reuse for educational purposes; search by content topic or type; pre-curated content including tag stories and tag tree map features; creative consulting	http://www.culturing.kr
Daum Cultural Heritage Map	Daum	State-designated cultural heritages; Korean name, designation and number, period, description and photo	http://place.map.daum.net/heritage
Deoksugung	CHA	Theme service on Deoksugung Palace including tourist information, information on events, educational content on history and buildings, links to related publications.	http://www.deoksugung.go.kr/
Deoksugung, in My Hands	CHA	In My Hands Mobile App Series; Includes basic information on sightseeing, cultural treasures, the local area, and a gallery; Includes three options for an AV guide - normal mode, time travel, and experience travel, which includes tour courses shown on an interactive map, animations, photos, audio, text, navigation, and image tracking; Includes options for posting to SNS, saving favorite cultural heritages, and making reports.	https://itunes.apple.com/us/app/deoksugung-in-my-hands/id569417760?mt=8
Digital Local Culture Encyclopedia of Korea	AKS	A digital encyclopedia featuring articles and media content on a variety of topics relating to local Korean culture, among which are topics which relate to cultural heritage; includes directories (searchable by field, type, and period), indexes (on	www.grandculture.net/

		people, geographical/organization names, and books/art), a map, a timeline, and media content (including photo, video, audio, tables, graphs, and animation); Individual articles include metadata, text, media content, article author, and references, and include some links to related articles; The English version of the site is an abbreviated version of the Korean one	
Encyclopedia of Korean Culture	AKS	A digital encyclopedia featuring articles and media content on a variety of topics relating to Korean history and culture, among which are topics which relate to cultural heritage; includes directories (searchable by field, type, and period), indexes (on people, geographical/organization names, and books/art), searchable bibliography of reference materials, theme-based content, and media content (including photo, video, audio, tables, graphs, and animation); Individual articles include metadata, text, media content, article author, and references.	https://encykorea.aks.ac.kr/
Gyeongbokgung	CHA	Theme service on Gyeongbokgung Palace including tourist information, information on events, educational content on history and buildings, children's education content with quizzes, links to related publications.	http://www.royalpalace.go.kr
Gyeongbokgung, in My Hands	CHA	In My Hands Mobile App Series; Includes basic information on sightseeing, cultural treasures, the local area, and a gallery; Includes three options for an AV guide - normal mode, time travel, and experience travel, which includes tour courses shown on an interactive map, animations, photos, audio, text, navigation, and image tracking; Includes options for posting to SNS, saving favorite cultural heritages, and making reports.	https://itunes.apple.com/us/app/gyeongbokgung-g-in-my-hands/id802897053?mt=8
Heritage Terminology Dictionary	CHA	Includes 1,803 terms relating to cultural heritages in Korean and Chinese characters along with a definition of the term; can browse alphabetically or search for a particular term.	http://www.cha.go.kr/dic/selectDictionList.do?mn=NS_04_02_05
Heritage Type-based Search	CHA	Can retrieve a list of heritages by heritage type and sub-type (main types include historical site structure, artifact, documentary heritage, intangible heritage, natural heritage); can run a term-based search within the type-based heritage list; can download search results via Excel including designation type and number, heritage name in Korean and Chinese, region, address, manager, owner, and designation date.	http://www.cha.go.kr/korea/heritage/search/keyword_search_01_new.jsp?mn=NS_04_03_03&mc=NS_04_03_03
Jongmyo	CHA	Theme service on Jongmyo Shrine including tourist information, information on events, educational content on history and buildings, links to related publications.	http://jm.cha.go.kr
Jongmyo in my hands	CHA	In My Hands Mobile App Series; Includes basic information on sightseeing, cultural treasures, the local area, and a gallery; Includes three options for an AV guide - normal mode, time travel, and experience travel, which includes tour courses shown on an interactive map, animations, photos, audio, text, navigation, and image tracking; Includes options for posting to SNS, saving favorite cultural heritages, and making reports.	https://itunes.apple.com/us/app/jongmyo-in-my-hands/id948488726?mt=8
Joseon Royal Palace	CHA affiliate	Theme service on the royal palaces and Jongmyo Shrine, including tourist information, information on events, educational content on history and buildings, links to related publications; This site does not seem to link to the individual sites for each palace and Jongmyo Shrine also featured in this table.	http://royalpalaces.cha.go.kr
K-HERITAGE Channel	CHA	Videos about Korean cultural heritages; Some videos in English	https://www.youtube.com/user/koreanheritage/featured
Korea National Heritage Online	CHA	This website is divided into three sections: Learn, Explore, and Experience; The Learn Section includes video content in multiple languages, 3D renderings, e-books on heritages in each region, and educational materials; The Explore section includes	http://www.heritage.go.kr

