

DESIGNING A GRIOTTE FOR THE GLOBAL VILLAGE:
INCREASING THE EVIDENTIARY VALUE OF ORAL HISTORIES
FOR USE IN DIGITAL LIBRARIES

A Dissertation

by

RHONDA THAYER DUNN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2011

Major Subject: Computer Science

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August 2011

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ABSTRACT

Designing a Griotte for the Global Village: Increasing the Evidentiary Value of Oral Histories for Use in Digital Libraries. (August 2011)

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A griotte in West African culture is a female professional storyteller, responsible for preserving a tribe's history and genealogy by relaying its folklore in oral and musical recitations. Similarly, Griotte is an interdisciplinary project that seeks to foster collaboration between tradition bearers, subject experts, and computer specialists in an effort to build high quality digital oral history collections. To accomplish this objective, this project *preserves* the primary strength of oral history, namely its ability to disclose "our" intangible culture, and addresses its primary criticism, namely its dubious reliability due to reliance on human memory and integrity. For a theoretical foundation and a systematic model, William Moss's work on the evidentiary value of historical sources is employed. Using his work as a conceptual framework, along with Semantic Web technologies (e.g. Topic Maps and ontologies), a demonstrator system is developed to provide digital oral history tools to a "sample" of the target audience(s).

This demonstrator system is evaluated via two methods: 1) a case study conducted to employ the system in the actual building of a digital oral history collection (this step also created sample data for the following assessment), and 2) a survey which involved a task-based evaluation of the demonstrator system. The results of the survey indicate that integrating oral histories with documentary evidence increases the evidentiary value of oral histories. Furthermore, the results imply that individuals are more likely to use oral histories in their work if their evidentiary value is increased. The

contributions of this research – primarily in the area of organizing metadata on the World Wide Web – and considerations for future research are also provided.

DEDICATION

This dissertation is dedicated to Danielle and Gabrielle – always remember to work hard, trust God and never give up on your dreams.

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1. INTRODUCTION

Though [the griot] has to know many traditional songs without error, he must also have the ability to extemporize on current events, chance incidents and the passing scene. His wit can be devastating and his knowledge of local history formidable. – Paul Oliver (Oliver, 1970) [74]

Several years ago, the National Park Service (NPS) conducted a survey [59] to evaluate the status “of oral history¹ projects and programs within” its individual parks.² The survey found that oral history projects often experience “funding shortages, poor quality equipment, insufficient staff training, inconsistent guidelines, staffing shortages and inadequate preservation measures” [59]. These conditions were attributed to “low management priority” and a prevailing view of oral history as an unsuitable historical resource. Moreover, the study concluded that, “Continuing to regard oral history as a low priority will almost certainly lead to the loss of irreplaceable [cultural and historical] resources” [59].

Although the survey did not address the reason(s) for the negative perspectives, oral history literature cites memory lapses and distortions as being responsible for lessening the reliability of the data collected [23, 43]. Generally, oral history practitioners address these failings either by serving as archivists, collecting oral testimonies as primary source material for future researchers [43] – in essence leaving the problem for future researchers to solve – or by accepting memory discrepancies as reflections, devised to ascribe meaning to past events in light of current circumstances. However, for those seeking historical evidence, these solutions are inadequate.

This dissertation follows the style of International Journal on Digital Libraries.

¹ Oral history is “a method of gathering and preserving historical information through recorded interviews with participants in past events and ways of life” [75].

² At the time of the survey there were 385 parks, 147 parks responded, of those 118 had “oral history collections, projects or programs” [59].

This leads us to theorize that any attempt to improve the suitability of oral history as a historical resource must involve increasing its evidentiary value [64] – assuming history is a “science” of probabilities and its practitioners strive to achieve a “degree of certainty” [92]. For oral history testimonies to be convincing as evidence there must be consistency between different accounts of the same event(s), and concurrency between the aggregated accounts and official or public records documenting said event(s) [43] [64]. This implies the need to compare large quantities of data; a task which could be facilitated by computerization. Accordingly, this paper describes a toolkit environment called the Griotte³ designed to support the compilation, analysis and presentation of digital oral history⁴ collections.

1.1 The Global Village: Utopia or Dystopia

Today, after more than a century of electric technology, we have extended our central nervous system in a global embrace, abolishing both space and time as far as our planet is concerned. – Marshall McLuhan (McLuhan, 1964) [62]

The title of this paper implies that the intended audience is the entire world or at least those individuals with Internet access. Initially the term, *global village* was chosen (by the author) as a cliché or as a colloquialism – a metaphor for the Internet. Upon further consideration, the expression took on a deeper meaning, as a descriptor of a worldview – a utopian worldview. The vision was of the Internet as a promoter of democracy; a peacemaker capable of breaking down cultural barriers; and the great equalizer, giving voice to all regardless of socio-economic status – a virtual United Nations. Consequently, initial research efforts were focused on designing a system to function in this envisioned “cyber vision”.

However, sharing one’s life history or on a smaller scale one’s life events is intensely personal and it makes the individual vulnerable; in this case before a global audience. This warrants further consideration of my utopian view(s), someone or their

³ The feminine form of *griot*.

⁴ The term oral history is used “loosely” in this paper and is inclusive of all recorded forms of recollection.

descendants could be harmed by the exposure. This leads to the question, “What is the *global village* and is it perilous?” Media theorists [Herbert] Marshall McLuhan coined the term in the 1960s, to describe a new social organization created by “electronic interdependence” [61]. He explained the phenomenon of the global village as follows:

Instead of tending towards a vast Alexandrian library the world has become a computer, an electronic brain, exactly as an infantile piece of science fiction. And as our senses have gone outside us, Big Brother goes inside. So, unless aware of this dynamic, we shall at once move into a phase of panic terrors, exactly befitting a small world of tribal drums, total interdependence, and superimposed co-existence. [...] Terror is the normal state of any oral society, for in it everything affects everything all the time. [...] In our long striving to recover for the Western world a unity of sensibility and of thought and feeling we have no more been prepared to accept the tribal consequences of such unity than we were ready for the fragmentation of the human psyche by print culture. [61]

McLuhan envisioned technology as a tool, without moral bent in and of itself – neither good nor bad. Instead it is the effect that a technology has on the individual and on the society(s) to which it is introduced that is significant. He stated, “there can only be disaster arising from unawareness of the causalities and effects inherent in our technologies.” Therefore, the advice is “be aware” of the potential ramifications – both personal and societal – of unleashing a new technology.

1.2 Intended Audience

The actual anticipated audience consists of oral historians – professional and avocational, researchers, digital librarians, archivists, educators, students and the general public (i.e. history buffs). According to the oral history literature, oral historians either produce oral histories for consumption by future historians, or consume oral histories produced by their own research efforts [23]. Meaning, oral historians serve as both archivist and researcher.

During the course of this research, additional target audiences were identified: one – that is in the throes of change as a direct consequence of computerization – practitioners of the field of museology (i.e. museum studies); and another – whose

practitioners have followed a path somewhat parallel to that of oral historians, in terms of recency and their efforts to find a place and recognition within the “academy” – historic preservationists. Since many of the artifacts produced by contemporary culture are “born digital”, museum curators must develop new standards of interpretation and analysis applicable to the properties of digital objects. Digital art has evolved into its own field within the arts [16]. The museum industry is also grappling with such questions as “How do online exhibits (often free of charge) impact offline or actual museum attendance?” and “How do we preserve digital cultural resources for future generations?” Museums use oral histories as interpretive tools to ascribe meaning and context often to other artifacts.

Moreover, historic preservationists have a similar responsibility of protecting historical and cultural resources – primarily extant within the built environment – for future generations. In the United States, much of their effort(s) takes place within the framework of federal regulations established by the National Historic Preservation Act of 1966. According to the regulations, a “[historic] site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure” [66]. The concepts expressed in the definition that are relevant to this research are those of historical significance and the “*value of place*”. Both of these should be defined by (or at least have the input of) the participants and/or the inhabitants of a “site”. To this end, some preservationists conduct oral history interviews to determine “if a site is, in fact, of local significance” [13]. Longtime residents are used as a reference to delineate “how the town or area developed, its ethnic composition, and what events occurred that were notable to the people who lived there” [13]. Other practitioners find oral sources helpful in supplementing documentary evidence: e.g. interviews are employed to “provide important biographical details”, to “establish the location(s) of subsurface deposits” (i.e. ruins), and to “fill in gaps in the official records” [13, 63, 81] – especially in the case of minority communities whose “historical record” is often conveyed via oral tradition.

Thus, in historic preservation oral histories form a social and cultural context for the site(s) (and the communities) being investigated.

1.3 Research Goals

The primary goal of this research is to explore whether generating composite digital objects, via semantic associations between narrative data and evidence – supporting and contradictory – will increase the reliability and the validity of narrative data: the intent being to compile quality resources for digital libraries. Within the discipline of oral history reliability may be defined longitudinally “as the consistency with which an individual will tell the same story about the same events on a number of different occasions” [43]. Furthermore, this definition may be extended to cover cross-sectional research by stating, “Reliability is [also] the consistency with which” **multiple individuals** “will tell the same [parallel] story about the same events.” The related concept of “validity refers to the degree of conformity between the reports of the event and the event itself as recorded by other primary resource material such as documents, photographs, diaries and letters” [43]. It is important to note that validity cannot be established without first substantiating reliability.

A second research objective is to investigate the work process(es) of those who employ historical narratives as source material, in an effort to ascertain that the resulting system facilitates their work. For the primary research goal to be realized human agency is compulsory. In other words, individuals must supply the semantics. On the other hand, from the potential users’ perspective, there must be a benefit to contributing. If there is no perceived benefit(s) potential users will not participate. Consequently, correct modeling of existing work practices and proper delineation of tasks are crucial to the future success of this project.

A third objective is to develop an extensible model for a “historical Web”, one capable of organizing historical material based on events, people and places. The Griotte is designed as an augmentation of a digital library management system. It builds a hypertext of historical data local to the digital library system. Nonetheless, the tools

used to generate the hypertext – in particular XML Topic Maps, an XML grammar for interchanging Web-based resources – lend themselves to a distributed hypertext [34]. Hence, the technology is available to support the interchange of historical concepts widely and to express these concepts in contextual ways. What is required is a common vocabulary or ontology along with the social and technical vehicles to support a historical Web, this research attempts to define such a vocabulary.

1.4 System Overview

The toolkit described in the paper constitutes a key component of a system⁵ affectionately called “Griotte”. A griotte in West African culture is a female professional storyteller; responsible for preserving a tribe’s history and genealogy, by relaying its folklore in oral and musical recitations. The feminine form of the word was chosen to emphasize the niche of oral history – “to give voice to those who have been silenced or ignored”⁶ [59]. As an integrated development environment (IDE), the Griotte toolkit has similar functions. It assists subject experts (e.g. academicians and researchers) in conducting oral history research projects online, within an intuitive user interface (via standard web browsers).

To elaborate, the IDE is implemented as a Web application that allows users to:

1. Import existing oral histories of “tradition bearers” in digital (audio/video or text) format.
2. Import digital surrogates of evidentiary artifacts.
3. Build cultural crosswalks between oral histories and evidentiary artifacts.
4. Build digital collections of selected oral histories, evidentiary artifacts, and cultural interpretations.

⁵ The term **system** within the context of this paper refers not only to the computer application but to the people, hardware, practices, and procedures required for project success.

⁶ The masculine form of the word, “griot” was introduced into the American vernacular in 1977, via the “record-breaking” television miniseries *Roots*; based on Alex Haley’s book *Roots: The Saga of an American Family* [40]. Alex Haley consulted the griot (among other sources) of his ancestors’ West African village, to obtain source material for his book.

5. Prepare completed digital oral history collections for archiving in an XML-based digital library⁷.

The types of oral history projects anticipated include community, gender and ethnic studies, family histories, and architectural histories.

1.5 Dissertation Overview

This dissertation begins by discussing the justification for this work along with the author's motivation for pursuing digital oral history – mainly to represent cultural diversity in the collective human record. The paper continues with coverage of the theoretical foundations of this work, namely sited in the fields of oral history, digital annotation, machine readable languages, social informatics, cultural studies, usability design and structural linguistics. This is followed by a survey of computer applications, and research computing systems (i.e. prototypes) that inspired or informed the design of the Griotte. A field study conducted to gather specifications and requirements for the dissertation system is discussed next.

The following sections focus on the design, implementation and evaluation of the Griotte system; starting in **Section 6** with revisiting the conceptual design presented in the research proposal. This section is delineated as follows: conceptual design comparison, data model, and application scenarios. **Section 7** continues with a discussion of the semantic technologies that form the foundation of the demonstrator⁸ system. The resulting system was evaluated via two methods: 1) a case study conducted to employ the system in the actual building of a digital oral history collection (this step populated the system); and 2) a survey administered to a non-randomized sample, which involved a task-based evaluation of the demonstrator system. A discussion of the

⁷ In its current implementation the Griotte stores the metadata (i.e. the descriptive XML elements) of digital collections, in a digital library. Moreover, subject experts are directed to archive the resulting digital collections either in the Internet Archive (if they are not professionally affiliated with an institution) or in their institution's digital repository, if they have access.

⁸ The author views the Griotte as an ongoing project. Accordingly, the Griotte Integrated Development Environment in its current implementation, as a full function horizontal prototype is referred to as a demonstrator system throughout this paper.

evaluation methods and the author's findings may be found in **Section 8**. Finally in **Section 9**, this dissertation concludes with reflections on the contributions of this effort and provides possible direction(s) for future work.

2. SIGNIFICANCE AND MOTIVATION

The digital heritage is inherently unlimited by time, geography, culture or format. It is culture specific, but potentially accessible to every person in the world. Minorities may speak to majorities, the individual to a global audience.

The digital heritage of all regions, countries and communities should be preserved and made accessible, so as to assure over time representation of all peoples, nations, cultures and languages. – (U.N. Charter on the Preservation of the Digital Heritage, adopted October 17, 2003) [88]

In preparing to conduct this research three field trips were taken to Texas A&M University's Cushing Memorial Library and Archives. The archive's primary mission is to carefully preserve the cultural artifacts produced by the university and its alumni. In addition to the anticipated issues related to the conservation of physical objects, other archival issues that surfaced included the lack of physical space to store recently donated and future artifacts; the absence of guidelines regarding how to make the public aware of their holdings; and the inability to define a collection policy, since "culture shifts" alter the standards of historical significance. In view of these issues, this section covers the problem domain(s) addressed by the Griotte as well as the author's personal motivation(s) for developing the system.

2.1 Propagating Oral History

Allan Nevins, founder of the modern oral history movement in the United States, established the first oral history research office at Columbia University in 1948⁹. "To obtain, from the lips and papers of living Americans who have led significant lives, a fuller record of their participation in the political, economic, and cultural life of the last

⁹The first large scale oral history project conducted in the U.S. was performed by unemployed journalists involved in Franklin D. Roosevelt's depression relief program(s). It was entitled "*Born in Slavery: Slave Narratives from the Federal Writers' Project, 1936-1938*", the collection "contains more than 2,300 first-person accounts of slavery and 500 black-and-white photographs of former slaves. The collection was assembled and microfilmed in 1941 as the seventeen-volume '*Slave Narratives: A Folk History of Slavery in the United States from Interviews with Former Slaves*'." [11]

sixty years.” [69] The second oral history research program was established at the University of California Berkeley in 1954. Both of these programs along with subsequent programs have amassed large collections of oral histories, produced for consumption by (today’s) historians. However, much of this material goes unused due to questions about the reliability of the oral data; unpublished finding aids; or physical access barriers. Some collections have been digitized and are available on the Internet but most remain archived in the form of paper transcripts and fragile audio cassette tapes. Developing high quality digital collections utilizing this vast amount of data as source material, along with integrated corroborating evidence, and providing cost effective methods of recording oral histories via the Internet to obtain new content are project aspirations of the Griotte.

Additionally, the Griotte aspires to move the practice of oral history from a primarily physical realm to a computer mediated environment. The broader intention being to boost productivity in all phases – pre-interview research, interviewing, transcription, editing, cataloguing, and archiving – of the oral history workflow process. More specifically, since the existing process consists of discrete steps and units, it lends itself to the possibility of devising computerized or digital solutions, comprised of accessible source materials of high evidentiary value (partially due to the linking and comparative capabilities of computers). Hence, within the realm of computer science this research effort falls under the subdiscipline of digital scholarship. Furthermore, since the resulting artifacts will be placed in digital archives, the systematic improvement of a constituent artifact type will be beneficial to the field of digital libraries.

In essence the Griotte is a digital humanities system; as such another desirable attribute is that of backward compatibility. To explain, in his seminal article *Oral History: How and Why It Was Born* [69], Nevins laments the decline of the “letter writer” and gives this as one “consideration” for the development of oral history as a discipline. To quote Nevins,

All the while the hurry and complexity of modern politics, modern financial and business affairs, and even modern literary and artistic life

slice away the time that men need for methodical, reflective writing ...
No doubt great letter writers still exist. But their numbers are fewer, and
the spirit of the times is hostile to them. [69]

Thus oral histories were designed to compensate for information formerly contained in letters – including diaries, journals, memoirs etc. Unfortunately, oral histories also inherited the failings of letters: Self reports regardless of their form pose reliability and validity issues. In Moss’s model – discussed in **Section 3.1.1** below – oral histories possess the same evidentiary value as letters. Accordingly, methods devised to increase the evidentiary value of oral histories should also be applicable to letters. Consequently, both the cassette tapes of oral histories, and the written pages of letters¹⁰ will be acceptable input to the Griotte.

2.2 The Digital Heritage at Risk

A related problem to the aforementioned issues being faced by archives is that of preserving digital cultural artifacts, especially those that are “born digital” – meaning without a tangible representation. The international organization, UNESCO¹¹ formally addressed the potential loss of the world’s digital cultural heritage in the *Charter on the Preservation of the Digital Heritage* [88]. In it UNESCO defines a new legacy – the “digital heritage” – as follows:

The digital heritage consists of unique resources of human knowledge and expression. It embraces cultural, educational, scientific and administrative resources, as well as technical, legal, medical and other kinds of information created digitally, or converted into digital form from existing analogue resources. Where resources are “born digital”, there is no other format but the digital object.

Digital materials include texts, databases, still and moving images, audio, graphics, software and web pages, among a wide and growing range of formats. They are frequently ephemeral, and require purposeful production, maintenance and management to be retained.

¹⁰ This information must be digitized first and then uploaded from the user’s computer into the Griotte, via the Internet.

¹¹ United Nations Educational, Scientific and Cultural Organization

Many of these resources have lasting value and significance, and therefore constitute a heritage that should be protected and preserved for current and future generations. This ever-growing heritage may exist in any language, in any part of the world, and in any area of human knowledge or expression. [88]

The charter goes on to explain the threat to this new legacy as follows:

The world's digital heritage is at risk of being lost to posterity. Contributing factors include the rapid obsolescence of the hardware and software which brings it to life, uncertainties about resources, responsibility and methods for maintenance and preservation, and the lack of supportive legislation.

Attitudinal change has fallen behind technological change. Digital evolution has been too rapid and costly for governments and institutions to develop timely and informed preservation strategies. The threat to the economic, social, intellectual and cultural potential of the heritage – the building blocks of the future – has not been fully grasped. [88]

Nonetheless, the questions that are not addressed by the charter – yet, they are crucial to the usefulness of the digital record – are “How do we avoid information overload?” and “How do we make sure that the digital record being propagated is of the highest quality, in light of currently available technologies?” These are inquiries undertaken by this research effort. Influenced by Vannevar Bush's *memex* [15] (as all good “hypertexters” are) the Griotte seeks to build a semantic hypertext to facilitate searching for and retrieval of digital artifacts. Moreover, by basing the retrieval criteria on the evidentiary value of the artifacts the quality issue is (in part) addressed. Quality assurance also requires the establishment of social policies or “best practices” regarding collection, digitization, and preservation.

2.3 Discussion: *Roots*: A Saga – An Example of Why Quality Matters

In January 1977, as a young teenager I was captivated by a national event in popular culture, the airing of the miniseries *Roots*¹², “broadcast for a total of twelve hours on eight consecutive nights”. The series told the spellbinding story of Kunta Kinte

¹² Based on the book, *Roots: The Saga of an American Family* [40] mentioned above.

(or Kintay), a West African enslaved in the United States, and of his descendants; concluding with a narration by the book's author, Alex Murray Palmer Haley (Alex Haley). The episode in which Haley's great-great-great-grandmother, Kizzy proudly tells her playmate, Missy Anne that her grandfather is a great man in Africa – a griot – still resonates. It was as if I had become privy to a colossal cultural secret: though millions watched, the experience was intensely personal. Moreover, for many African-Americans due to the transience of family during slavery, Haley's story became their story. Personally, there was always apprehension about accepting the *saga of Roots* as my own story. Having grown up in New Orleans, once the second largest port for immigrants in the country and a cultural melting pot, the storyline of *Roots* did not fit. Nonetheless, the experience stirred in me the passion to become a (digital) griotte.

Haley spent twelve years researching his family's genealogy and writing *Roots*. To him the pursuit was a scholarly endeavor, which included “visiting archives, interviewing relatives, and even traveling to Liberia and taking a ship from there to America to help him recreate the ‘Middle Passage’” During the course of his investigation, “he determined that his Great-great-great-great grandfather was captured from The Gambia in the mid-1760's” [38].

Consequently, “Haley visited The Gambia in 1967, and interviewed a griot (an African elder that kept up the tradition of oral history of a tribe) named Fofana. Fofana was of the Kinte family on his mother's side and identified for Haley that his ancestor was Kunta Kinte, captured by slavers in 1767” [38]. This revelation ignited interests in the book and the miniseries.

As a result of his efforts, Haley was invited to speak at many conferences and his book became required reading in numerous college courses. Prior to his death in 1992, he purchased a farm in Clinton, Tennessee to house his research collection. However, due to debts totaling over 1.5 million at the time of his death, the farm was sold. Today a comprehensive collection of Haley's work – including documents dating back to 1870 –

is available at the University of Tennessee Special Collections Library [38]¹³. The collection represents a balanced view including not only his research but documentation pertaining to two plagiarism lawsuits considered to have had merit.

One grievance was posed by Margaret Walker-Alexander the author of *Jubilee* – a fictionalized account of the life of Walker's great-grandmother, Margaret Duggans Ware Brown, who was born a slave in Dawson in Terrell County and lived through Reconstruction in southwest Georgia. It is based on stories told to Walker by her maternal grandmother. [70]

Published in 1966, the novel is one of the first “to present the nineteenth-century African American historical experience in the South from a black and female point of view” [70]. Most of the book was written as dissertation research during Walker-Alexander’s studies at the University of Iowa. To defend her authorship Walker-Alexander penned the seminal essay “*How I Wrote ‘Jubilee’*” published in 1972 (included in the *Haley Papers*).

The other complaint was posed by Harold Courlander, the author of *The African*. At one time a United Nations press officer, he expressed his interests

in ethno history and folklore by collecting stories, making recordings, and writing books and articles about a variety of African and African diaspora cultures. The result of his travels and studies was the publication of more than thirty-five books and many sound recordings of the rich and varied musical and story traditions of African, African-American, Caribbean, Indonesian, and Native American cultures. [18]

The *Haley Papers* contain legal documents from Courlander's case against Haley, the publisher (Doubleday & Company), and associated groups. Likewise, the *Harold Courlander Papers* contained in the de Grummond Children's Literature Collection, at the University of Southern Mississippi, describe the proceedings as follows:

After several months in court, it was determined that several pages of Haley's novel quoted almost verbatim from *The African*. Haley claimed

¹³ Haley was born in Ithaca, New York but spent much of his childhood in Tennessee with his maternal grandmother. Legend has it, that it was there on his grandmother’s porch that he heard and became fascinated with his family’s history. [39]

that the researchers who gave him the material in question had not cited any sources. Haley eventually settled out of court, awarding as much as \$650,000 to Courlander. [18]

Over the years genealogists, literary critics and historians have used the *Haley Papers* to disprove his (Haley's) story. Moreover, prominent African American historians have not cited his collection as source material in their research. Henry Louis Gates, Jr., director of the W. E. B. Du Bois Institute for African and African American Research at Harvard University has been quoted referring to Haley's *Roots* as "a work of his imagination": A sad commentary on a collection that was so diligently and painstakingly amassed.

As a result of these challenges and other harsh criticism regarding literary style¹⁴, Haley's "masterpiece" once touted as "non-fiction" by Doubleday & Company has been marginalized. In the online *Tennessee Encyclopedia of History and Culture* the article on Haley's writings [53] reads like an exercise in tabloid journalism using such derogatory phrases as "a pyramid of bogus research", "arranged by a collusion" (referring to his meeting with the griot), "authorship is suspect" and "stereotypical". The article concludes by describing Haley's legacy as follows:

No doubt that during an important period in our history, *Roots* helped give white Americans sympathy for what black Americans had suffered in bondage. Unfortunately, the book will be remembered as a phenomenon of popular culture rather than as a serious and enduring study of black history. [53]

Hence quality matters, obviously, historical narratives that are perceived to be of low quality are in danger of not being utilized: moreover, they could permanently damage the academic reputation of the subject expert(s) that collect, analyze and interpret them.

¹⁴ Literary critics questioned Haley's work based on its given genre. *Roots* was written in the form of a novel with detailed conversations that could not have been passed down from generation to generation verbatim.

3. FOUNDATIONS

In this section, the theoretical foundations of this work, namely sited in the domains of oral history, digital annotation, machine readable languages, social informatics, cultural studies, usability design and structural linguistics are discussed. Since an effort is being made to establish a cultural crosswalk – where narratives provide “sense-making” and context, while evidence supplies verification – background resources were sought that not only offered guidance on the digital representation and manipulation of evidence (i.e. technical resources) but that shed light on how to delineate or to describe social (e.g. work) and cultural activities, as well. Accordingly, this section is divided into two major subsections: 1) Technical Foundations and 2) Social and Cultural Foundations.

3.1 Technical Foundations

In this subsection we consider literature focusing on: the categorization of; a graph-based model for; and the computerized analysis of; evidence. First for classification, the discipline of oral history is consulted, in particular the work of William Moss who provided a taxonomy for documentary evidence. Next digital annotation, its current definition and features common to annotation systems is covered. Although the field of digital annotation is in flux, researchers in the area generally agree that annotation supplies support (i.e. evidence) for passages within initial texts. Lastly, semantic languages which offer a formal representation of annotation are discussed: the benefits being that the annotations are machine readable and are able to be processed by machine.

3.1.1 Moss’s Taxonomy

In moving oral history collections from physical form to digital, the reliability assurance required by scholars is addressed by adding corroborating evidence to the digital adaptations. To assist in identifying and evaluating historical evidence, William Moss’s work on the evidentiary value of historical sources is employed. His seminal

essay, *Oral History an Appreciation* [64] aided the Oral History Association in developing assessment guidelines and standards [76]. Moss's thesis is "if the discipline of history in general and the tool of oral history in particular are to be employed successfully, then we must have some systematic means of relating evidentiary and abstract values and of distinguishing them from each other." He further explains,

Analysis requires the comparing and testing of different records against each other, weighing the relative values of insight and evidence that they contribute in fair proportions, forming theoretical structures from the information (both evidence and insights), and then testing these new hypotheses against the evidence again and again to see if it can survive critical examination. [64]

Therefore, a valid historical interpretation necessitates a comparative analysis between multiple types of historical proof in "fair proportions".

Moss organizes historical sources into five categories based on content and degrees of authority. Since these categories are used as models for entities in the system, a detailed definition of each category is provided. **Transactional records** are the most authoritative. They constitute primary evidence and embody the essence of the event(s) being investigated. Included in this category are legal documents, constitutions, treaties, sales contracts, diplomas, certificates, etc. **Selective records** are one degree away from the physical reality. Recorded at the time of the event(s), they are abstracted by the limitations of recording devices as well as by human interpretation and selectivity. These include original film footage, court transcripts, photographs and eyewitness reports.

In Moss's categorization oral histories fall in the middle, two degrees away from the physical reality, abstracted by the selectivity of memory and the passage of time. Diaries, memoirs and letters are grouped with oral histories to form the brunt of a category labeled **recollections**.

The aggregate recollections of many people can provide a rough means for approximating historical truth where no transactional records or selective records exist. But it requires many accounts from a good cross-section sample of witnesses to endow this kind of evidence with a reliability even approaching that of transactional or selective records. [64]

Related to recollections albeit less reliable are **reflections**. These involve assessing the past within the context of the present. Inherent in reflections is a propensity to distort the past, as individuals analyze and infer the meanings and values from said events. Reflections have minimal evidentiary value. **Historical analyses** conducted by predecessors are last: these are the least authoritative, due in part to their distance from the historical reality – yet analyses are necessary for context. Generally speaking, historical analysis is a weighing of the available evidence.

Within the Griotte, Moss's categories are used as conceptual units to structure and to organize data. Note, in a computerized system one stores electronic copies of transactional records, hence unlike Moss's model the records are abstractions of the historical reality and are not equivalent to the reality. Nonetheless, digitized transactional records should be regarded as having high evidentiary value, especially when accompanied by user entered metadata specifying provenance, quality controls and authenticity. **Figure 1** below summarizes the concepts presented in this subsection.

Historical Sources: Conceptual Units

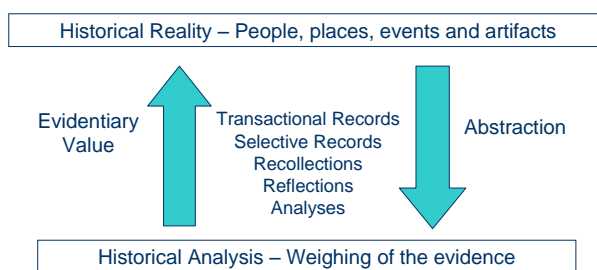


Figure 1: Moss's Taxonomy. There is an inverse relationship between evidentiary value and abstraction with respect to historical reality.

3.1.2 Discussion: Digital History Objects

Moss's classification does not include physical objects such as archaeological artifacts. Nonetheless, digitization allows the incorporation of digital surrogates of physical objects. With this in mind, we add historical objects to the taxonomy; particularly (archaeological) artifacts created by human agency at the time of the

event(s) being investigated. Thus, the objects serve as primary sources providing evidence of material culture¹⁵. Physical historical objects require context or explanation, in order to have meaning; leading to their being categorized as third in the taxonomy, subsequent to selective records and ahead of recollections. These objects give insight into a culture's practices, aesthetics, and rituals.

Within the field of museum studies active discourse is currently underway to identify the characteristics and behaviors of digital historical objects. The concept encompasses both surrogates of existing tangible objects and “born digital” objects. In [16] the marble David of Michelangelo is compared to the three dimensional (3D) laser scan of David – created at Stanford University – using the following statements:

Both modalities... are material objects by definition. That is, they are both the result of human creativity, exist in real time, can be touched, can be looked at from many angles, and are the target for feelings and actions. Moreover, both the materiality of marble and the digital David are unstable and subject to change, the latter due to mutations of data. Whereas the marble David as a physical object is fixed, the digital David is no longer semantically and aesthetically discrete, can exist in potentially infinite versions, and be distributed in space and time due to its numerical coding and modular structure. [16]

Based on conclusions previously drawn in the field of digital art, the material properties of digital historical objects include “Variability, Interactivity and Computability, Collaborative, Distributable, and medium-independent behaviors described as Social, Networked, Encoded, Duplicated and Reproduced” [16]. Therefore, like their physical counterparts, “they are cultural constructs and have the power to shape cultural identities, engage emotions, perceptions, and values, and to influence the way we think” [16] – they are components of material culture.

3.1.3 Research Question

Moss's modified taxonomy inclusive of digital history objects forms the basis for our research question. Oral history as a modern discipline is a little over sixty years old,

¹⁵ Material culture is informally defined as all of the physical objects that humans create and give meaning to. Such objects only become culturally significant after they are assigned meaning.

nevertheless oral historians have yet to devise a systematic means of ascertaining the reliability or the validity of the oral data collected. Though it is believed that this problem may be solved by computerization, at this point it is still too early to tell; hence, this is exploratory research. Preliminary questions need to be posed regarding the increase in evidentiary value (if any) wrought by an extended collection model; consisting of narratives and supporting (or contradicting) evidence. In light of these thoughts, this research endeavors to address the following question: *How does linking [personal] recollections with related historical sources influence the evidentiary value of recollections?* The unit of observation in this case is the composite object – i.e. the recollection plus corroborating (and/or contradicting) evidence – jointly created by tradition bearers (i.e. eyewitnesses) and scholars (i.e. domain experts).

3.1.4 Digital Annotation

So, that notion of hypertext seemed to me immediately obvious because footnotes were already the ideas wriggling, struggling to get free, like a cat trying to get out of your arms. – Ted Nelson (Nelson, 2001) [68]

Within the realm of computer science the act of linking oral histories or recollections to corroborating evidence would generally be regarded as digital annotation(s). However, the current state of digital annotation research is in flux. To borrow a quote from [55], regarding the present state of the field:

‘strangely enough, there is not an agreement yet on the definition of digital annotation, or on how to distinguish it from other digital entities (e.g. hyperlinks, metadata, newsgroup messages). Furthermore, an analysis of the basic operations, to be enabled by a digital annotation system, seems to be lacking.’ [55]

3.1.4.1 The Perceived Value of Annotations

Despite the field’s inability to define the term digital annotation, there is some agreement regarding determinants of the perceived value of annotations. An underlying goal of this research is to instill quality in narrative sources to increase their likelihood of being reused in the future – reusability implies value. Likewise, the same general principle applies to annotations. Literature focusing on annotation practices and patterns

suggests an annotation's potential for reuse is directly tied to its ability to retain its meaning. To quote Marshall, "A highlighted sentence, a cryptic marginal 'No!' an unexplained link, a reading history, or a bookmark all pose interpretive difficulties for anyone other than the original annotator (and the passing of time sometimes erodes that privilege)." [55]

Marshall's statement brings to bear a transitional concept, namely that the form of an annotation is one characteristic, which influences its perceived value. In an ethnographic study involving annotated textbooks at a university bookstore, Marshall found that "experienced used textbook buyers tend to prefer longer written marginal notes over highlighting and text emphasis" [57]. Book buyers also considered the authority or the reputation of the note taker (or the source of the note(s) e.g. the instructor) in determining the perceived value of annotated texts. Within the context of personal note taking, the form is usually more cryptic, e.g. highlighting, underlining, graphic symbols, i.e. markings other than intelligible words. For private use these markings¹⁶ are often sufficient, yielding clues to passages that warrant review or identifying quotes for later inclusion in a written assignment. However, private musings may inadvertently cross into the public milieu, at which point this form of expression can threaten an annotation's continued usefulness (i.e. the annotation has the potential of losing its meaning).

In a later user study [56], employing a *public* annotation system to support online discussions of reading assignments, it was found that students re-authored and refocused personal annotations before sharing them with others. The preferable form of expression was commentary that "consisted of anchors in text coupled with margin notes". The implication being that readers/annotators felt they must transform their notes for clarity and comprehension to transition them from a personal to a public context. Thus, within a public context the intelligibility of a note influences its perceived value.

¹⁶ In [55] Marshall stratifies highlighting, underlining and margin symbols based on their focus and/or granularity. Focused or finer grained notes are considered more valuable than other markings.

With respect to computerized annotation systems, the question becomes how to facilitate reuse or rather how to systematically identify those annotations with the highest likelihood of being reused. Thus far there have been two proposed approaches to this problem: 1) to find consensus among multiple readers' annotations; and 2) "to find specific kinds of annotations ... that are predictably useful" [56]. As an example of the first method, Marshall in [55] searched for matching or overlapping sentences demarcated by student participants. She found that the regions of consensus implied a new form of (re)structure derived from the readers, suggestive of an improvement in document organization or a document summarization – both are annotative activities. The second method was employed by Shipman et al. [85] in analyzing legal briefs prepared by law students who used prior case documents as (primary) source material.

Shipman developed a three pass "mark parser that analyzed freeform digital ink to identify ... high-value annotations" – those noted in the case documents and used directly in the legal briefs. In terms of form, an analysis of the annotations found that they fell into one of two major categories: 1) "selection marks such as highlighting, underlining, circling and margin bars that identify a document passage"; or 2) "interpretative marks such as comments and symbols that respond to the content" [85]. To determine the value of annotated passages¹⁷ an emphasis rating was assigned; based on the number of marks, the scope or focus of the marks, and the type of the marks. The general rating heuristic employed is described as follows:

First, initial emphasis values were selected so that passages with a combination of mark clusters would be ranked higher than or equal to passages with only one cluster. Second, marks that are more precise in indicating focused attention are assigned higher emphasis values than those that are just rough indications of interest. ... [Third] Interpretive marks ... are given a high emphasis value¹⁸. [85]

¹⁷ The parser used multi-level clustering to identify annotated passages.

¹⁸ It was suggested in the article that interpretive marks should be given higher values based on the assumption that "readers may reflect more when they write interpretive comments and symbols than when they simply highlight a passage" [85].

Accordingly, each identifiable note within a marked passage is assigned an emphasis value and the sum of these values is assigned to the encompassing passage. Consequently, within the context of digital annotation systems the degree or level of consensus among annotators, the number of marks (within a single annotation area), the focus or scope of marks and the content of marks (words vs. drawings) all influence the perceived value of annotations.

In summary, the actual value of an annotation is tied to its propensity to be reused. However, its perceived value is characterized by its form, its authority, and its intelligibility, within a human context. On the other hand, from a system perspective the perceived value of annotations is determined by the degree or level of consensus, the number of marks, the focus or scope of marks and the content of marks.

3.1.4.2 Annotation System Design Considerations

As mentioned above, there are no clear guidelines regarding the preferred features of digital annotation systems [55]. Nonetheless, a survey of a cross section of the digital annotation literature did yield some common system design considerations. The outcome of that inquiry is discussed in this subsection.

The identified system design considerations are as follows [1, 3, 54, 55]:

- **Identify annotation patterns and practices within the proposed work environment.** In other words, “Will the system support personal annotations, workgroup activities, distributed collaboration or a combination of these?” This has a bearing on the chosen system architecture and the user model; the primary options being a single user (usually desktop) system, a multi-user LAN system with defined users and groups, or a client-server WAN system (usually over the Internet) with user authentication features.
- **Decide what qualifies as annotation.** According to [3], annotation may be “metadata, content, hypertext, context, or dialog acts”. In view of this, a resulting system should be flexible and capable of supporting multiple forms of annotation.