		pre-curated introduction and list of related or representative heritage on various topics grouped into categories such as world heritages, royal palaces and tombs, religions, history, periods, natural heritages, and people; The Experience section includes links to other interpretive resources, including those mentioned in this table like mobile apps and the Cultural Heritage Digital Hub, as well as learning and volunteer opportunities.	
Local Government Tourism Sites	Local governments	Local government sites; most have tourist information which includes information on the cultural heritages under its jurisdiction in varying degrees of depth; the amount of information in other languages varies from government to government	Misc.
My Own Cultural Heritage Interpreter	CHA	This app is more or less a mobile version of the CHA Heritage Search website, including photos, video, metadata and interpretive texts (with auto-generated audio). Nearby heritages can be searched for, as well, using GIS locations. There is also a tab for “related cultural heritages,” but through a basic test of the app, it appears that these related heritage results are not automatically generated, but pre-selected for a very few heritages like some royal palaces. The app also includes services such as a travel itinerary creator, ways to report on cultural heritages (such as mistakes on the information panels), and an SNS feature which appears to allow users make posts about their visits to heritages. Apart from the Heritage Search feature, the remaining services on the app require a personal identification log in.	https://itunes.apple.com/us/app/%EB%82%98%EB%A7%8C%EC%9D%98-%EB%AC%B8%ED%99%94%EC%9C%A0%EC%82%B0-%ED%95%B4%EC%84%A4%EC%82%AC/id1051619675?mt=8
Names of Parts of Cultural Heritages	CHA	Includes diagrams of the parts that make up heritages with the label of each part named; 44 topics/diagrams total.	http://www.cha.go.kr/html/HtmlPage.do?pg=heritage/knowledge/name_01.jsp&mn=NS_04_02_04
National Memory Heritage Service	CHA	Portal to the CHA heritage database including educational information on documentary heritage	http://www.memorykorea.go.kr/
National Research Institute of Cultural Heritage	NRI CH	This site's content differs to some extent from the Korean one. It includes content which relates to cultural heritages including research reports, videos, audio, slides, and the Journal of Korean archaeology. It also includes information on the various research projects relating to cultural heritages underway at the institute.	http://www.nrich.go.kr/english_new/
North Korean Cultural Heritage Information	NRI CH	A searchable list of North Korean cultural heritages which can be filtered by designation, type, material, period, and region; Includes photo material and interpretive texts.	http://portal.nrich.go.kr/kor/northList.do?menuIdx=64
Royal Tombs of the Joseon Dynasty	CHA affiliate	Theme service on the royal tombs, including tourist information, information on events, educational content on history and buildings, links to related publications.	http://royaltombs.cha.go.kr
Smart Tour Guide	KTO	This app features interpretive resources on key tourism sites (mostly cultural heritages) including text, audio, and photos; Sites are browsable via region, category, and GIS location tracking; Can also be searched for via keyword. The Korean version has more content than that in the other languages.	http://korean.visitkorea.or.kr/kor/hd/smt_kor/index.html
Traditional Korean Art Search	Samsung	A searchable list of cultural heritages owned by Samsung at the Leeum Museum; filterable by type; includes the name, period, material, dimensions, designation type and number, its display location, and a description.	http://leeum.samsungfoundation.org/html/collection/traditional.asp
Traditional Pattern Design	KCI SA	9,718 traditional Korean patterns (9,062 2D, 656 3D); information on their significance; sometimes a photo of the real heritage off of which the pattern was based; name of the pattern, pattern differentiation, origin/period, the heritage it was taken from, the owner of the heritage, the material of the heritage,	http://www.culture.go.kr/tradition/designPatternList.do

		explanation, design elements, items which it could be applied to, design direction.	
World Heritage Suwon Hwaseong	Gyeonggi Tourism Organization	This app includes information about Hwaseong Fortress and the Temporary Palace, with an interactive map, audio recordings of interpretive texts, links to videos, and games including true/false quizzes and spot the difference pictures. It also allows users to bookmark sites, take notes, and read QR codes.	https://itunes.apple.com/kr/app/%EC%84%B8%EA%B3%84%EB%AC%B8%ED%99%94%EC%9C%A0%EC%82%B0-%EC%88%98%EC%9B%90%ED%99%94%EC%84%B1/id483963902?mt=8