- **Focus on facilitating a “smooth transition from reading to annotating” and vice versa.** Annotation involves high order/critical thinking and requires “active involvement”. Hence, the user interface should provide interactive features to facilitate such actions as drawing, writing, linking, and selecting. Furthermore, these markings should be free form and “distinguishable from the source document” [54]. The suggested functionality should entail minimal distraction and should be intuitive.
- **Determine the type of data (i.e. digital objects, web resources, database records) to annotate and the system that manages this data type** – e.g. a digital library system, the web or a database management system. Annotation is added content; therefore an annotation system should be an extension of an existing (information management) system. [3]
- **Modify existing search and retrieval algorithm(s) (or heuristics) to include annotations.** In other words, update the search strategy of the underlying (information management) system, to exploit the additional source of evidence or relevance provided by the annotation. Annotations superimpose an additional layer of knowledge and establish connections between annotated objects. This associative context should be utilized to improve response to users’ information needs. [1, 3]

The order given is not meant to imply an exact ranking; system designers should assess their own priorities and organize the tasks accordingly. As a caveat, Marshall does state that the third implication involving the “smooth integration of annotating with reading is the most difficult to” implement and “until [we], system designers, get this right, it is likely that people will continue to annotate paper materials, even as they read [digitized] materials” [54].

3.1.4.3 Document-Annotation Hypertext Model

Among the different annotation systems studied, the most appropriate system design model – with regard to the research objectives – was the “document-annotation

hypertext” as described by Drs. Maristella Agosti and Nicola Ferro in the article *Annotations as Context for Searching Documents* [2]. In this model “existing content and annotations constitute a hypertext ... that can be exploited not only for providing alternative navigation and browsing capabilities, but can also offer advanced search functionalities” [2]. Additionally, the annotations illuminate “hidden facets of the annotated documents” creating an “annotative context”, which differs depending on the intended audience of the annotation e.g. private, or public. The annotations may also reference external resources or content providing a “distributed annotative context”; connecting information resources managed by different systems.

Within the structure of the generated hypertext, annotations may be linked to documents or to other annotations via two primary types of links:

1. “**annotate link**”: “Intended only to allow an annotation to annotate one or more parts of a given digital object (DO)¹⁹.” Hence, this link type highlights relationships within digital objects.
2. “**relate-to link**”: “Intended only to allow an annotation to relate to one or more parts of other DOs, but not to the annotated one.” Thus, this link type establishes relationships between digital objects. [2]

Moreover, the resulting hypertext is a labeled directed graph with the following formal definition:

$$H_{da} = (DO, E_{da} \subseteq A \times DO)$$

Where DO is the set of vertices (or nodes) and E_{da} is the set of edges. Let $l_{da} : E_{da} \rightarrow LT$ be the labeling function, where LT is the set of allowable link types: either annotate or relate-to. For each $e = (a, do) \in E_{da}$ there is a $l_{da}(e)$ – labeled edge from the annotation **a** to the generic digital object **do**. Additionally, the following constraints must be satisfied:

1. “Each annotation **a** must **annotate** one and only one digital object.”
2. “The graph does not contain loops”: meaning no annotation can annotate itself.

¹⁹ In [2] digital objects are generic documents and annotations.

3. “The graph does not contain cycles”: meaning one cannot follow a path of annotations where the starting annotation and the ending digital object (annotation) are the same. [2]

The given definition ensures that each annotation “belongs to a unique tree rooted in a document” and that each “annotation is connected to one and only one document”. The reasons being to ascertain that each annotation maps to one and only one document (a necessary constraint for a viable search algorithm), and to establish that the number of annotations in a (search) result set for a given document does not exceed the total number of annotations in the larger result set (for all matching documents).

In [2] the authors follow the definition of the “document-annotation hypertext” with an explanation of how it may be utilized in a search strategy. The documents are stored in a digital library system separate from the annotations, which are managed by a “flexible annotation service tool” (FAST) [4]. When a user enters keywords to invoke a search the digital library system does a full text search and generates a list of matching documents. These keywords are then sent to FAST, which searches the stored annotations and generates a list of matching annotations. The annotations are then mapped to documents; producing a list of documents related to (or that have) annotations. This list is combined or merged with the list of documents returned by the digital library system. Lastly, the list of documents is sorted by relevance with those that have the highest combined relevance being listed first. The formulas employed to calculate relevancy are also given in [2] but we will discuss these in the section below with respect to their application to the Griotte’s hypertext.

3.1.4.4 Discussion: The Griotte Hypertext

For comparison, within the Griotte a document is a [personal] recollection (RC) and its related historical sources (HS) are annotations. Meaning the Griotte’s definition of evidence is more formal, encompassing the aforementioned evidence categorization (in **Section 3.1.1**). With respect to link types, the annotate link requires specification to reflect the stance of the evidence. In other words for a given annotation users must be able to indicate or to determine, if the annotation supports or contradicts the noted

passage. Accordingly, in the Griotte environment the annotate link is replaced by two link types: 1) a support link, and 2) a contradict link. The base properties of the two link types are the same as those of the annotate link. To adhere to the formal definition of a document-annotation hypertext, support and contradict are mutually exclusive. Thus the constraint that “*an annotation can annotate one and only one digital object*” remains intact.

The Griotte adopts the relate-to link with one minor change. Annotations can “relate to” other annotations within the same document (or annotation). The documents of the Griotte are primarily expressed in TEI XML, one of the features of this markup language is that elements may refer to other elements within the same document (or one element may have multiple pointers to the same element) using a unique identifier. Hence, in actual implementation the constraints of the relate-to link type must be abridged. This modification does not violate the formal properties of the resulting hypertext, since the relate-to links are not used to map annotations to documents.

The similarity score formulas of the document-annotation model also require extension, to incorporate the evidentiary value of each annotation. To explain, using a ranking of the aforesaid historical sources – inclusive of transactional records, selective records, (archeological) artifacts, recollections, reflections and historical analyses – each annotation is assigned a value of $1/\text{rank} * (+1 \text{ or } -1)$; where +1 represents a support link, and -1 a contradict link. As an example, a contradicting selective record would be assigned an evidentiary value of $(-1/2)$. Hence, the compound similarity score $s_{a,q}^c$ calculated in Equation (1) of [2] is modified as follows:

$$s_{a,q}^c = \begin{cases} \alpha s_{a,q} e_{a,q} & \text{if } \mathbf{a} \text{ is a leaf.} \\ \alpha s_{a,q} e_{a,q} + \frac{(1-\alpha)}{|\text{succ}(a)|} \sum_{a_k \in \text{succ}(a)} s_{a_k,q}^c & \text{if } \mathbf{a} \text{ is not a leaf} \end{cases} \quad (1a)$$

Where $e_{a,q}$ is the evidentiary value of an annotation \mathbf{a} , in the result set of a query \mathbf{q} and $s_{a,q}$ is the (simple) similarity score of \mathbf{a} . Additionally, $\text{succ}(a)$ is a function that returns the set of successors of an annotation \mathbf{a} : while $\alpha \in [0, 1]$ is a parameter or a weight,

utilized to ascertain that annotations that are farther from the digital object have less of an influence on the resulting compound similarity score, $s_{a,q}^c$. Lastly, $s_{a,q}$ is zero for annotations along the path that do not belong to the result set. The remaining similarity equations, (2) – (4) in [2] do not require further modification for the Griotte.

However, for reference we list equations (2) – (4) below. First the similarity score $s_{d,a}$ – which is calculated by FAST and represents the cumulative similarity score of the annotations for a document \mathbf{d} – is given by:

$$s_{d,a} = \frac{1}{|\text{succ}(d)|} \sum_{a \in \text{succ}(d)} s_{a,q}^c \quad (2)$$

Where $\text{succ}(d)$ is a function that returns the set of successors (i.e. the annotations) of a document \mathbf{d} . This simply computes the average of “*the compound similarity scores of the annotations belonging to the tree rooted in \mathbf{d}* ”.

In Equation (3) s_d represents the similarity score for a document (\mathbf{d}) which involves combining the similarity score of the document and/or its annotations.

$$s_d = \begin{cases} 2(s_{d,q} + s_{d,a}) & \text{if } \mathbf{d} \in R_{d,q} \cap R_{d,a} \\ s_{d,q} & \text{if } \mathbf{d} \in R_{d,q} \cap \overline{R}_{d,a} \\ s_{d,a} & \text{if } \mathbf{d} \in \overline{R}_{d,q} \cap R_{d,a} \end{cases} \quad (3)$$

Where the set $R_{d,q}$ contains the resulting documents (selected) by query and the set $R_{d,a}$ contains the resulting annotations (selected) by query.

According to Agosti and Ferro, Equation (4) should be applied prior to Equation (3), if and only if $s_{d,q}$ does not have a value between 0 and 1 inclusive. Also the authors assume that the initial value of $s_{d,q}$ is calculated by the underlying digital library; meaning it is an input to FAST. Equation (4) which is used to normalize $s_{d,q}$ if necessary reads as follows:

$$\overline{s}_{d,q} = (s_{d,q} - \min_{d \in R_{d,q}} s_{d,q}) / (\max_{d \in R_{d,q}} s_{d,q} - \min_{d \in R_{d,q}} s_{d,q}) \quad (4)$$

Figure 2 below provides a graphical depiction of the Griotte hypertext. The documents labeled as RC (for recollections) are expressed in TEI XML or SMIL XML depending on the form of the narrative; i.e. written or verbal, respectively. [See **Section 7** for details on the use of these XML vocabularies.] The annotations labeled as HS (for historical sources) are implemented as XML elements with evidentiary value attributes. Observe the single and double solid lines signify *support and contradict links* respectively: while the dotted lines depict *relate-to* associations.

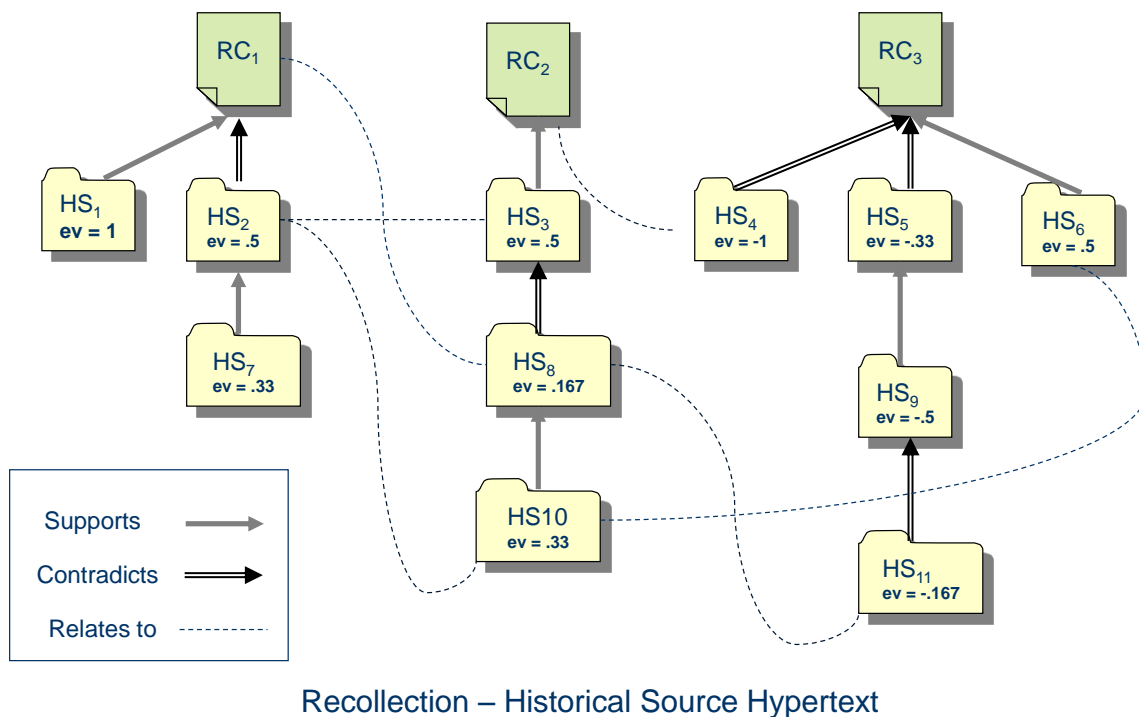


Figure 2: Griotte Hypertext. Recollections (RC) constitute documents and historical sources (HS) represent annotations.

3.1.5 Topic Maps or RDF

As mentioned earlier, the annotations of the document-annotation hypertext form an annotative context. Within the milieu of the Griotte, we desire to progress from this general context to a domain specific historical context(s). In order to build a historical hypertext the base documents must reveal information (in machine readable form)

regarding the historical events being documented. Events (e.g. births and deaths), people, places, dates and times require delineation (i.e. markup) for the computer to recognize these subjects. To this end TEI XML, an extensive XML vocabulary with elements to represent these concepts was chosen as a “markup language”. [See **Section 7.2** for a discussion of how TEI was employed in this research.] So at this juncture, we have a conceptual understanding of documents and of annotations as they pertain to the Griotte. Moreover, we have discussed the XML components – evidence elements and TEI documents – required to implement the rooted inverted trees of [2] (with documents as roots and annotations as branches and leaves). Nonetheless, what has not been addressed is a potential method for connecting the XML trees, to generate a hypertext graph and in the case of the Griotte, a semantic hypertext graph.

Presently, two markup schemes are available for this task, Resource Description Framework (RDF) and (XML)²⁰ Topic Maps. Both are capable of representing resources in the World Wide Web and both address the issue of information overload by attempting to improve “findability in the mass of data on the Internet” [77]. However, the languages have different strengths. “RDF is fundamentally a framework for metadata, that is,” best suited “for attaching a set of property-value pairs to information resources.” Whereas, “topic maps take a topic (or subject) centric view” [77], focused on establishing relationships between information resources²¹: this is expressed grammatically via topic links and topic associations. Hence, its strength is “in its ability to express a collection of resources related to a topic” [77]. Additionally, topic maps possess the concept of scope; meaning a topic and its properties may be defined within a given scope. This “gives topic maps a greater ability to model knowledge” and is “crucial when information objects participate in many knowledge-bearing structures simultaneously – a normal situation in any serious Semantic Web” [77]. Since each of

²⁰ The ISO/IEC 13250 standard defines a “*Topic Maps Reference Model*” which may be implemented in any markup language. XML Topic Maps are an application of the reference model [48].

²¹ RDF can be extended to express relationships between resources using RDF schema (RDFS). However, with respect to simplicity, available software libraries, and readability; topic maps proved to be the better tool for implementation.

these semantic technologies has its merits, the problem(s) addressed in this research were assessed and the appropriate technology was applied as mandated by the problem at hand. [See **Section 7.3** for a description of Topic Maps.]

3.2 Cultural and Social Foundations

It is the author's viewpoint that computer systems are created by human agency and as such are artifacts which are ascribed meaning and function by the social and cultural contexts that create and utilize them. Accordingly, in this subsection we consider the social technical aspects of system design.

3.2.1 Social Informatics

An underlying assumption of this research effort is that computerization of the oral history workflow process will yield productivity gains. However, studies in the field of social informatics²² have shown that the introduction of (new) computer systems into existing work environments has in many cases yielded only a nominal increase and in some cases a decrease, in productivity. Acknowledged reasons for this phenomenon, termed the "productivity paradox" include [51]:

- a) "many organizations develop systems in ways that lead to a large fraction of implementation failures; or
- b) few organizations design systems that effectively facilitate people's work; or
- c) we significantly underestimate how much skilled work is required to extract value from computerized systems." [51]

Therefore, **how** an organization computerizes or updates existing computer systems is significant. This also implies that "effective computerization depends upon close attention to workplace organization and practices" [51].

²² Social informatics is defined as "*the interdisciplinary study of the design, uses and consequences of information and communication technologies that takes into account their interaction with institutional and cultural contexts*" [51].

In assessing the workplace environment, we must first understand that work is a social act and as such forms a social context. This milieu determines the way(s) that people utilize information and communication technologies and thus influences the outcome of their work, which has ramifications for “organizations and other social relationships”, as well. Hence, computing systems should be viewed as interdependent, social technical systems consisting of [51]:

- **People** in various roles and relationships with each other and with other system elements;
- **Hardware** (computer mainframes, workstations, peripherals, telecommunications equipment);
- **Software** (operating systems, utilities and application programs);
- **Techniques** (management science models, voting schemes);
- **Support resources** (training/support/help); and
- **Information structures** (content and content providers, rules/norms/regulations, such as those that authorize people to use systems and information in specific ways – access controls).

Moreover in system design, formal ““discovery processes”” – such as “workplace ethnography, focus groups, user participation in design teams and participatory design strategies” – must be pursued to “understand which features and tradeoffs will most appeal to the people who are most likely to use the [resulting] system” [51].

The Griotte seeks to operate within two socio-cultural contexts: 1) that of the tradition bearers and of the community being studied and 2) the work environment of the subject experts conducting the research. Additionally, we are using the Internet to mediate communication between and within the two groups. Consequently, successful system design mandates empirical investigation into the “relevant life world(s)” of tradition bearers and into the “work world(s)” of subject experts. Such an investigation should focus on: the people involved, their interaction(s) with each other and the

system's features; identifying suitable support resources including online help, training and guidance; and "information structures e.g. content, content providers" (human and automatic), social constitutions and access controls. With respect to the human factor,

the perceived quality of online or offline relationships is determined by similarities in social characteristics (e.g., age, sex); content multiplexity (the number and types of conversation subjects); activity multiplexity (the number and types of shared social activities) and the duration of the relationships²³. [96]

[Please reference **Section 5** for details regarding the application of social informatics research methods in the design of the Griotte.]

3.2.2 A Cultural Framework

The *art* of oral history lies in its ability to preserve those aspects of culture that are intangible, namely a group's social norms, beliefs and core values. However, as one might imagine codifying and quantifying intangible culture for research purposes is quite difficult; merely establishing criteria for the presence or absence of culture is socially divisive. One endeavor that has made strides in this area is the Urban Institute's Arts and Culture Indicators in Community Building Project (ACIP) [49]. Begun in 1996 the chief objective of the project was to discover how, "art and culture are understood and valued at the neighborhood level by residents, community" organizers, and cultural institutions that "live or work there".

The study found that previous definitions of culture were too narrow (if not elitist) and that measurements of cultural impact or correlation(s) with other community values such as public safety needed to be established. As a result of their findings, the ACIP formulated four "domains of inquiry" that should be investigated during the execution of a community-based cultural study. The term community within the context of this research refers to a group of individuals with common interests, characteristics, or experiences.

²³ <http://informationr.net/ir/13-3/paper350.html>

The “domains of inquiry” are as follows [49]:

1. **“Presence of Arts and Cultural Opportunities”**: This involves finding out what cultural venues are available and/or frequented by tradition bearers, possibly both inside and outside of their community(s). Not only should tradition bearers be questioned but community organizers (e.g. political leaders) and affiliated cultural institutions should be polled as well.
2. **“Cultural Participation”**: Asks tradition bearers to identify ways in which they participate in cultural activities, where the term *participate* is broad in scope and may include *creation, teaching, sponsorship, consumption*, etc., of cultural opportunities.
3. **“Impacts and Contributions of Arts and Cultural Participation”**: Asks tradition bearers (and community affiliates) to identify the results, benefits, or outcomes of cultural participation, e.g. community cohesion, “stewardship of place”, “tolerance or acceptance” of cultural differences or controversy (not all cultural experiences are positive).
4. **“Systems of Support”**: Asks tradition bearers, community organizers and affiliated cultural institutions what resources were required to bring the cultural activity(s) to fruition. Resources may include social, financial, organizational, etc. Further questions may relate to whether the resources were gleaned from outside or inside of the community as well as the sustainability of these resources.

This information provides insight into how communities define or ascribe meaning to their cultural experiences, as well as input regarding the value and uses of these experiences. A broad objective of the Griotte IDE is to offer design concepts (i.e. “best practice” suggestions), as an aid to subject experts. Consequently, these “domains of inquiry” are published as guideposts for interview topics and questions. Nevertheless, subject experts have the freedom to produce interview guides that are specific to their research objectives.

3.2.3 Literacy as an Issue

Contemporary oral history has empirical biases in human (i.e. interviewee) subject selection with respect to age, education, and income. Obviously older adults are preferred as tradition bearers. Moreover, “by giving voice to people not included in the usual historical sources” [59], oral history has a tendency to favor the less fortunate or the less authoritative. As the practice of oral history is moved from the physical environment to a computer mediated milieu, it is important to continue to serve this population.

To do so begins with assessing potential tradition bearers’ current Internet adoption rate, followed by an evaluation of general barriers to Internet adoption. According to a 2004 survey only “22% of Americans age 65 and older use the Internet” [29]. At first glance this statistic may seem discouraging until one considers that technology aware “Baby Boomers” recently turned 60. In support of this statement, a 2001 survey revealed that “Internet use rates ... level off at relatively high rates for people between ages 26 and 55, and then fall among people at higher ages” [91]. It is highly unlikely that the “Baby Boomer” cohort group will discontinue Internet use. Therefore, in the future, age should not be a hindrance to adoption.

Subsequently, consider education and income. As one might expect, individuals with lower levels of education or individuals in lower income brackets are “less likely to use the Internet”. Of the two factors, the 2001 survey asserts that education has the greater impact – “people who have lower levels of education but live in households with high family income are less likely to be Internet users than those who have high levels of education and live in households with low family income” [91]. Consequently, literacy may be a key usability issue for tradition bearers.

Recently, Jakob Nielsen (a systems usability expert) conducted an Internet-based study for pharmaceutical giant, Pfizer to ascertain the needs of lower-literacy consumers [72]. Nielsen estimates that “30% of Web users have low literacy” and “because most of the higher-literacy population is already online, future growth in Internet usage mainly

come from adding lower-literacy users”. To improve “usability for lower-literacy users” he suggests the following [72]:

1. **“Simplify the text”**: “Use text aimed at a 6th grade reading level on the home page, important category pages, and landing pages. On other pages, use text geared to an 8th grade reading level.”
2. **“Prioritize information”**: “Place the main point at the very top of the page.” “Place any other important information” within the first screen-full, “to minimize the risk of users losing their place after scrolling.” Avoid scrolling if possible.
3. **“Avoid text that moves or changes”**: “Static text is easier to read.”
4. **“Streamline the page design”**: “Place important content in a single column.”
5. **“Simplify navigation”**: “Place the main choices in a linear menu.”
6. **“Optimize search”**: “Make your search tolerant of misspellings (which also helps seniors, who are particularly prone to making typos)... All hits should provide short, easy-to-read summaries.” [72]

Applying these principles in the Pfizer case yielded improved performance results for both higher and lower literacy users. These recommendations have been utilized in this research as design heuristics. Moreover, suggestions one through five are posted on the Griotte’s web site, to assist subject experts in preparing presentation materials for both tradition bearers and the general public.

3.2.4 The “New Literacy”

Cultural and media studies have begun to focus on a “new literacy”, required for effective use of information and communication technologies (ICTs). Where

‘the new literacies of the Internet and other ICTs include the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives.’ [16]

Within the media field this literacy is referred to as “media literacy” and is “defined as the ability to access, [comprehend and] analyze, [critically] evaluate, and

create messages across a variety of contexts” [16]. At this point there are no clear guidelines on how to measure or advance this new literacy. Nonetheless, equipped with the definition of “new literacy”, this research effort attempts to devise an informal means of assessing the readiness of its two primary audiences – tradition bearers and subject experts – to efficiently employ ICTs.

3.2.5 Emic versus Etic

Since there are two primary social contexts being represented within the Griotte – the tradition bearers’ and the researchers’ – the theory of emic versus etic often discussed within the field of cultural anthropology is relevant. The concept penned by linguist and anthropologist, Kenneth Pike [79] emphasizes an insider’s versus outsider’s perspective during the performance of observational or ethnographic research. Emic, from the word *phonemics* refers to the viewpoint of the “normal participant” or eyewitness. Whereas etic, from the word *phonetics* refers to the “detached observer’s view”. The reason for the distinction was Pike’s belief that the structure of language should be studied in context, as opposed to focusing on structural units such as phrases and sentences. Generally, both viewpoints – emic and etic – are necessary for an accurate recounting of an event(s).

To Pike both views are distorted. The emic “molds vision or experience so that one interprets what one sees, or hears, or understands, only through the rose-colored glasses of one’s own experiential structure.” The etic “ignores the concept of relevance, or purpose, or meaning.” Nonetheless, when human “behavior is studied simultaneously through these two approaches it is seen in a much more exciting depth of understanding”. [79]

Furthermore,

etic systems are the creation of the analyst, [scientific and] conceptual tools ready to be applied to data so that one can begin to observe them as an alien and reach toward an appreciation of the emic structuring of that data. Emic systems are discovered by the analyst, as units reacted to or constituting the reaction of native participants in events. Participants discover these units by being ‘born into’ a system – by suddenly finding

themselves in a series of events which they at first do not comprehend.
[79]

Eventually, participants become enculturated and respond appropriately to their environment. This description applies to language and to behavior.

With respect to the Griotte, the emic descriptions of the tradition bearers ascribe relevance, meaning and purpose to events, from firsthand observers or participants. These descriptions are subjective. On the other hand, the etic analyses of subject experts provide a “physical analysis of a physical event”, which are reproducible and verifiable i.e. objective. This concept of emic versus etic became vividly apparent when the author was faced with a collection of historical narratives that required translation. Since the events being researched occurred almost two hundred years ago, those with an emic view had passed on. As such finding a translator who comprehended not only the language but the context of the events was extremely difficult. [See **Section 5.4** for details concerning this aspect of the research.]

3.3 Summary

To summarize, in this section, the adopted theoretical framework and related socio-cultural theory were presented. This interdisciplinary cross-section of literature formed important foundational models for this research and was crucial in establishing a system design. In the next section, related computer applications that further influenced the design of the Griotte are discussed.

4. RELATED COMPUTER APPLICATIONS

In this section existing computing systems which have informed the development of the Griotte are discussed. An abundance of literature exists on the design and development of digital interactive storytelling systems. The focus of most of these systems is either on the features that facilitate interaction or on the structural components of stories and how these components may be combined in different ways to generate new stories. For this research, systems were sought that emphasized the intellectual content of historical narratives and the process(es) by which such narratives could be digitally compiled, stored and presented. Moreover, computing systems that support shared digital annotation in networked environments as well as systems that define annotations as hierarchies of topics were investigated. Hence, this section is divided into three primary subsections: 1) Oral History Systems, 2) Annotation Systems and 3) Ontology Based Systems.

4.1 Oral History Systems

A few research groups in the information and computer sciences have published articles describing the use of computer technology to process, store and/or access oral history testimonies. Three of these research projects, which are beneficial to the work being presented in this paper, are discussed below.

4.1.1 USC Shoah Foundation Institute

“In 1994, after releasing Schindler’s List, Steven Spielberg was approached by many survivors who wanted him to listen to their stories of the Holocaust.” [36] In response to their requests, Spielberg began the *Survivors of the Shoah Visual History Foundation* (VHF) [90] to record the oral testimonies of survivors worldwide, in an effort to educate others about the “horrors of intolerance”. In 2006, the foundation became a part of the University of Southern California’s College of Letters, Arts and Sciences and was renamed USC Shoah Foundation Institute. Presently, the collection consists of almost “52,000 testimonies (approximately 105,000 hours of video) from 56

countries, in 32 languages.” “The Institute recorded the testimonies in its archive on Betacam SP [Superior Performance]²⁴ master tapes; these tapes must be replaced by 2014 before they begin to deteriorate and [the testimonies are] lost.” [89] The Institute has a multi-year preservation effort underway to convert the Betacam SP tapes to Motion JPEG 2000, the digital format used by the Library of Congress “to archive its video collections” [89]. In addition to the preservation copy, the tapes are being copied to MPEG-1, MPEG-2, QuickTime, Flash and Windows Media Player formats for access via most Web browsers or PC based media players.

Interviewees were contacted ahead of time and asked to complete “Pre-Interview Questionnaires (PIQs)”²⁵ [36] containing demographic and geographic (e.g. prewar, during war, and postwar location) information. The initial intent of the PIQ was to give interviewers an opportunity to review interviewees’ experiences in advance, so that the interviewers could prepare to ask suitable questions. However, the questionnaires proved more valuable than anticipated: PIQ responses have been digitized and are currently being used to index, as well as catalog oral testimonies. The Institute “uses time codes to associate index terms to topics discussed at particular times within each interview” [90].

Interviews were usually filmed in a survivor’s residence and lasted on average a little over two hours. Only the Holocaust survivor appeared on camera, in a “head-and-shoulders shot”; however, at the end of the interview session survivors were encouraged to share any related artifacts they desired to have filmed. For each videotape, the originals were recorded in analog format—Sony Betacam SP. The Institute

utilizes advanced dual robot technology to digitize, preserve, and access the testimony in the archive. One robot digitizes the Institute’s original testimonies into various file formats (those mentioned above) for preservation and access. Once digitized, the nearly 52,000 testimonies are transferred to a second robot, which serves as an online storage system for the Institute’s archive. [89]

²⁴ Betacam SP was “the industry standard for most television production through the late 1990s.”

²⁵ The PIQ is an extensive 44 page questionnaire. It is available online at http://college.usc.edu/vhi/download/Survivor_Pre-Interview_QuestionnaireAugust10.pdf.

To date roughly 10,000 testimonies have been converted to digital format.

Currently twenty-one (21) universities located both in the U.S. and abroad (including Texas A&M University) have access to the full collection. The testimonies are available to researchers, teachers and students for scholarship and research; the broad objective being to promote tolerance, and to combat bigotry and injustice. To assist computer scientists in conducting similar large scale oral history projects, the foundation documented its process(es), identified the technical difficulties encountered, and offered much of its material as training or test data to other researchers: the eventual goal being “to develop a set of tools that will be useful for other oral history collections and audio materials generally” [36].

The Institute’s work revealed the value of identifying topics during the initial phase of research. These topics may be used throughout a project to format, organize, search and retrieve the narrative data. Moreover, the “Cataloguing Guidelines” used to code the data in the PIQs offers detailed instructions on how to format names of people and places, dates and relationships. This information was valuable to understanding how to computerize narrative data and how to apply topic maps in the design of the Griotte.

4.1.2 Palaver Tree Online

A Palaver tree is a West African tree that serves as the center of a village. It is a place where elders come to share their stories. It is a place where members of the community come to have disputes settled, and elders set the record straight. [26]

In a field study conducted by the Georgia Institute of Technology, school children and tradition bearers were brought together in a virtual online community called *Palaver Tree Online* [26], “to build a shared database of oral history”. The broad goals of the online community were to make oral history projects easier for teachers to manage, and to provide communication tools designed to support interaction between children and tradition bearers.

Before designing *Palaver Tree Online*, the researchers conducted two pilot studies using conventional e-mail and electronic mailing lists for communication

between children and elders. The topics of the two pilot studies were World War II and the Civil Rights Movement, respectively. It was found that elders led active lives and often did not respond within expected time frames; leading to interviews being conducted asynchronously via e-mail. Moreover, some children “did not seem to grasp that the stories their elders told them are just as valid a form of history, as what they read in books”. With regard to the level of learning, students using the oral history resources learned no more or less than those using traditional (i.e. written) historical sources. From these observations, an interaction model and the *Palaver Tree* software were developed.

The interaction model included the following steps:

1. **Recruiting**—teachers recruit elders.
2. **“Background**—students read literature from the standard curriculum.
3. **Brainstorming**—kids brainstorm questions based on their reading and send them to elders.
4. **Elders Reply**—elders respond with answers, stories, photos, and/or cartoons.
5. **Going Deeper**—students ask deeper questions based on elder replies (repeat from step 4 as necessary).
6. **PalaverStories**—kids build artifacts based on elder responses.
7. **Feedback**—elders respond to PalaverStories.
8. **Revision**—students revise their PalaverStories based on elder feedback (repeat from step 7 as necessary).
9. **Finalization**—PalaverStories are finalized.” [26]

This model has been adapted for the Griotte project, to take into consideration the current work practices of oral historians.

Lastly, the *Palaver Tree Online* user interface consisted of four major parts: “Profiles, Discussion Space, Palaver Stories, and Home Screens”. The Griotte’s user interface has a similar structure. (See **Section 6** for further details.) Acknowledging the need to accommodate disparate schedules, asynchronous communication technologies

including “comment threads” that support internal messaging are incorporated into the Griotte system, as well.

4.1.3 Books with Voices

Researchers at the University of California Berkeley, along with the assistance of Ricoh Innovations, Inc. conducted a field study, to ascertain if oral historians found “paper transcripts augmented with bar-codes — enabling fast, random access, to digital video interviews on a PDA”²⁶ — beneficial and acceptable [50]. Oral history interviews were carried out with two of UC Berkeley’s computer science professors — “recorded on digital video then converted to MPEG-2 format”. The resulting files were professionally transcribed and printed; adding bar-codes (“aligned at speaker turns and paragraph boundaries”), along with video stills, to the margins of the text.

The study showed that “users frequently and fluidly accessed recorded interviews when paper books were the interface”. Participants consulted the recordings to: obtain a “feel for” the persona of the interviewee; listen to the tone of an exceptionally gripping excerpt; and ascertain the correctness of the transcript. Moreover, oral historians “fluidly integrated video watching, into their [transcript] editing process”.

Researchers concluded “this lightweight, structured access to original recordings offered substantial benefits with minimal overhead”. What’s more, oral historians involved in the study asked “How could they switch to digital transcription tools?” To them the notion of utilizing paper transcripts as a “tangible interface”, to the initial, digital video recordings “seemed perfectly ‘natural’”.

Since there are several digital transcription systems currently available, this work does not address initial transcription, however the system is capable of importing digitized transcripts. Moreover, the Griotte does possess the capability to index audio/video clips to “speaker turns and paragraphs” as well as to digitized artifacts, as long as they are “marked-up” in the underlying TEI XML.

²⁶ Personal Digital Assistant

4.2 Annotation Systems

Without established guidelines many systems fall into the category of “annotation system(s)”. Since the Griotte is designed to provide study and interpretative tools within a collaborative environment, this subsection highlights shared or collaborative annotation systems; especially those that utilize hyperlinks to connect annotations to content. The only system covered in this section that is not a collaborative system is the XLibris reading device. This device is the defacto forerunner in the field of annotation systems; Amazon.com’s *Kindle* reading device bears many resemblances to XLibris.

4.2.1 Discussion: Collaborative Annotation Systems

The primary difference between private and shared systems²⁷ is that shared systems regard annotations as communicative or social objects. For instance, many shared systems support “threads of annotation” similar to discussion forums. In such systems the discussion is directly linked to the annotated object. Additionally, the annotation (data) types are different; they are modified to reflect the communication relation(ship) “between the content of the annotation and the” annotated object. To manage the transition between private and shared contexts, these systems usually require access control – entailing user authentication; and support electronic versioning – facilitating the selection of annotated versions. With respect to Halasz’s seven issues of hypertext, these shared systems generally address the issues of collaboration and versioning [37].

In [3] Agosti, generalizes the work context of shared annotation systems as follows:

A team of people could annotate a text for various purposes, as they are working on a common text or they are reviewing someone else’s work; annotating a text is thus a way of sharing ideas and opinions in order to

²⁷ In the literature the terms *shared* and *collaborative* were often used interchangeably. However, some authors distinguished between the two terms based on the user’s ability to engage in discourse. In these cases collaborative systems contained discussion tools, while shared systems did not.

improve a text. This process principally involves a collective dimension, because the recipient of an annotation is a team of people working together on a given subject. [3]

4.2.2 XLibris

A tablet based reading device designed to facilitate personal annotations and seemingly designed with the considerations above (in **Section 3.1.4.2**) in mind – especially the third guidepost of providing a “smooth transition from reading to annotating” and vice versa. XLibris uses a paper document as its metaphor thus digital images of documents (in portrait orientation) can be placed in a user’s lap while he/she writes on the tablet using a (free form) digital ink pen. For easy retrieval, the user’s annotations are stored in a Reader’s Notebook; allowing users to click on an annotation to navigate back to the annotated passage (in essence providing context for the note). XLibris also automatically searches for other documents and annotations related to marked text (within the current document), and creates margin links to this material. A later extension of the system includes, a thumbnail overview depicting all of the pages within a document and their related markings. Shipman’s marker parser mentioned above has extended this view to highlight “high-emphasis” passages via the use of “color and icon shape” [84, 85].

In a user study conducted by Marshall et al. [58] XLibris received mixed reviews. Nonetheless, the lessons learned from XLibris are as follows:

- **“Readers are mobile.”** Considering the ubiquity of laptops/WI-FI, the author is not certain annotation systems (as extensions of existing systems) require special features to address this. However, handheld devices may be an area of interest to annotation system developers due to the intuitiveness of note-taking.
- **“Analytic reading is, above all, reading.”** In the study readers spent 90% of their time reading. Therefore HCI²⁸ issues or the ergonomic aspects of reading should be considered.

²⁸ Human Computer Interaction

- **“Reference pursuing is important, but rare and deferred.”** To address this, bibliographic citations to related references should be linked to documents. Thus readers can choose to retrieve related materials.
- **“Annotations are unselfconscious.”** As such they are often cryptic and unpredictable. Designers should solicit input from users to interpret markings and their value(s).
- **“Readers want to return to key material and extract it.”** Readers desire to reuse their annotations for reference, writing, review etc. Designers need to facilitate this re-use. [58]

XLibris remains a prototype. Accordingly, refinements continue to be made. Primarily the device serves as a test environment for further development of “annotation infrastructures, standards, and/or interfaces”.

4.2.3 Annotea

Among shared annotation systems Annotea is the most widely referenced. Annotea is an extension of the open source browser and editor, Amaya developed by the World Wide Web Consortium (W3C) to support experimentation on and validation of nascent Web specifications. In this system the annotations are formatted as RDF XML elements “about” the content of a Web-based document(s). Moreover, the annotations are stored separately from the documents, in “generic RDF databases accessible via Apache HTTP servers” [65]. The merging of the annotations with their related documents takes place in the Amaya browser on a user’s computer. As such researchers are encouraged to develop annotation viewers (and publishers) in Amaya tailored to the needs of their target audiences.

The following is a list of features provided by the Annotea system [65].

- **“Annotated documents are well-formed, structured documents.”** Numerous annotation systems allow any Web resource with a URI (Uniform Resource Identifier) to be annotated. This is not the case in Annotea, only documents

expressed in HTML or well-formed XML can be annotated (also, Annotea annotations may be annotated).