Table 26 Korean cultural heritage brochure review

Institution Type	Institution	Website	SNS	QR	Nearby Attractions	Guided Tour	AV / Mobile App	Programs and Experiences	Interpretive Facilities
Historic Site	Namho House	○	×	×	×	×	×	×	×
Historic Site	Gyeongsang Gamyeong Park	○	×	×	×	○	×	×	×
Historic Site	Empress MyeongSeong Birthplace historic site	○	×	×	○	×	×	×	Memorial Hall, Culture and Arts Hall
Historic Site	Baek In-je House Museum	×	×	×	○	Reservation only	×	×	×
Historic Site	Jukseoru	○	×	×	×	×	×	×	×
Historic Site	Yuksinsa Shrine	○	×	×	×	○	×	×	Daegu Tourist Info Center
Historic Site	Royal Palaces and Jongmyo	○	×	×	○	○	×	×	×
Historic Site	Jangneung	○	×	○	×	×	×	×	×
Historic Site	Unhyeonggung	○	×	○	×	Audio guide tour only	×	×	×
Historic Site	Ojukheon Museum	○	×	○	○	×	×	×	×
Historic Site	Haemieupseong Fortress	○	×	×	×	○	×	Folk skills, folk games, folk life (both free and paid activities), fair, cultural performances	×
Museum	Daegu National Museum	○	×	×	×	○	×	×	Korean Culture Activity Room, History Exploration Room, Children's Library, Lecture Room
Museum	National Debt Repayment Movement Memorial Hall	○	×	×	○	×	×	×	×
Museum	National Palace Museum of Korea	○	×	○	○	○	Audio guide	×	×
Museum	National Hangeul Museum	○	×	×	×	○	×	Educational programs	×
Museum	LEEUM	○	×	×	×	○	Digital guides	Educational programs, membership	×

Museum	Dongdaemun History Museum	×	×	×	×	×	×	Learn by Playing for children	×
Museum	Seoul City Wall Museum	○	×	○	○	×	×	×	Seoul City Wall Archives, Learning Room
Tourist Guide	Eight Scenic View of Hantanggang River, Pocheon	○	×	×	×	×	×	Activities including rafting, art farm, culture museum, and village experiences	×
Tourist Guide	Yeongju	○	×	×	○	×	×	Festivals, seonbi training center	Museums, cultural villages
Tourist Guide	Gochang Tourist Map	○	×	○	○	×	○	Pottery, music, hanok experience center, festivals	Museums
Museum	National Folk Museum of Korea	○	Blog, Facebook, Twitter; Family Sites	○	×	○	×	Education programs for kids and children, teens, adults, professionals, disabled teens, international visitors, internship; Saturday, Sunday, Wednesday performances; Friends of the NFMK membership program	Archive, IT service room
Museum	National Museum of Korea	○	Daum, Facebook (En), Instagram, Naver, Twitter	×	×	Curator's talk, talks on NMK highlights, smart curator, sign language, docents, permanent exhibitions	AV devices	Library, educational programs, children's museum, theater, outdoor exhibitions	×
Museum	Seoul History Museum	○	Facebook, Twitter	○	○	×	×	×	×
Tourist Guide	Suwon Hwaseong	○	Facebook, Twitter	○	○	○	○	Festivals, performances, experiential events (weekend and permanent programs; free and paid)	Suwon Hwaseong Information Center (augmented reality and animation)