- **“Annotations are first-class Web resources.”** This means annotations are assigned URIs by system servers and are capable of being referenced by other Web resources.
- **“Annotations are typed.”** Annotea has pre-defined annotation types which allow users to categorize their commentary, for example a note may be classified as a revision or as a correction. Since the type is implemented as a RDF property or attribute, new domain specific types may be easily added to the underlying RDF Schema.
- **“Annotation properties must be described with an RDF Schema.”** Annotea’s servers are implemented as generic RDF database systems. Accordingly, all compatible client software must generate valid RDF instance documents; otherwise their output (i.e. annotations) cannot be stored. Utilizing a non-proprietary XML-based schema increases the longevity and the interoperability of the system.
- **Both “local (private) and remote (shared) annotations” are supported.** Initially users’ annotations are stored on their personal computers at which point they are considered private. However using menu options users may elect to save these annotations to Annotea servers in essence making them shared. Access privileges to remote annotations are controlled by the Web server software (i.e. the Apache HTTP servers); Annotea does not have built-in security features.
- **Across the Internet “multiple annotation servers” may coexist.** This is possible within internal intranets (as long as they support HTTP protocols) as well. Individual workgroups may be assigned dedicated Annotea servers.

Within Annotea an annotation consists of two parts 1) a RDF compliant header or annotation metadata; and 2) the annotation’s content in HTML format, referred to as

the body of the annotation. The RDF header contains a list of properties and their associated values including: *rdf:type*, a general indicator of the purpose of the note; *annotates*, a XPointer path to an XML element within the document (i.e. a reference to a content fragment); *body*, the URI of the content of the annotation; *dc:creator*, borrowed from the Dublin Core metadata set indicates the author of the annotation; *created*, a timestamp of the date and time of instantiation; and *dc:date*, (also from the Dublin Core) a timestamp recording the date and time the annotation was last modified. This is not an exhaustive list since additional RDF properties may be added as the need arises. To reduce network traffic and to minimize response time, the textual (or graphic) content of a note is only delivered to a user's computer on demand (i.e. the user must explicitly click on the body link in the annotation's header to view the annotation).

Lastly, since annotation types are a key concept in this research, use of the *rdf:type* property warrants further investigation. Annotea uses a predefined class hierarchy to delineate type. The super class or base class is *Annotation*, from which the subclasses – *Advice*, *Change*, *Comment*, *Example*, *Explanation*, *Question* and *See Also* (indicating the note is a cross reference to another source) – are all “derived”. With respect to schema implementation, Annotea adheres to two RDF schemas; one describing the annotation header, the other defining the class hierarchy of annotation types.

Annotea is a research system as evidenced by its dependence on Amaya. However, to address the needs of a general audience a Mozilla-based web browser is better suited: It is W3C standards compliant, has name recognition amongst the general public, and is simple to install and use. To this end, Griotte is designed for compatibility with Mozilla's Firefox web browser but has been tested for usability across several browsers, including Microsoft's Internet Explorer and Apple's Safari browser. To further lessen browser dependence, the merging of annotations and their delivery as XHTML are handled by the Griotte server.

4.2.4 IPSA

Another sample system is the IPSA²⁹ extended digital library (DL) system, developed at the University of Padua [5]. It was designed to allow art historians, historians of science and botanists to collaborate on historical drawings of plants. The system supports the addition of textual and link annotations to create a rich hypertext of the digitized images. Moreover, the links are typed to represent the relationship(s) between the images, e.g. is a copy of, is an elaboration of, and is the progenitor of are possible link types. The superimposed hypertext allows users to trace the lineage (i.e. a path) of drawings; illustrative of “how scientific culture spread through Europe and countries under the influence of Islamic culture, and the possible contacts that different cultures may have had in the past” [5].

To implement the annotation features, a separate annotation server was designed, which communicates with the digital library via a gateway. The annotation (content) is stored in the digital library but requests for the annotated document are handled by the annotation server. As a brief overview of the retrieval process, all requests for documents are first sent to the annotation server, which invokes the underlying digital library’s search function. The digital library returns handles to matching documents and their associated similarity measures: the server then finds related annotations and ranks the results based on the similarity measures of both the documents and/or any related annotations. This system served as the inspiration for the Document-Annotation Hypertext Model discussed in **Section 3.1.4.3**. As an endnote, the system also handles the distinction between personal and public annotations by allowing the owners (i.e. contributors) of images to determine their visibility (i.e. private vs. shared).

4.2.5 COLLATE

A Web-based repository designed to assist film experts in critiquing early 20th century European films, COLLATE [12] is also an example of a collaborative system.

²⁹ IPSA – Imaginum Patavinae Scientiae Archivum. This system is a prototype, as well. Commercial systems were not forthcoming with design details.

The system supports workflow activities by representing annotations as meta-communication (communication about the work process). It uses three “basic communicative acts” to direct workflow: 1) Assertives – are statements with a truth value (i.e. true or false), e.g. request comments, yes or no; 2) Directives – are commands or requests to others to perform work tasks e.g. assignments; and 3) Commissives – are commitments made by individuals to perform future tasks e.g. to-do lists. To expound upon the work itself, the system uses discourse structures typed according to the possible relationships, with the annotated document(s) (i.e. film reviews). Hence, a discourse is a threaded annotation similar to an online discussion tied to a specific document. The discourse types are: elaboration, comparison (or contrast), cause, background information, interpretation, and argumentation (for or against). Discourses create a context for the documents (i.e. an annotation context). Moreover, COLLATE employs Semantic Web technologies: the documents, the annotations and their links are stored utilizing XML schemas and RDF descriptions. The Griotte has adopted the discourse types from [12] and accordingly allows typed comment threads; it also stores annotations and their links in XML Topic Map form or RDF XML.

4.3 Ontology-Based Systems

As mentioned above in **Section 3.1.5**, a design decision was made to employ topic maps, in particular XML Topic Maps (XTM), to impose structure on annotations and to link annotations both within documents and between documents. Also stated earlier was the purpose of annotations within the context of the Griotte which is to provide evidence; generally, evidence of events, people and places. However, systematic processing requires a formal definition of the nature (or the properties) of historical narratives, specifically, we must delineate those elements (or concepts) of a narrative that are verifiable.

In philosophy and in computer science this set of concepts and the relationships between these concepts are referred to as an ontology. Formally speaking,

an ontology defines a set of representational primitives with which to model a domain of knowledge or discourse. The representational

primitives are typically classes (or sets), attributes (or properties), and relationships (or relations among class members). The definitions of the representational primitives include information about their meaning and constraints on their logically consistent application. [35]

Accordingly, computing systems that define an ontology applicable to the realm of historical narrative(s) or that utilize topic maps to construct and to expose ontologies are discussed in this section.

4.3.1 Historical Event Markup and Linking (HEML) Project

Begun in 2001, the project [83] is the brainchild of Professor Bruce Robertson in the Department of Classics, at Mount Allison University in Canada. His primary goal is “to explore how disparate historical materials on the Internet can be navigated and visualized.” Initially the project used a W3C compliant XML Schema to define and to markup the properties of historical events. The identified concepts included events, periods, dates, locations, participants, keywords and references (these could be either bibliographic information pertaining to physical source materials or hyperlinks to online source materials). This initial schema lacked extensibility and efforts are underway to migrate to an RDF representation of historical events using a (internationally accepted) standard ontology for cultural heritage information. This ontology is entitled CIDOC CRM which stands for the *International Committee for Documentation (CIDOC), Conceptual Reference Model (CRM)*. CIDOC CRM became an official standard in September of 2006 and is referred to as ISO 21127:2006 [19].

In the project’s initial implementation, the goal of creating visualizations of historical events was achieved by applying “XSLT stylesheets ... to conforming [i.e. HEML] documents and generating lists, maps and graphical timelines out of them”. The XML instance documents, the XSLT stylesheets, and the generated graphic visualizations were all integrated using a Java/Apache Cocoon 2 “web publishing system”³⁰. Dr. Robertson’s analysis of this preliminary prototype “revealed some

³⁰ Dr. Robertson uses this terminology to describe Apache Cocoon; however a Java servlet-based web development framework is a better description.

deficiencies in the underlying data format”, leading him to make the following suggestions for improvement: “it ought to provide for nested events, it ought to represent relations of causality between events and it ought to express the varieties of scholarly opinion about the attributes of events” [83].

The Griotte supports nested events as well as the capability to express the analyses of multiple domain experts. However, causality in computer science falls under the subdiscipline of argumentation, which deals with the logic process(es) that lead to conclusions. Artificial reasoning is beyond the scope of this research, instead the emphasis here is on knowledge discovery and representation. Regarding the current state of the HEML project, recent posts on Dr. Robertson’s website assert that the project intends to transfer the TEI event element to RDF and that the RDF query language SPARQL will be used to generate event visualizations.

4.3.2 New Zealand Electronic Text Centre Project

The New Zealand Electronic Text Centre (NZETC) at the Victoria University of Wellington began a project [17] in 2002 to develop “a delivery system for its growing online digital library using ISO Topic Map technology”; the name of which is Topic Map Presentation Framework (TMPF). The “topics in the NZETC digital library represent authors and publishers, texts, and images, as well as people and places mentioned or depicted in those texts and images”. Moreover internal resources are linked to external resources (e.g. other online texts or electronic library catalogues) using a custom naming authority management system called Entity Authority Tool Set (EATS).

Initially the TMPF was applied to texts encoded in TEI, since then other document structures e.g. newspaper articles have been annotated. TEI was “designed to be convenient for scholars to encode complex information including information about people and places and events, as well as literary criticism, and linguistic analysis” [14]. Due to its complexity existing web-browsers cannot interpret and display TEI documents. Prior to the advent of topic maps TEI documents were transformed directly into HTML for the purpose of online display. However, many of the features of TEI are

difficult to express directly in HTML, and as an intermediate step had to be stored in a relational database and then queried for display. NZETC discovered that topic maps could effectively replace this intermediate step and could model “all kinds of metadata structures: catalogue records, indexes, tables of contents, controlled vocabularies, multiple hierarchies, glossaries, thesauri, and taxonomies, all can be linked together within a single topic map” [17].

For an ontology, a subset of CIDOC CRM was utilized. Based on the ontology, Extensible Stylesheet Language (XSL) transformations were used to extract the topics of interest from TEI documents along with the relationships between those topics. These annotations were merged with the names from the naming authority tool and with the topic types identified in the ontology, to produce a final topic map. This final topic map was used to create a website.

To do this, [they] programmed [the] web server to generate a web page for each topic in the map. To do this, the web server asks the topic map engine for a topic, and creates a web page by copying information from the topic, as well as from topics which are associated with it, and from occurrences of those topics. [17]

All associations are converted into hyperlinks allowing “for an exploratory style of navigation”. To date the digitized “NZETC collection consists of over 2500 texts covering 110,000 topics.”

“The NZETC system [17] is based on international standards for the representation and interchange of knowledge including TEI XML, XTM, XSL and the CIDOC CRM.” The Griotte incorporates these same standards; however instead of the naming authority management system (EATS), the Metadata Authority Description Schema (MADS)³¹ is employed to provide a standard XML record format for name variations. MADS was developed and is maintained by the Library of Congress’ Network Development and MARC Standards Office. It’s a W3C XML compliant “schema for an authority element set that may be used to provide metadata about agents

³¹ <http://www.loc.gov/standards/mads/mads-doc.html>

(people, organizations), events, and terms (topics, geographies, genres, etc.)” [17]. NZETC elected not to use MADS due to the lack of sharable, persistent identifiers to uniquely identify authority records. However, their EATS tool is proprietary and is still under development. Consequently, a design decision has been made to automatically generate unique identifiers for authority records within the Griotte, but this “uniqueness” cannot be maintained outside of the system. We anticipate that in the future a global public naming authority will be made available possibly by the World Wide Web Consortium, since naming should be a key issue in the “Semantic Web”.

4.3.3 Semi-Automatic and Automatic Topic Map Construction Techniques

The literature is sparse with respect to in progress research in the domain of ontology-based systems. Most of the current research effort in this area is being expended to create tools to extract ontologies from existing digital resources, and to negotiate formal ontologies (e.g. CIDOC CRM) for specific domains. Accordingly, much of the resulting literature focuses on the trials and travails of ontology construction. For researchers employing topic maps, in addition to ontology related issues they report having to

deal with large and complex information systems involving a great diversity of resources, concepts and actors. Thus, topic map construction can be very costly and can quickly become a bottleneck in any large-scale application if recourse is not made to automatic or semi-automatic building approaches. [27]

In [27] a survey of thirteen different topic map construction approaches was conducted. The authors found that “some of the[se] approaches take as input XML documents and propose to apply automated processes to leverage these documents; other approaches propose to map directly RDF metadata to topic maps”; others use “collaborative construction involving different users”; and “most topic map construction approaches are a combination of auto-generation, enrichment techniques and a merging process.” The paper’s conclusion is that further strides are necessary toward automation, since manual methods are error-prone and cannot master the volumes of information available that require processing. Also noted was that no efforts have been made at this

time toward internationalization or multilingual support in spite of the scope mechanism available in topic maps. Lastly, the authors observed that few projects have clear guidelines regarding how resulting topic maps should be evaluated.

Of the construction approaches reviewed in [27], the commonly used technique that applies most to this research is the “automatic generation of topic maps from XML documents”, since TEI XML documents are the primary source of input. Within this category there were three approaches described which may be summarized as follows [27]:

- The first technique uses an agreed upon domain-based ontology which is converted to a foundational topic map. The XML source files are then “mined” for additional topic types not included in the ontology. A visual check is conducted to ascertain whether the ontology is complete, then XSLT is applied to the XML instance documents to extract elements and attributes referenced in the ontology. The XSLT process uses the definitions and the relationships provided in the ontology, to convert the extracted items into a XTM compliant topic map – one per XML instance document. The resulting topic maps are merged yielding “a Topic Map that can be as rich as if completely hand authored”.
- The second technique stores existing knowledge structures such as ontologies, thesauri, and user-authored topic maps into a MySQL database. “Wrappers” are created for each structure type, converting these structures into a common XML schema that is a superset of the topic map XML schema (XTM). However, for interoperability the system transforms these extended XML files to XTM for import and export.
- The third technique focuses on ontology building for different classes (i.e. schemas) of XML documents. For each document set, the system creates a XSTM (XML Specification for Topic Maps) which matches the elements and the attributes in the schema with the topic types, and the association types in the ontology. Then the set of XML instance documents along with its XSTM

definition are sent to the XSTM processor (called the XSTM-P), which extracts the topic instances, occurrences and associations from the XML documents to generate topic maps.

Of the three approaches discussed the first method is the one closest to that employed in the Griotte, with the exception of the XSL transformations. In this research, the open source topic map engine TM4J (Topic Maps for Java) was used to extract topic instances, associations and occurrences.

4.4 Discussion: A Few Considerations for the “Historical Web”

With the semantic web technologies available today, the vision of a “historical Web”³² is indeed attainable, however; there are some core issues that must be addressed prior to widespread adoption. These feasibility issues were identified from a survey of the existing body of literature and are as follows:

- **Historians must have access to easy to use editing tools to “mark up” the historical events.** Additionally, these tools must hide the technical details of RDF XML (or of XTM); the level of abstraction should be similar to that provided by a general purpose word processor.
- **A formal ontology needs to be defined to describe historical events and the relationships between them.** The Names and Dates Module of the TEI specification provides a good starting point. In addition to the event element it contains constructs for ISO standard representation of time and time spans, extensive descriptors of people and places, as well as explicit elements for birth and death. Matching these elements and their attributes with the entities and properties defined in CIDOC CRM could provide a rich foundation for a historical event ontology.³³

³² Though the term “historical Web” has not caught on yet we will attribute it to Dr. Bruce Robertson, whose vision is currently driving this construct. He uses the term in [82].

³³ A **TEI Ontologies SIG** was “established at the 4th annual members meeting of TEI in Baltimore in October 2004.” Their work efforts are focused on “the development of guidelines for how to create TEI

- **To “express the varieties of scholarly opinion” on a singular historical event the concept of scope is necessary.** As mentioned above in **Section 3.1.5** RDF XML does not support scope. To express differences in perspective topic maps offer a viable solution via the built-in construct of scope. Key characteristics of scholarly expression are attribution and argumentation, to represent either in machine-readable form requires the capability to limit assertions.
- **A formal query language that “understands” the formal ontology is required.** The reason for this is to provide effective search and retrieval of historical information based on the concepts and the associations in the ontology. Such questions as “What sources document the role(s) of the Knights Templar in the Crusades?” cannot be succinctly asked of existing keyword-indexed search engines. [82]
- **A global naming authority should be established along with rules for merging (or at least cross referencing) information based on the naming authority’s records.** The purpose of the naming authority is to resolve the various formats, timeframes and linguistic expressions of a name, in an effort to uniquely identify a named object (e.g. a person, place or organization). For instance, when a request for information on Winston Churchill and World War II is made, the reliable response should include all information across the historical Web pertaining to the former Prime Minister of Britain, not Winston Churchill the novelist and author of *The Celebrity* (published in 1898).
- **Since the universe of historical data is voluminous, the different “mark-up” phases have to be automated or as a minimum semi-automated.** The digital library of the NZETC TMPF project (see **Section 4.3.2** above) contains 2500 texts and 110,000 topics. Nonetheless, within the scope of the human record in its entirety this is a diminutive project. Tools to extract ontology elements from

documents that easily may be mapped to ontologies such as the CIDOC-CRM”. The group hosts an annual workshop at the larger TEI Consortium conference. [25]

existing free form text, as well as tools to generate structured annotations (inclusive of their associations), are a must.

Obviously, this list extends beyond the talents and the time of a single individual and necessitates the support of a community of interest. Nonetheless, the Griotte project does address each of these issues albeit some in a purely experimental or cursory manner.

5. PRACTICING SOCIAL INFORMATICS: A FIELD STUDY

In an effort to understand the potential social context of the Griotte, both an informal and a formal pilot study with members of the intended target audience were conducted. The informal feasibility study was executed by presenting a conceptual overview of the Griotte – along with a discussion of the underlying principles and the potential pitfalls – to an international conference of historic preservationists³⁴. The project’s ideals were well-received. To explain the project, several proposed case studies were presented. The audience comprehended the mental model(s) and was able to assess the potential value (and weaknesses) of the Griotte through the case illustrations. Accordingly, a case study was conducted to obtain a “candid” evaluation; by observing a sample of the target audience involved in an authentic situation. An IRB (Institutional Review Board) request was filed and approved before the study (i.e. the interviews) commenced. The IRB approved Study Description is contained in **Appendix B**.

5.1 Description of Historical Sources

Recently, the Cushing Memorial Library acquired a collection of archeological artifacts related to the Mexican Army’s activities after the Battle of San Jacinto – the decisive battle for Texas’s independence. The collection is entitled the Dimmick Collection in honor of the donor, pediatrician and avocational archeologist Dr. Gregg Dimmick – a Texas A&M University alumnus. Dr. Dimmick is the principal investigator of the excavation site(s) located in Wharton, TX. These sites have been identified as the campsite(s) used by the remaining units of the Mexican army, subsequent to Commander-in-Chief General Antonio Lopez de Santa Anna’s capture. To date, Cushing Library has obtained approximately 1,200 physical artifacts from Dr. Dimmick. These have been numbered consecutively (using a four digit numbering scheme); stored in Ziploc bags; and placed in an archival filing cabinet, in a (secure) climate controlled

³⁴ The Association for Preservation Technology International (APTI) Conference in Halifax, Nova Scotia, Canada -- September 21 - 26, 2005.

room. The collection also includes audio recordings of Dr. Dimmick describing several of the artifacts. Auxiliary items include: a fired cannon ball stored in a cardboard box; an electronic inventory file of the artifacts (i.e. an MS Excel file) and an electronic bibliography of sources related to the collection.

Items not included in the collection but crucial to establishing context and gathering background information include: an accompanying book authored by Dr. Dimmick entitled *Sea of Mud: The Retreat of the Mexican Army after San Jacinto, An Archeological Investigation* [22]; two reports published by the Houston Archeological Society (HAS) [44, 45] – coauthored by Dimmick – documenting the Wharton campsites³⁵; and documentary evidence (e.g. letters, diaries, and journal entries) produced by members of the Mexican (and Texan) Army, especially firsthand accounts from the generals who took charge immediately after Santa Anna's capture. Dr. Dimmick provided a copy of his book along with the HAS reports. The bibliographies of these three texts together with suggestions from the collection's on-staff curator led to the compilation of a sizable reference list. The published diaries of General Vicente Filisola and of General José de Urrea were available at Evans Library (the main campus library at Texas A&M University) on microfiche. Photocopies of the handwritten letters of Officer Jose Pena were available at the Center for American History, sited at the University of Texas (UT). Other materials were ordered via interlibrary loan from various sources. [See **Appendix B** for a complete list of sources.]

5.2 Significance of Case Selection

The acquired collection could be categorized as combat archeology. As such it holds in-depth emotional meanings for the cultures affected by it, namely the Mexican and Texan cultures. Presently, the story of Texas's independence ends with the Battle of San Jacinto. Established belief is that the Mexican Army was decimated with the defeat and capture of their Commander-in-Chief, Santa Anna; alluding to the military

³⁵ Dr. Dimmick's collection appears to be a subset of a larger find. To which the owners of the excavated property maintain the rights.

superiority of the Texans. However, documentary evidence from both sides (Mexican and U.S.) challenges this common perception.

To explain, Santa Anna remained in captivity from April 21st, 1836 to late December (or early January of the next year) of that same year, at which time he was released and escorted by the U.S. Navy back to Mexico. Considering the deaths attributable to him at the Alamo and the ordered massacre at Goliad, later historians are puzzled concerning his “lenient” treatment and later release. One analysis is that the Texans and even the U.S. government were aware of the remaining military capabilities of Mexico and thus, desired to avoid further provocation [60]. Another analysis is, it was the “political” thing to do; from this perspective Santa Anna was more valuable alive as a tool of negotiation (to secure Texas’s annexation to the U.S.) [60]³⁶.

Material evidence uncovered by Dr. Dimmick and the Houston Archeological Society, as well as Mexican (written) documentation seemingly supports the first analysis. For instance, the HAS reports quote General Vicente D. Filisola, the second-in-command to Santa Anna, regarding the remaining army’s capacity and circumstances. According to Filisola, the remaining army consisted of ““2,573 troops, 1,200 mules and a number of non-combatants referred to as camp followers”” [45]. Moreover, the Mexican Army’s intent after hearing the news of Santa Anna’s capture was to reassemble and ““to recross the Colorado River, to re-establish communications with the Mexican Government and await aid from Mexico”” [45]. However, this plan was derailed by severely inclement weather.

The second of the two HAS reports describes the predicament of the Mexican Army as follows:

The Mexican Army that left Mrs. Powell’s [the army’s chosen meeting point] on April 26 was a well disciplined and formidable fighting force. However, they were soon rendered inept and in desperate conditions due to heavy rains that occurred April 26-27. The Bernard Prairie, now a ‘sea of mud’, brought them to a state which General Filisola wrote in a report

³⁶ <http://www.tamu.edu/ccbn/dewitt/dewitt.htm>

on May 14, ‘...the army is without clothing, the arms ruined, ammunition of every kind in bad condition, horses and mules badly used in the extreme; we have neither physician or apothecary; we are threatened with the epidemic of the season and innumerable sufferings...’ [45]

The implication being that the weather and environmental conditions thwarted the Mexican Army’s response.

Accordingly, this series of events has spawned a vibrant research community of both professionals and hobbyists: working together to explore such questions as, “Why was Santa Anna’s life spared by the Texans?” or “How might the outcome have been different if not for the severely inclement weather?” One such group The Friends of the San Jacinto Battleground (FOSJ), of which Dr. Dimmick is an officer, works tirelessly to preserve the site of the battle and holds an annual symposium to present new research. It was from this association (and HAS) that interview subjects were chosen.

5.3 Methodology

The intent was to conduct a qualitative assessment of the work practices of members of the target audience; in particular domain experts. Ethnography or observation was the preferred approach, however since the test subjects did not work together in a formal setting this was not feasible. Therefore, interviewing the test subjects about the subject matter, their interactions with each other, and their methods of discovery became the course of action. With respect to Moss’s taxonomy their body of work constitutes historical analyses and generally it was the author’s intent to evaluate how analyses are formulated and if computerization (beyond word processing) could facilitate the process.

5.3.1 Background Research

Two of the interview subjects were published (book) authors. As mentioned earlier Dr. Dimmick wrote the *Sea of Mud* and a second interview subject, Dr. James Crisp wrote the book *Sleuthing the Alamo: Davy Crockett's Last Stand and Other Mysteries of the Texas Revolution*. Another subject co-authored the HAS reports and submitted the details of the excavations in Wharton, TX to the Texas Archeological

Research Laboratory (TARL) of the University of Texas at Austin, the state's primary archeological repository. Of course to conduct the interviews their work was read in advance. Also several trips were made to the *Sea of Mud* site in Wharton, TX. Today historical markers and natural landmarks such as the San Bernard and West Bernard rivers are what remain above ground. However, after a heavy downpour of rain the area still becomes flooded and difficult to cross.

5.3.2 Interview Process

The author along with the curator of the collection video recorded interview sessions with Dr. Dimmick as well as with members of HAS and FOSJ instrumental in excavating and documenting the archaeological find. Two digital video cameras were employed: 1) a high definition Sony camera borrowed from the library's media department and used by the curator; and 2) a standard definition consumer quality Hitachi camera used by the author for back up. The high definition video recordings were to be donated to Cushing Library as visual interpretive resources to accommodate the artifact collection. The backup footage was to be used by the author for analysis.

The sampling method employed was convenience or snowball sampling. Interview subjects were asked, who else would be a good candidate to interview and we followed their suggestions. There was a definite gender and age bias in the sample. A total of four (4) male subjects were interviewed; ranging in age from 55 to 70. Though the sample size seems small, FOSJ lists a total of nineteen active members on its website. (See **Appendix C** for sample interview scripts used during this phase of the study.)

Three of the subjects were interviewed in Wharton, TX either at Dr. Dimmick's home or at the *Sea of Mud* site. To maximize lighting, on-site recordings were scheduled according to sun path charts which measure the position of the sun with respect to the horizon. One of the subjects although a native of Texas, lives and works in North Carolina. Hence, his interview was video recorded by the author using *Skype*³⁷ – an

³⁷ <http://www.skype.com/intl/en-us/home>

Internet application that allows users to place video calls; a video capture program called *Pamela*³⁸; and a Logitech webcam. The subject was also mailed a Logitech webcam and was registered with Skype (by the author).

With Dr. Dimmick, four interview sessions were recorded; ranging in length from 30 minutes to an hour. The other three subjects participated in a single (one on one) interview session which lasted approximately 20 to 30 minutes each. Thus a total of seven interview sessions was conducted.

5.4 Discussion: Lessons Learned and Results

In terms of existing computer usage, subjects primarily used their computers for e-mail, word processing, and online searches. The value of collaborating with other researchers to generate a common knowledge base to expand their resources and of introducing others to their work in the form of analyses, translations and videos was not easily grasped. The author quickly realized that within this research community (as may be the case amongst historians, in general) any addendums to the original texts are considered the “intellectual property” of the editor and as such warrants either recognition or compensation. This brings to mind Ted Nelson’s compensation model for the Xanadu [67] hypertext and digital library publishing system. In Xanadu “authors” receive compensation for original works, derivatives of original works and hyperlinks between works. Since this is not the intended direction of this research, reputation building will have to serve as the means of compensation, as opposed to any monetary rewards. At present, the Griotte is restricted from offering (full) attribution to annotation authors by the governing IRB, nonetheless in the future as mentioned in **Section 4.4** the system will allow browsing by “scholarly opinion”.

With respect to the primary source materials, it immediately became apparent that language was a barrier. All of the primary sources were written in 19th century Spanish however, none of the interview subjects were native Spanish speakers. So translation or rather interpretation of the original text into modern English was often the

³⁸ <http://www.pamela.biz/en/>

source of dispute within the FOSJ community (and its affiliates). As one of the subjects explained, translations are often unreliable or inaccurate because the translator imposes his/her own biases and cultural experiences. Thus an effective translator must not only be fluent in the language of study but familiar with the cultural context of the narrative(s) as well. On a research trip to the Center for American History at UT, the author had the pleasure of discussing the translation process with a reference librarian who is a well respected translator of 19th century Spanish. He co-authored a book with Dr. Dimmick in which he was responsible for translating the analysis of one general's diary, by a rival general. The librarian summarized his knowledge of the culture and the language by stating "I know enough to understand the sarcasm." The gist of the conversation was that the language must be understood in context.

In an effort to test whether translation tools could be added to the Griotte to support research communities with language barriers, several online and open source language tools were tested. They worked on individual words and small phrases (on average three word phrases) but not on entire sentences or blocks of text. One problem is that Spanish has actually changed syntactically since the 1800s. Many words that formerly contained the letter "v" now contained the letter "b"³⁹, similar switches occurred from "t" to "ct" and "t" to "pt". Also the accent marks over quite a few vowels had changed direction. Efforts to update blocks of text using a custom translation dictionary (called a phrase table) were unsuccessful. Hence, existing automated language tools do not have a knowledge of the past (of course) and are not able to understand context.

After careful thought, a design decision was made to support collaborative translation. Meaning an author/editor in the Griotte could list a translation, which will be public and have a hyperlink(s) to the original document incorporated in the translation. Other researchers in the system could freely comment on the progress of the translation via the typed comment thread assigned to the translation. Hence, others may assist by

³⁹ Some linguistic texts on Spanish state there was a merger between "v" and "b".

offering translated text, explanatory notes and analyses, or links to evidence. Subsequently, the accuracy and the reliability of translations within the Griotte will depend on the collaborative efforts of domain experts.

In spite of the author's attempts to remain as a neutral observer, the subjects insisted that the author become "well" versed in the activities of the Mexican Army after the Battle of San Jacinto. The author was also chided for not using "scholarly references" to delineate the history of Mexico in the interview scripts. This along with the group's general lack of interest in computers beyond their basic word processing and communication capabilities (i.e. e-mail) leads to the concept of the need for a new social group within the existing research community. A group well-versed in the subject matter, yet simultaneously well-informed of technologies applicable to that subject matter and willing to train the remainder of the community on how best to utilize these technologies. As an example, this past year the author had the pleasure of participating in the Texas Association of Museums and one of their special interest groups (SIGs) is a digital collections and technology group. They work as a team throughout the year putting on workshops and distributing newsletters. They also present at the annual conference. The other members of the association use them as a technical resource to keep them current on the latest museum (computer) applications. Hence, this new social group (i.e. SIG) would be responsible for explaining the relevancy (and the benefits) of, and providing training on, new technologies.

Obviously users will not adopt a new computing system unless there is some perceived benefit to utilizing the system. Initially the author's intent was to "itemize" the target audience's workflow process and to specify potential system features (and work practices) to facilitate each identified step. However, the field study did not reveal a common workflow process instead it exposed a common set of issues being faced by a subset of the target community. This set of issues – namely, authority and language issues – can be generalized to the larger target audience. Generally, the solutions to these problems require social-technical approaches.

For instance, one must build a reputation amongst his or her peers; accordingly, in addition to attribution, an online rating system to assess analysts' opinions may advance the cause of reputation-building. With respect to translation, although the reason offered above for collaborative translation is that context is not machine discernable, collaborative translation does provide the benefits of increase reliability and validity. These benefits are the result of the final shared artifact (i.e. the translation) not being biased by a single translator's cultural background or perspective. Finally, developing a system with a user interface comparable in complexity to those of common productivity applications is an overarching objective of the Griotte. Even if this goal is achieved the field study showed that technical support is necessary for acceptance of and acclimation to the new system.

6. CONCEPTUAL DESIGN: THEN AND NOW

In the author's Research Proposal three potential target audiences were put forth along with their anticipated contributions. The three presented were as follows: 1) tradition bearers, 2) domain experts, and 3) the general public. To investigate the feasibility of these expectations field research was conducted not only with domain experts as discussed in **Section 5** but with tradition bearers as well. The author accepted a graduate internship sponsored by the Institute of Museum and Library Services (IMLS) with the Brazos Valley African American Museum in Bryan, Texas. The position lasted for two years. During that time the author's primary responsibility was curating the museum's oral history project entitled "We Grew Up in the Brazos Valley". Observations from both experiences substantially changed the author's views regarding anticipated target audience contributions and subsequently, impacted Griotte system design. Accordingly, this section consists of the following major subsections: 1) Discussion: Field Observations Continued; 2) Conceptual Design Comparison; and 3) Application Scenarios.

6.1 Discussion: Field Observations Continued

The oral history project entitled "We Grew Up in the Brazos Valley" is one of the museum's main exhibits. The primary selection criterion for the project was residing for most of one's life in one of the seven Brazos Valley counties, including: Brazos, Leon, Robertson, Grimes, Washington, Burleson or Madison County. Additionally, participants were required to be ninety years old or older⁴⁰. The author's preferences were sixty-five years or older and/or individuals that have made a significant contribution to the Brazos Valley community. However, the selection criteria were nonnegotiable.

⁴⁰ The author realizes that the recorded field observations are definitely biased by age. However, the members of the subject expert group and the children of the tradition bearers were within the age range of the author's anticipated tradition bearer. Amongst the tradition bearers' children the author found individuals desiring to learn how to use Genealogy software and Ancestry.com but no interest was expressed in building some form of digital collection from scratch.

The author participated in eleven interviews as either an interviewer or as the video camera operator. During each interview tradition bearers were asked a series of questions from a predetermined interview script. Moreover, each tradition bearer was video recorded alone, usually in a head to shoulders shot. Tradition bearers' families were required to be present to facilitate the conversation and tradition bearers were encouraged to wear their "Sunday best" attire. Afterwards, an interview summary was prepared, of one or two typed pages and all interview related materials – the video tape, the permission form, and the summary – were labeled and stored. Interview sessions usually lasted forty-five minutes to an hour in length.

From both field experiences the author surmises that initial expectations of target audience contributions were impractical. The target audiences originally envisioned were correct: 1) tradition bearers, capable of producing oral histories; 2) domain experts whose research efforts involve analyzing historical narratives; and 3) the general public, inclusive of casual viewers interested in consuming historical narratives for pleasure or research⁴¹. Nonetheless, with regard to the source materials anticipated from tradition bearers and domain experts, these were either non-existent or off-limits; in the case of domain experts they regarded their analyses as intellectual property. These findings meant, the input required for system feasibility was not present nor could the author think of a strong enough incentive to encourage the target audiences to produce it. These observations considerably impacted the conceptual design, system design and ultimately the implementation of the Griotte demonstrator system.

6.2 Conceptual Design Comparison

In this subsection, a conceptual model for the Griotte is provided in three parts: 1) Roles and Activities – Previous and Current, 2) Data Model, and 3) Computer System

⁴¹ A sample population of each audience group was identified and observed (the sample population of the general public, consisted of those who took the usability survey discussed later in **Section 8.3**) Each group was eager to participate in activities supportive of the author's research, it's merely the degree of participation that was less than expected.

Architecture. As a comparison, the original concepts are presented with emphasis on the modifications that were made in light of the field study observations.

6.2.1 Previous Roles and Activities

Figure 3 below depicts the various collaborators and their anticipated contributions to and uses of the system, as initially envisioned. In addition to (oral) narratives, tradition bearers were encouraged to share photographs, electronic recordings, and/or personal artifacts, related to the historical event(s) being investigated. For tradition bearers who were not available either due to death or other incapacities, subject experts were to collect these items on their behalf. Generally though, subject experts had the primary roles of designing the research project(s) and of conducting the research effort(s). Specifically, during the *design* phase subject experts were to: choose the phenomenon to be investigated; identify the tradition bearers to interview (or research); develop pre-interview surveys; conduct background research and create initial interview guides (topics and questions).

The double arrows in **Figure 3**, between the user groups and their contributions indicate that tradition bearers and subject experts are also considered as users of the system's contents. The double arrow linking the contribution(s) of subject experts to those of computer specialists denotes that system design and development are iterative, informed by user feedback – system design remains iterative. Initial Griotte system design, implementation and testing were led by the author of this paper. In the future, volunteers may be solicited to assist with web site administration and technical support. External users were only to have access to a subset of the system's features and contents – primarily due to intellectual property and creative rights issues. (The dashed lines in **Figure 3** and in **Figure 7** below indicate limited access.⁴²)

⁴² System security and access control are provided by the underlying DSpace system and are based on user and group rights.

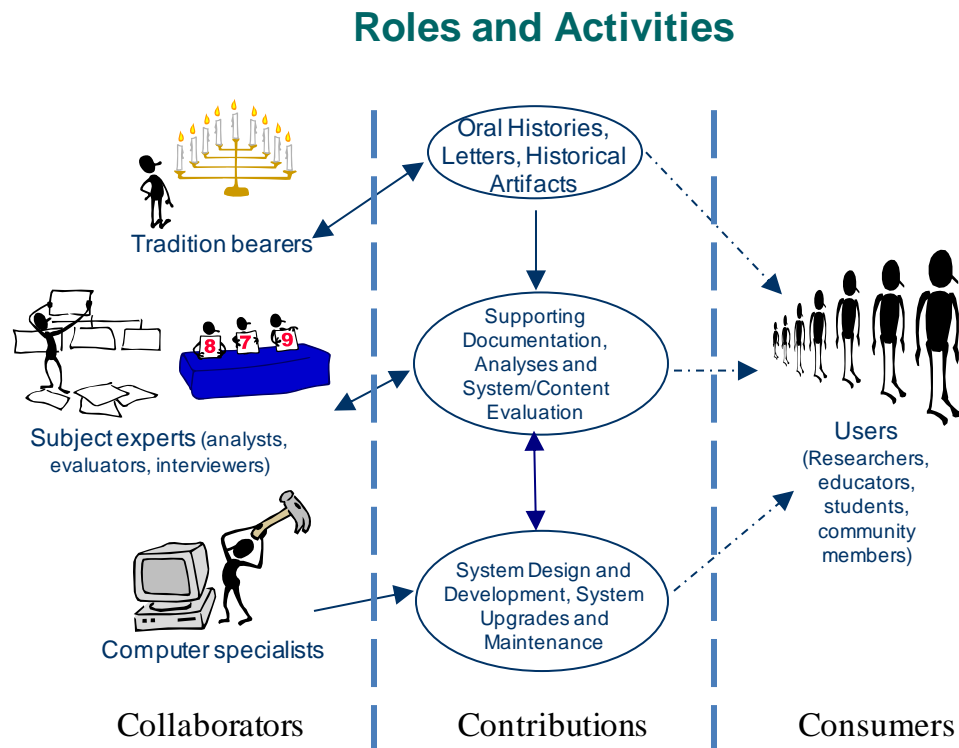


Figure 3: Collaborators' Anticipated Responsibilities. The Griotte is a cooperative effort soliciting support from multiple disciplines.