Table 27 CHA cultural heritage designation categories

Top Category	Middle Category	Sub Category
Artifact	Buddhist Handicraft	Attire
Artifact	Buddhist Handicraft	Misc.
Artifact	Buddhist Handicraft	Offering Implement
Artifact	Buddhist Handicraft	Reliquary Implement
Artifact	Buddhist Handicraft	Ritual Implement
Artifact	Buddhist Handicraft	Sarira Equipment
Artifact	Buddhist Painting	Hanging Painting
Artifact	Buddhist Painting	Mural
Artifact	Buddhist Painting	Scroll Painting
Artifact	Buddhist Painting	Sagyeonghwa Painting
Artifact	Buddhist Painting	Panhwa Painting
Artifact	Buddhist Sculpture	Clay
Artifact	Buddhist Sculpture	Dry-lacquered
Artifact	Buddhist Sculpture	Metal
Artifact	Buddhist Sculpture	Stone
Artifact	Buddhist Sculpture	Wooden
Artifact	General Painting	Documentary Painting
Artifact	General Painting	Figure Painting
Artifact	General Painting	Four Gentlemen
Artifact	General Painting	Genre Painting
Artifact	General Painting	Landscape Painting
Artifact	General Painting	Modern Painting
Artifact	General Painting	Wild Animal/Bird Painting
Artifact	General Sculpture	Modern Sculpture
Artifact	General Sculpture	Rock Face Sculpture
Artifact	General Sculpture	Tomb Sculpture
Artifact	Lifestyle Handicraft	Attire Handicraft
Artifact	Lifestyle Handicraft	Earthenware/Ceramic Handicraft
Artifact	Lifestyle Handicraft	Jade Handicraft
Artifact	Lifestyle Handicraft	Metal Handicraft
Artifact	Lifestyle Handicraft	Modern Handicraft
Artifact	Lifestyle Handicraft	Ox Horn Inlay Handicraft
Artifact	Lifestyle Handicraft	Paper Handicraft
Artifact	Lifestyle Handicraft	Textile Handicraft
Artifact	Lifestyle Handicraft	Wooden Handicraft
Artifact	Lifestyle Handicraft	Chogo Handicraft
Artifact	Misc. Religious Handicraft	Confucian Handicraft
Artifact	Misc. Religious Painting	Confucian Painting
Artifact	Misc. Religious Painting	Folk Painting
Artifact	Misc. Religious Sculpture	Confucian Sculpture
Artifact	Misc. Religious Sculpture	Popular Spirituality Sculpture
Artifact	Scientific Technology	Astronomical Geography Apparatus
Artifact	Scientific Technology	Food Making Implement
Artifact	Scientific Technology	Game/Amusement Implement

Artifact	Scientific Technology	Handicraft Technology Implement
Artifact	Scientific Technology	Measuring and Trade Implement
Artifact	Scientific Technology	Movement/Transport Technology
Artifact	Scientific Technology	Natural Science Artifact
Artifact	Scientific Technology	Prehistoric Artifact
Artifact	Scientific Technology	Print Technology Implement
Artifact	Scientific Technology	Vocational Technology Implement
Artifact	Scientific Technology	Weaponry
Documentary Heritage	Book	Manuscript Copy
Documentary Heritage	Book	Moveable Type Copy
Documentary Heritage	Book	Printing Woodblock Copy
Documentary Heritage	Collection	Epigraph Collection
Documentary Heritage	Collection	Modern Collection
Documentary Heritage	Collection	Printing Woodblock Collection
Documentary Heritage	Document	Buddhist Temple Document
Documentary Heritage	Document	Commoner Document
Documentary Heritage	Document	Confucian Academy/School Document
Documentary Heritage	Document	Government Document
Documentary Heritage	Document	Royal Document
Documentary Heritage	Letters	Calligraphy
Documentary Heritage	Letters	Cordiality
Documentary Heritage	Letters	Modern Letters
Documentary Heritage	Letters	Poem
Documentary Heritage	Letters	Rubbing
Documentary Heritage	Modern Media	Visual/Auditory
Heritage Site Structure	Archeological Site	Land Archeological Site
Heritage Site Structure	Archeological Site	Underwater Archeological Site
Heritage Site Structure	Archeological Site	Archeological Site
Heritage Site Structure	Dwelling Lifestyle	Dwelling Architecture
Heritage Site Structure	Dwelling Lifestyle	Dwelling Site
Heritage Site Structure	Dwelling Lifestyle	Landscape Architecture
Heritage Site Structure	Dwelling Lifestyle	Modern Dwelling
Heritage Site Structure	Education Culture	Education Institution
Heritage Site Structure	Education Culture	Modern Education Culture
Heritage Site Structure	Figure/Event	Figure Commemoration
Heritage Site Structure	Figure/Event	Modern Figure
Heritage Site Structure	Industrial Production	Agriculture
Heritage Site Structure	Industrial Production	Ceramics
Heritage Site Structure	Industrial Production	Fishing/Salt
Heritage Site Structure	Industrial Production	Manufacturing
Heritage Site Structure	Industrial Production	Mining
Heritage Site Structure	Industrial Production	Modern Industrial Production
Heritage Site Structure	Politics/Defense	Battlefield
Heritage Site Structure	Politics/Defense	Fortress
Heritage Site Structure	Politics/Defense	Modern Political Defense
Heritage Site Structure	Politics/Defense	Palace/Government Office
Heritage Site Structure	Religion/Spirituality	Buddhism