6.2.2 Current Roles and Activities

Though clear demarcations still exist between the projected user groups, the lines between their anticipated contributions are no longer as clearly defined. Taking a cue from the success of social networking web sites such as Facebook and Twitter, users are only expected to enter information in the form of short statements or small “chunks” of text. Within the context of this research this includes user entered comments, website recommendations and authority information – used to establish a shared names list as previously covered in **Section 4.4**. Such information may be entered by a member of any of the target audiences. **Figure 4** below illustrates the **Add a Comment** form.

Note, we have adopted the discourse types from the COLLATE system covered in **Section 4.2.5** including elaboration, analogy, contrast, cause, background information,

interpretation, supporting argument and counter argument. This forms an annotation thread, similar to a discussion thread and provides context for those entities within the system that possess comments. Initially any object which could be referenced with a Uniform Resource Identifier (URI) was considered as being “comment worthy”. However, this has been narrowed to include authority names, documents, and collections; the key metaphors of the system. Lastly, for accountability users are required (currently it is optional for IRB purposes) to enter their e-mail addresses.

Figure 4: Add a Comment Form. Note the adoption of the discourse structures.

Figure 5 displays a **Resource Recommendation** form. Instead of having tradition bearers or domain experts upload digitized content directly into the Griotte system, they are asked to list the URIs of: online oral history collections⁴³ – in progress or completed; supporting documentary evidence; and/or other digitized artifacts, using a

⁴³ These may be projects the user is actively involved in or merely has knowledge of and deems appropriate for the Griotte system.

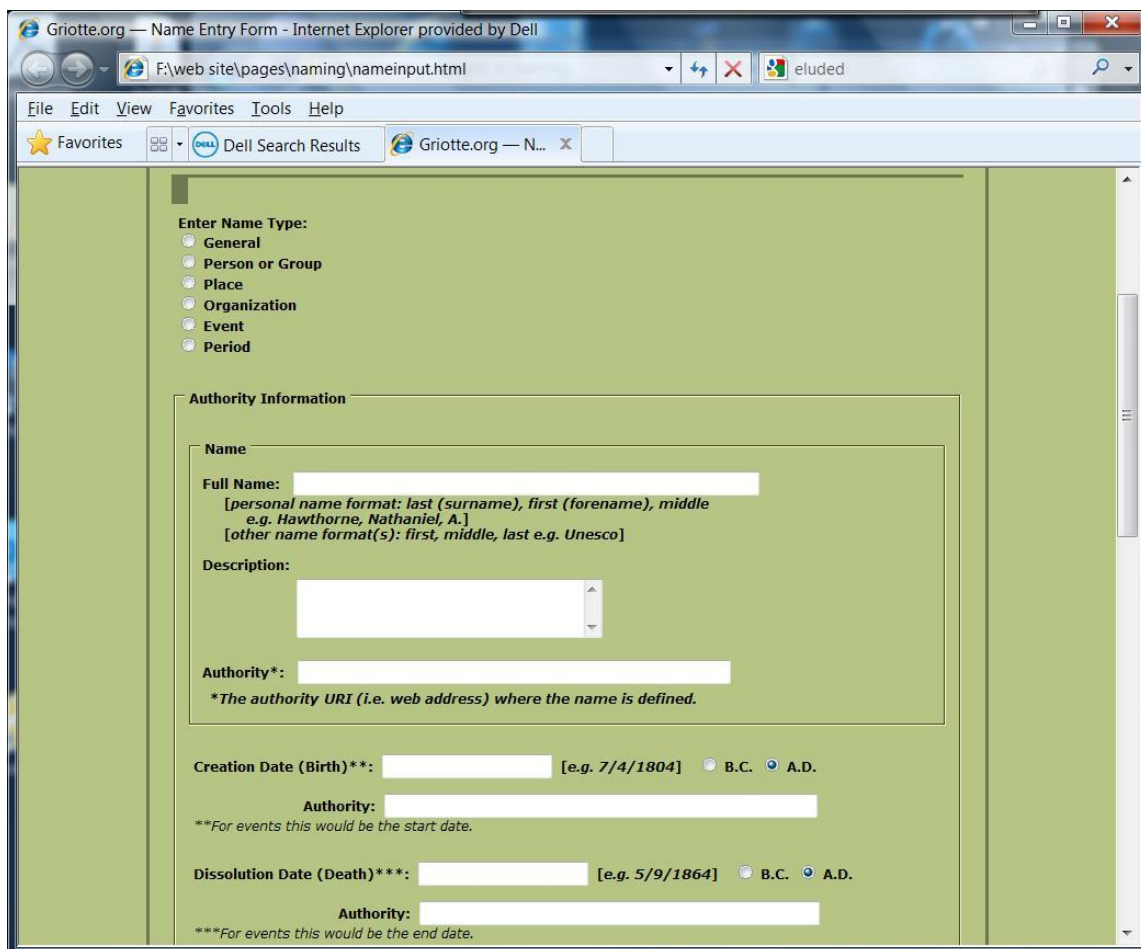
Resource Recommendation form. Subsequently, these resources are retrieved and manipulated as if they are local to the Griotte file system. This is accomplished by utilizing the World Wide Web Consortium (W3C) Document Object Model (DOM) interface available in Java.

Figure 5: [TEI] Resource Recommendation Form. Observe users are required to identify and to justify their recommendations.

Observe users are asked to identify the URI of a Collection's homepage as well as the URI of the resource being listed. This allows the system to assign the resource to the proper collection. Permission is also requested to crawl the source's website, starting with the Collection's homepage; to search for additional resources e.g. other documents that also belong to the collection but may be too numerous to list manually. Finally note,

that justification (of case) is required along with the recommender's e-mail address. Thus, the recommendation though merely a “blurb” is an expression of a user's selective judgement. Recommendations like comments are open to any user desiring to expend the effort, nevertheless all commentary will be monitored and inappropriate material will be removed.

Figure 6 displays an **Authority Name Input** form. In addition to the “authorized” name, the form has fields for birth and death information along with fields for variant and related names and their relationship(s) to the authority name.



Griotte.org — Name Entry Form - Internet Explorer provided by Dell

F:\web site\pages\naming\nameinput.html

eluded

File Edit View Favorites Tools Help

Favorites Dell Search Results Griotte.org — N...

Enter Name Type:

- General
- Person or Group
- Place
- Organization
- Event
- Period

Authority Information

Name

Full Name:
[personal name format: last (surname), first (forename), middle e.g. Hawthorne, Nathaniel, A.]
 [other name format(s): first, middle, last e.g. Unesco]

Description:

Authority*:
*The authority URI (i.e. web address) where the name is defined.

Creation Date (Birth):** [e.g. 7/4/1804] B.C. A.D.

Authority:
**For events this would be the start date.

Dissolution Date (Death)*:** [e.g. 5/9/1864] B.C. A.D.

Authority:
***For events this would be the end date.

Figure 6: Authority Name Input Form. Note that the names are *typed* e.g. general, people, places, organizations etc.

Within the system two names reference the same entity if the authority name, as well as the birth and death dates match⁴⁴.

The Authority field, which identifies the URI of the organization that controls the official representation of the name, is required input. As is the case with the input information mentioned above, any user may enter an authority name provided he/she includes the proper data. However, to modify a name after it has been submitted, a request must be made to the system administrator. The point being to avoid an inadvertent name change that impacts searches across the system or to avoid sabotage. Furthermore, prior to submission each input field (on each form) is validated for proper formatting e.g. date, time, URI, e-mail address, numeric and text values are checked for proper syntax and ranges. These changes overall considerably reduce the anticipated manual and intellectual contributions from tradition bearers and domain experts.

6.2.3 Data Model

Theoretically the data model remains the same; the primary difference in practice is that the data (as opposed to the metadata) is remote to the Griotte file system. In other words, the Griotte file system stores annotation(s), inclusive of topic maps and RDF XML metadata. **Figure 7** illustrates the data model, which will be replicated for each digital oral history project. A given project may not possess all of the source types shown. Nevertheless, during indexing the materials collected will be classified according to Moss's evidentiary model [64] discussed in **Section 3.1.1**. To relate or to connect historical sources to oral histories the evidence attribute or evidence element introduced later in **Section 7** must be used; meaning within the oral history text one must "mark-up" an event, person, place etc., then create an evidence child element (or attribute) that (hyper)links to the source or cites the source.

Figure 7 also illustrates some minor changes to Moss's model. Added to Moss's model are archeological artifacts, they provide physical evidence of time, place and function. Digital imaging introduces the possibility of incorporating surrogates of

⁴⁴ Variant and Related Name information are not shown in **Figure 6**.

material artifacts into digital collections. In terms of authority (since these usually provide minimal descriptive content, yet are contemporary to the event(s) being investigated), their ranking should be third in the evidentiary model – below selective records.⁴⁵ As mentioned earlier, within the context of this research tradition bearers provide recollections and reflections (intermingled); in light of the field study observations the anticipated delivery format is (video) recordings. Moreover, domain experts are expected to provide historical analyses, either their own or recommend those of a predecessor. Again the anticipated digital format for lengthy analyses is an audio-video recording. These assumptions mandate the support for multimedia tools (e.g. SMIL) within the Griotte.

As each resource is ingested, its descriptive metadata is retrieved (from the resource's header) as a series of key-value pairs, and stored in the Metadata Values table of the DSpace database. These key-value pairs must be in either TEI XML, XHTML or RDF XML format as well as compliant with the Dublin Core standard.⁴⁶ At this point, we will clarify the types of digital files retrieved and processed via the W3C DOM interface. They include the following:

- **Audio and video files** containing recordings of interviews, eyewitness reports or analyses. These should be encapsulated in *Synchronized Multimedia Integration Language* (SMIL, pronounced "smile"), XML-based files. The metadata element(s) of these files must be in RDF XML format in order to be "read".
- **Text-based files** – encoded in the Unicode character set – containing interview transcripts, memoirs, letters, and/or diaries. These must be in text as opposed to image form so that they may be "marked-up" with TEI elements and referenced by topic maps. The system also converts PDF files to text, if the user selected "save as text" as opposed to "save as image" when he/she created the file.

⁴⁵ The historical value of archeological artifacts was made apparent during the field study covered in **Section 5** above. The crux of Dr. Dimmick's argument rests on the physical evidence (i.e. munitions and military paraphernalia found near the San Bernard Rivers).

⁴⁶ The digital library selected exposes Dublin Core metadata to other repositories in accordance with the *Open Archives Initiative – Protocol for Metadata Harvesting* (OAI-PMH).

Additionally, documents formatted in XHTML and TEI, versions P5 and P4⁴⁷ are suitable as well.

- **Image files** consisting of digitized photos of historical documents, archaeological artifacts and other physical evidence. The system will accept PDF files containing a single image per file (at this time the one image per file rule is not enforceable but highly recommended) and/or image files in a format recognizable (i.e. known) by DSpace (e.g. JPEG, TIFF, PNG, BMP etc.).⁴⁸

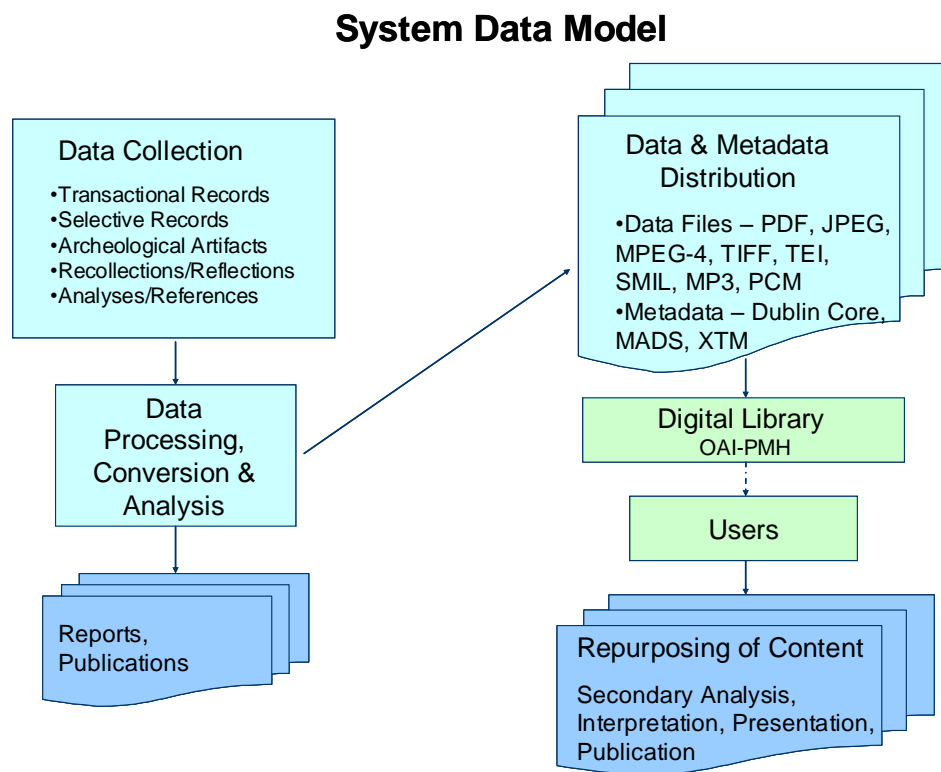


Figure 7: System Data Model. This model is repeated for each digital oral history collection.

⁴⁷ The system has been tested for backwards compatibility with the prior XML (P4) version of TEI.

⁴⁸ DSpace has a bit stream format registry which can be extended to support additional file formats, as they become available.

6.2.4 Computer System Architecture

Appendix A, Figure A-1 portrays the computer system architecture of the Griotte. Crucial to the system's architecture is the Tradition Bearer's and the Researcher's input via standard web browsers and their own Internet Service Providers. Initially, a dedicated portal for each of the two audiences was planned. However, given the observations of the field studies, the decision was made to allow shared (interest) pages such as collection pages to serve as portals and to be a means of communication between tradition bearers and subject experts. Using either the Comments section or the News link at the top of a collection page, subject experts can deliver pre-interview questionnaires and other pertinent materials. Prior to providing their testimonies tradition bearers may complete the pre-interview questionnaires⁴⁹, to aid subject experts in establishing cultural frameworks unique to the communities being investigated. (See **Section 4.1.1** for a description of pre-interview questionnaires and their application.) Subsequently, tradition bearers testimonies' may be recorded in audio/video form either via webcams and digital microphones (over Internet conferencing e.g. utilizing Skype and Pamela video capture software), or via digital camcorders and digital microphones used onsite (probably in a tradition bearer's home). To facilitate the interpretation process of future scholars, subject experts' analyses of the collected materials will serve as crosswalks between the testimonies and the evidentiary artifacts, in order to ascribe meanings to artifacts within their cultural context. Note, the term crosswalk implies linking or an interrelating, thus as a minimum a text-based pre-interview questionnaire and/or interview summary is necessary for indexing (i.e. automatic topic map generation).

The term *community* digital library is used to emphasize (a core concept) that anticipated oral history projects will take place within the context of a (real) community (albeit loosely defined). Moreover, the author desires to stress the importance of sharing the knowledge produced with the community being investigated.

⁴⁹ Pre-interview questionnaires will be administered in an application external to the Griotte, at present the chosen online survey tool is Survey Monkey (available at <http://www.surveymonkey.com>).

6.3 Application Scenarios

In general, the Griotte computer system facilitates compilation, analysis, and presentation, of digital oral history collections and supporting documentary evidence. Originally, the usage scenarios were rigid and based on the Interaction Model presented in **Section 4.1.2**. However, the model represents theory or proposed best practices as opposed to prevalent practice⁵⁰. The system objective at this point is to facilitate or to promote best practices but not to enforce them. To demonstrate the shift in viewpoint, the initial usage scenario(s) is presented first. It begins with the creation of an empty digital collection. Moreover, each digital collection is viewed as a project, with a project manager who may or may not enlist the help of a research team⁵¹.

Once a project manager creates a project the next step is to specify the details of the project. These include the phenomenon to be investigated; research period; selection criteria for tradition bearers and participating domain experts; type of research evidence sought; known biases and restrictions; hypotheses and other information typical of research proposals. This information will be saved and posted (or linked) to a project's home page, along with the project manager's contact information – this is an addendum to a collection's metadata in DSpace. [See **Figure 8** for a sample project home page.] At this point considering the scope of the project, the manager could either prepare a distribution list and e-mail other potential researchers for assistance, or continue alone.

As described earlier in **Section 4.1.2**, the developer of *Palaver Tree Online* devised an iterative interaction model for interviewing the elderly regarding a major cultural event (in that case, the Civil Rights Movement of the 1950s and 1960s). This model was adapted for the Griotte to take into consideration the theorized work practices

⁵⁰ In addition to the field research discussed, the author also actively participates in an Oral History Mail list and interviewed an oral history professor at the University of Texas in Austin regarding proper practice. Texas A&M has an esteemed oral historian on staff who is both a prolific author on the subject and the former president of the national Oral History Association. He interviewed the author for the Brazos Valley African American Museum internship, however, he resigned from the museum's board (of directors) shortly thereafter, partly due to a difference in opinion over oral history practices.

⁵¹ In the usage scenario provided, a team effort is assumed, to emphasize the collaborative nature of the project.

of professional oral historians – as illuminated in the oral history literature. The modified **User Interaction Model** [26] includes the following steps:

1. **Recruit**—enlist tradition bearers and/or domain experts (i.e. interviewers) online and offline.
2. **Background Research**—interviewers gather background information on interviewees and the event(s) being investigated. Documentary evidence should be available to tradition bearers, as well.
3. **Brainstorm**—develop topics and interview guide(s) collaboratively among interviewers.
4. **Interview**—tradition bearers respond with answers, photos, and/or artifacts.
5. **Elaborate/Clarify**—interviewers ask “*deeper questions* based on” previous responses. (Repeat from step 4 as necessary).
6. **Build Artifacts**—edit audio/video recordings and create transcripts. Also connect tradition bearers’ statements to gathered evidence.
7. **Obtain Feedback**—tradition bearers assess artifacts for accuracy and completeness.
8. **Revise**—interviewers edit artifacts based on tradition bearers’ feedback (Repeat from step 7 as necessary).
9. **Indexing**—interviewers check the system generated topic maps, for completeness and accuracy.
10. **Archive**—preserve finalized artifacts and analyses along with interviewers’ annotations, tradition bearers’ contributions, and data reconstruction details.

Throughout the remainder of this subsection, we employ the modified interaction model to delineate the (previously) anticipated system usage.



Figure 8: Sample Project Home Page. Each digital oral history collection has a home page describing the project in detail and listing recent comment posts.

6.3.1 Recruiting Domain Experts and Tradition Bearers

Potential researchers receiving "an invitation" e-mail will be directed to an online registration form via a hyperlink. If an invitation is accepted, as evidenced by the completion of registration, the individual(s) is added to the project's (user) group of domain experts. (Project managers register prior to project creation.) Subsequent to research team formation is interviewee selection.