Heritage Site Structure	Religion/Spirituality	Catholicism
Heritage Site Structure	Religion/Spirituality	Folk Religion
Heritage Site Structure	Religion/Spirituality	Popular Spirituality
Heritage Site Structure	Religion/Spirituality	Protestantism
Heritage Site Structure	Tomb	Modern Tomb
Heritage Site Structure	Tomb	Royal Tomb
Heritage Site Structure	Tomb	Tomb
Heritage Site Structure	Transport/Communication	Communication
Heritage Site Structure	Transport/Communication	Modern Transport/Communication Facilities
Heritage Site Structure	Transport/Communication	Transportation
Intangible Heritage	Ceremony/Ritual	Everyday Ritual
Intangible Heritage	Ceremony/Ritual	Folk Ritual
Intangible Heritage	Ceremony/Ritual	Misc. Ritual
Intangible Heritage	Ceremony/Ritual	Religious Ritual
Intangible Heritage	Oral Tradition and Expression	Language Expression
Intangible Heritage	Oral Tradition and Expression	Misc. Oral Expressions
Intangible Heritage	Oral Tradition and Expression	Oral Heritage
Intangible Heritage	Traditional Games/Martial Arts	Arts
Intangible Heritage	Traditional Games/Martial Arts	Festival
Intangible Heritage	Traditional Games/Martial Arts	Games
Intangible Heritage	Traditional Games/Martial Arts	Martial Arts
Intangible Heritage	Traditional Knowledge	Folk Medicinal Knowledge
Intangible Heritage	Traditional Knowledge	Misc. Traditional Knowledge
Intangible Heritage	Traditional Knowledge	Nature/Universe Knowledge
Intangible Heritage	Traditional Knowledge	Production Knowledge
Intangible Heritage	Traditional Lifestyle/Customs	Alcohol
Intangible Heritage	Traditional Lifestyle/Customs	Clothing
Intangible Heritage	Traditional Lifestyle/Customs	Food
Intangible Heritage	Traditional Lifestyle/Customs	Misc. Traditional Lifestyle/Customs
Intangible Heritage	Traditional Lifestyle/Customs	Seasonal Customs
Intangible Heritage	Traditional Performance/Art	Dance
Intangible Heritage	Traditional Performance/Art	Misc.
Intangible Heritage	Traditional Performance/Art	Mixed Arts
Intangible Heritage	Traditional Performance/Art	Music
Intangible Heritage	Traditional Performance/Art	Performance
Intangible Heritage	Traditional Technology	Architecture
Intangible Heritage	Traditional Technology	Art
Intangible Heritage	Traditional Technology	Handicraft
Natural Heritage	Natural Monument	Biology Monument
Natural Heritage	Natural Monument	Culture and History Monument
Natural Heritage	Natural Monument	Earth Science Monument
Natural Heritage	Natural Preservation Area	Culture and Nature Combined
Natural Heritage	Natural Preservation Area	Natural Science
Natural Heritage	Scenic Site	History and Culture Scenic Site
Natural Heritage	Scenic Site	Natural Scenic Site

Table 28 CHA Cultural heritage designation periods

Periods	
1	Prehistory Period
2	Stone Age
3	Bronze Age
4	Iron Age
5	Samhan Period
6	Gaya
7	Three Kingdoms Period
8	Goguryeo
9	Baekje
10	Silla
11	Unified Silla
12	Goryeo Period
13	Joseon Period
14	Korean Empire Period
15	Japanese Colonial Period
16	Period Unknown
17	Miscellaneous

Table 29 CHA cultural heritage designation types

State Level		City/Province Level		Other	
1	National Treasure	1	Tangible Cultural Heritage	1	Cultural Heritage Material
2	Treasure	2	Intangible Cultural Heritage	2	Registered Cultural Heritage
3	Historic Site	3	Monument	3	Undesignated Cultural Heritage
4	Scenic Site	4	Folklore Heritage		
5	Natural Monument				
6	National Intangible Cultural Heritage				
7	National Folklore Cultural Heritage				

Table 30 CHA city/province cultural heritage designation regions

Cities		Provinces	
1	Seoul	1	Gyeonggi-do
2	Busan	2	Gangwon-do
3	Daejeon	3	Chungcheongnam-do
4	Ulsan	4	Chungcheongbuk-do
5	Gwangju	5	Jeollanam-do
6	Daegu	6	Jeollabuk-do
7	Sejong	7	Gyeongsangnam-do
8	Incheon	8	Gyeongsangbuk-do
		9	Jeju