Prior to recruiting tradition bearers, domain experts will "flesh out" a list of topics related to the research subject (i.e. identify the collection-specific ontology) and will clarify the structure and location of the informant group. This brainstorming process may occur synchronously by means of online audio/video conferencing (e.g. Skype) or asynchronously via the project's comment list. Next, a sample from the informant group will be invited to participate via written letters or e-mail, explaining the project and the online registration process. Initial correspondences (both online and offline) with potential interviewees should clearly explain: the purpose and conduct of the project; the personal data collected and its use; how the testimonies will be used; the procedures for privacy and accuracy; the possibility of global access to testimonies; the (traditional) relinquishment of copyright to the archival institution; and the right to seal some or all of their testimony, for a specific period of time.

6.3.2 Background Research

After a group of respondents has been confirmed, domain experts must gather and digitize background information (e.g. transactional records and selective records), for import into the system. They will poll respondents (i.e. interviewees) and/or conduct research to locate contracts (i.e. official documents), photographs, published articles, journals, diaries, film footage and/or other relevant material artifacts. With regard to access privileges, primary and secondary sources collected by researchers may be accessed by all project participants, including contributing interviewees. Interviewees will have read only access to sources but they will be able to post to collection and item comment lists.

6.3.3 Brainstorming

Project design is iterative: hence, researchers will revisit and refine the central **topic list** throughout the lifecycle of the project. Using a “current” topic list, possible interview questions may be devised for each topic. Researchers will also determine the chronological scope and order of the events being investigated. Since the list of interviewees should be somewhat “stable” at this point, researchers should begin preparing and entering the names of project relevant people, places and events. From this information – the topics, the questions, an outline of the events and a name list – offline⁵² progress charts could be created, to later record (i.e. “check off”) for each interviewee, the topics discussed, the questions answered and the “remembered” order of events.

6.3.4 Interviewing and Elaboration/Clarification

Now the team is ready to schedule interviews with tradition bearers. The recording equipment used as well as the location chosen will be determined by: project funding, participants’ schedules, and the desired quality of the resulting artifacts. If expense is a major concern, interviewees may be interviewed online utilizing web cams

⁵² Currently the Griotte does not support online preparation of progress charts; however, to facilitate collaboration they may be attached to comment posts.

with built-in microphones, Skype and a Skype compatible video capture program (e.g. Pamela). Subsequent to equipment selection, project metadata should be updated to include the equipment utilized and the method(s) of digitization.

Digitized interviews (i.e. audio/video recordings) must be imported into the Griotte and should be *team* reviewed. During a review, researchers will: note missed topics and questions; update progress charts; and annotate contradictory statements. As a result, online group meetings (outside of Griotte, potentially in Skype) may be convened to determine if project direction and progress are as anticipated. Adjustments in topics, questions, and chronology could occur at this juncture. Based on these assessments, additional questions may be posed to interviewees or the interview phase may be closed. The interview process is often incremental and involves several sessions with individual interviewees, to avoid fatigue and to verify previous assertions.

6.3.5 Editing

Following the interview phase, project metadata needs to be reviewed and updated, and preliminary artifacts (“unmarked” transcript files and digitized images of evidence) require import and annotation. Deviations from the initial project objectives, methodology, or procedures as well as interview session details (e.g. interviewee attitudes, inaccuracies, reticence, or dishonesty) must be illuminated. Additionally, audio and video recordings must be edited offline via video editing software. The Griotte editor supports the creation of SMIL template files, which must be modified to the desired layout of multimedia presentations; including the order and the duration. TEI template builders are also available.

6.3.6 Feedback and Revisions

Preliminary artifacts should be presented to interviewees for approval. Based on their comments modifications may be made to the video recordings or to the transcripts. Interviewees may post their comments to the project’s comment list. Even if researchers choose not to incorporate interviewees’ suggestions, interviewees’ annotations will be

saved with the final artifacts. The names list should be reviewed and updated during this phase, as well.

6.3.7 Indexing

Once the artifacts (e.g. videos and transcripts) are stable, they are submitted to the Topic Map Builder. The [history] event-based ontology employed by the Griotte is combined with the project's ontology (i.e. the user defined topic list) to create a foundational topic map. Furthermore, the project's name(s) list is merged with the Griotte's central name list. The (TEI) XML source files are then "mined" for additional topic types not included in the base ontology. A visual check is conducted to ascertain whether the ontology is complete, then the Topic Map Builder applies the rules of the ontology to the XML instance documents to generate a XTM compliant topic map – one per XML instance document. In addition to the instance documents, an index is built by merging the resulting topic maps into a single topic map, the size of which may be too large to visually scan against the source files. If corrections are made, the source files must be resubmitted to the Topic Map Builder.

6.3.8 Archiving

Before archiving, the team should review all project content and preview all presentation materials. Consequent to team approval, the project is marked as completed and all artifacts are submitted to DSpace. Prior to submission the artifacts are stored and managed by a backend database. For researchers using written narratives (e.g. letters, diaries, memoirs etc.) as source material, the process is similar except, of course, there is no interaction with tradition bearers.

6.3.9 Communities of Practice

Step **6.3.7, Indexing** remains the same, as well as the use and availability of templates on the Griotte website. Furthermore, the author anticipates the aforementioned activities (to some extent) will occur on the domain experts' websites, as they prepare digital collections that will later be indexed by the Griotte. In light of the fast-growing,

social networking phenomenon it is the author's viewpoint that (composite⁵³) oral history collections could be produced which are egalitarian, dynamic and organic, at least within the environment of the Griotte⁵⁴. This eliminates the need for a dedicated project manager (willing to donate his/her time) role, as described in the above scenario(s). Instead the author proposes that in its current implementation the Griotte supports (composite) oral history collections, which could grow and be nurtured, within the context of "communities of practice" [95].

In DSpace the primary conceptual units are communities, collections and items⁵⁵: where all items are "owned" by at most one collection, and all collections belong to one or more communities. The Griotte adopts and broadens these concepts. As alluded to above, a Griotte collection is an extension of a DSpace collection and a XML instance document inclusive of hyperlinks to its associated digitized images (or digitized audio/video files) constitutes a DSpace item. However, due to the strategic role of communities within the Griotte, we resort to an extended definition of the term, *community*. Communities in this research are deemed to have the characteristics of "communities of practice", a core concept in knowledge management literature.

Communities of practice are self-organized, social entities that "develop around things that matter to people" [95].

"A *community of practice* defines itself along three dimensions:

1. **What it is about**—its joint enterprise as understood and continually renegotiated by its members.
2. **How it functions**—the relationships of mutual engagement that bind members together into a social entity.
3. **What capability it has produced**—the shared repertoire of communal resources (routines, sensibilities, artifacts, vocabulary, styles, etc.) that members have developed over time." [95]

⁵³ By listing the URIs of collection materials, different resources may reside on different web servers and thus multiple individual collections could contribute to a larger composite collection.

⁵⁴ Since we are storing metadata only and amassing multiple collections.

⁵⁵ Bundles and bitstreams are also key functional units in DSpace but are esoteric in this discussion.

Communities of practice are dynamic and progress through multiple phases of development as their levels of interaction and their communal activities change.

These communities are important within organizations and societies because they “fulfill a number of functions with respect to the creation, accumulation and diffusion of knowledge” [95]. Moreover, they impact the learning potential of their surroundings (e.g. an organization or a broader community) by sharing their amassed knowledge. Therefore, it is important to cultivate and facilitate communities of practice, with social and technological infrastructures. The Griotte is (somewhat) designed to provide such an infrastructure(s) via shared annotations, and ontology-based knowledge management and representation tools. A disadvantage of communities of practice is that they “die” when they have served their purpose. This is not problematic for oral history collections (as long as the web space is not reclaimed). Hence, beyond the aforementioned accountability features and the posted guidelines, the rules regarding collection management should be delegated to communities of practice.

6.4 Summary

The Griotte extends the DSpace digital library system primarily by adding XML tools and semantic technologies. A major issue in semantic systems is determining “who” will provide the annotation essential for machine readable content. Hence, with respect to human agency, the primary objective of this section was to answer the subsequent questions: “What roles will individuals play?”, “What tasks will they perform?” and lastly, “What informational content will they provide and how?” To address these inquiries, a conceptual overview along with explanations of how the overview has evolved in light of field research conducted by the author was presented. The next section describes the semantic technologies that form an experimental testing ground for the “Historical Web”.

7. THE DESIGN OF THE GRIOTTE

If HTML and the Web made all the online documents look like one huge **book**, RDF, schema, and inference languages will make all the data in the world look like one huge **database**. – Tim Berners-Lee (Berners-Lee, 1999) [8]

The Griotte system augments the DSpace environment by providing the following: a domain specific ontology, (dynamic) semantic hypertext construction, and semantic browsing and search capabilities. The overarching objective being to build a viable prototype for the “Historical Web” introduced in **Section 4.4** above. In this section, we discuss the design effort expended thus far to construct a Historical Web within the milieu of the Semantic Web – as envisioned by Sir Tim Berners-Lee [7, 9].⁵⁶ Accordingly, this section contains the following four primary subsections: 1) an overview of the Semantic Web; 2) a description of TEI XML documents and their use in the Griotte; 3) a high-level introduction to topic map concepts, along with examples of how those concepts are applied in the Griotte; and 4) a summarization intended to integrate the various concepts presented in this section, via a discussion of automatic topic map generation, as implemented in the Griotte.

7.1 Weaving Webs – An Overview of the Semantic Web

On Wednesday, January 27, 2010 Steve Jobs the Chief Executive Officer of Apple Computer, Inc. introduced the Apple iPad – part eBook (i.e. electronic reading device), part wireless communications device, and part digital entertainment center with video and gaming applications. News analysts spent the day assessing the future potential and impact of the device, “Would it revolutionize reading and hasten the demise of the book?”, “Is it the next killer Internet device, the ‘must have gadget’ that would spur the ‘entire world’ to utilize the Internet?” One reporter mused, which will

⁵⁶ The author visualizes the “Historical Web” as a subset or as an application of the Semantic Web.

have the most lingering impact Steve Jobs' iPad or the President's proposed jobs initiative, put forth in his State of the Union Address also broadcast on January 27th. Another analyst interviewed Sir Tim Berners-Lee, "the father of the World Wide Web" to obtain his opinion on the potential affect of the iPad. Berners-Lee rarely grants television interviews, in his book *Weaving the Web* [8] he expresses a suspicion of the media due in part to being misquoted early in his career.⁵⁷

At the beginning of the interview, the analyst introduced Berners-Lee as the inventor of the Internet.⁵⁸ At which point Sir Berners-Lee responded, "I invented the Web, NOT the Internet!" He continued on by explaining that though many were excited about the applications being made available on the iPad, it is the device's physicality or mobility that is the most impressive. At 0.5 inches thick and 1.5 pounds in weight, it increases the opportunity to "access the Web anyplace and anytime". Thus, the iPad is merely one of many mobile devices. With emphasis he stated, "Now a really important move is the move to mobile." ... "It's really important that the Web can work on anything." Berners-Lee further described how access to smaller, cheaper mobile devices (e.g. cellular telephones with Internet access) could change markets in developing countries like India by providing the small farmer or fisherman with pricing information that could improve his stance in negotiations. The interview concluded with him predicting that not only will we "see" the Internet on smaller devices but as pixels (have) become cheaper (and will continue to decrease in price); we will see billboards and advertising replaced by "larger and larger" plasma screens with increasing resolution, displaying Internet content nonstop.⁵⁹

⁵⁷ He reflected upon the experience with the following words: "I had learned how difficult it is to determine what a reporter does and does not understand, and how vital it is to get one's story across in no uncertain terms" [8].

⁵⁸ The Internet traces its theoretical beginnings to the formation of the Defense Advanced Research Projects Agency (DARPA) in February of 1958, a U.S. agency initiated in response to the USSR's launch of the Sputnik satellite. British scientist Tim Berners-Lee is credited with inventing the Web in 1989.

⁵⁹ Tim Berners-Lee, CNBC Interview, January 27th, 2010.

In his book *Weaving the Web* Berners-Lee predicts that the existing Web will evolve into the “Semantic Web” – thus it is fitting that we reference his conceptual proposal(s) as a theoretical foundation for the Historical Web. In his seminal article “The Semantic Web” Berners-Lee (et al.) reveals the potential of the future web by describing a possible application. The application scenario unfurls as follows (for brevity the scenario has been paraphrased) [10]:

A gentleman was listening to his entertainment system when the phone rang. When he answered, the phone signaled to the entertainment system and “to all other local devices with a volume control” to lower their volume. The person on the other end was his sister calling “from the doctor’s office”. She said “Mom needs to see a specialist and then has to have a series of physical therapy sessions. Biweekly or something. [sic] I’m going to have my agent set up the appointments.”

While at the physician’s office, the sister controlled her Semantic Web agent using a web browser on her mobile device (probably a cellular phone). “The agent promptly retrieved information about Mom’s prescribed treatment from the doctor’s agent, looked up several lists of providers, and checked for the ones in-plan for Mom’s insurance within a 20-mile radius of her home and with a rating of excellent or very good on trusted rating services.” The agent then attempted to find potential appointment times by matching the schedules of the in-plan specialists, the sister and the brother (who willingly volunteered to chauffeur his mother).

Within “a few minutes the agent presented them with a plan”. For the brother the initial schedule was inconvenient. “He set his own agent to redo the search with stricter preferences about location and time.” The sister’s “agent, having complete trust in” her brother’s “agent in the context of the present task, automatically assisted by supplying access certificates and shortcuts to the data it had already sorted through.”

The brother’s agent almost immediately presented a new plan. However, he “would have to reschedule a couple of less important appointments” and the specialist selected was not listed by the insurance company under physical therapy. His agent reported “Service type and insurance plan status securely verified by other means” and asked if he desired “(Details?)” The brother was satisfied with the changes and put the details off until later. The sister agreed to the scheduling update as well. [10]

According to the article, the technologies for constructing this application and hence, the Semantic Web are [10]:

- **eXtensible Markup Language (XML)** – allows individuals to structure information within documents. This is accomplished by creating arbitrary tags (i.e. elements) that annotate words, images, sections etc. of Web pages. “Scripts, or programs, can make use of these tags in sophisticated ways, but the script writer has to know what the page writer uses each tag for” – i.e. the script writer must know the semantics of the XML documents in order to process them.
- **Resource Description Framework (RDF)** – is the World Wide Web Consortium⁶⁰ recommendation for encoding knowledge. Using RDF, meaning is expressed in triples, like simple sentences containing a subject, a verb and an object – each is represented by a Uniform Resource Identifier (i.e. a web address). The triples may be written in XML (they may also be serialized in XML Topic Map syntax). Moreover, these triples “make assertions that particular things (people, Web pages or whatever) have properties (such as ‘is a sister of’, ‘is the author of’) with certain values (another person, another Web page).” These relationships form webs.
- **Ontologies** – described above in **Section 4.3**, generally ontologies for the Web consist of “a taxonomy and a set of inference rules”. Taxonomies identify “classes of objects” and the relationships between them. “Classes, subclasses and relations among entities are a very powerful tool for Web use. We can express a large number of relations among entities by assigning properties to classes and allowing subclasses to inherit such properties.” Moreover, inference rules allow us to impose rules of logic such as implication. For example, an ontology containing addresses may enforce the following rule: “If a city code is associated with a state code, and an address uses that city code, then that address has the

⁶⁰ Established by Sir Tim Berners-Lee, is the main international standards organization for the World Wide Web.

associated state code.” Ontologies also allow us to resolve issues of terminology across web resources, by “negotiating” meaning(s) between ontologies.

- **Digital Signatures** – address the issue of trust. “They are encrypted blocks of data that computers and agents can use to verify that the attached information has been provided by a specific trusted source.” Agents in the future may have access to private data such as banking information and should therefore be wary of client agents.
- **Service Discovery** – Since agents collaborate they must have a means of locating and identifying the specific functions performed by other agents. “Consumer and producer agents can reach a shared understanding by exchanging ontologies, which provide the vocabulary needed for discussion.” “Ontologies that define the meaning of semantic data play a key role in enabling the agent to understand what is on the Semantic Web, interact with sites and employ other automated services.”

At this point, it bears mentioning that the notion of software agents interacting on behalf of humans to coordinate activities and to facilitate daily tasks (over a wide area network) is not new. In the landmark article *The Computer as a Communication Device* published in 1968, J. C. R. Licklider⁶¹ and Robert W. Taylor described the OLIVER,

an ‘on-line interactive vicarious expediter and responder,’ a complex of computer programs and data that resides within the network and acts on behalf of its principal, taking care of many minor matters that do not require his personal attention and buffering him from the demanding world. [52]

Hence, Licklider and Taylor established a research agenda we continue to pursue today.

Ontologies are domain or discipline centric – each having its own “alphabet soup”. The author also envisions the Semantic Web will develop as a collaboration of agents communicating and exchanging services (on behalf of humans); however, the meanings or the contexts of those exchanges will be dictated by the agents’ respective

⁶¹ J. C. R. Licklider is often credited with creating the ARPANET, the precursor to the Internet.

domains. (It is not wise for one to speak of things he/she has no knowledge of.) The implication being the Semantic Web will evolve as a series of smaller domain-centric semantic webs whose agents⁶² collaborate and exchange information based on their given knowledgebase. For instance, an agent for the Historical Web could potentially request information on material culture and archaeological artifacts from an agent of the (yet to be realized) Archaeological Web.

7.2 TEI XML (Instance) Documents

As mentioned earlier in **Section 4.4** TEI XML is the XML schema utilized to annotate the Griotte's documents. TEI provides an extensive list of elements and attributes (grouped into modules by analytical function), the aim being to express common concepts in the humanities and social sciences. The "Text Encoding Initiative (TEI) is an international organization founded in 1987 to develop guidelines for encoding machine-readable texts" [14]. Its members include academic institutions as well as individuals associated with "standards bodies, funding agencies, and/or governmental organizations" [14]. The organization has adopted a set of guidelines (P5 being the most recent edition released in November of 2007) delineating "recommendations on what features are to be encoded and how those features are to be encoded" [42]. Thus, TEI XML is a defacto (discipline) standard with an existing user-base and a well-defined terminology; meaning potential users (primarily domain experts) will have less of a learning curve (or at least the opportunity to develop skills relevant to their discipline), and the semantics of the elements (and attributes) have garnered widespread acceptance.

Although TEI XML encompasses more than 400 elements, document editors (and authors) may choose which elements are suitable for a given text. "In fact very few tags (i.e. elements) are required and these are mostly in the header which provides (document) metadata" [42]. Generally, a TEI document consists of a "header followed by the body of the text". The header is divided into four main sections [42]:

⁶² Here the agents are not personal, they receive (and fulfill) requests from multiple clients.

- The **file description** (using the <fileDesc> element) which is required;
- The **encoding description** (using the <encodingDesc> element) which describes the text transcription process;
- The **profile description** (denoted by <profileDesc>) which focuses on the languages “used, the situation in which the text was produced, the participants and their setting”; and
- The **revision history** (using the <revisionDesc> element) which encompasses the change/modification history of a text.

TEI also provides header metadata to support annotation of composite documents (e.g. a corpus) however, the Griotte does not process composite documents at this time. Instead it provides tools (discussed in **Section 8.1**) to subdivide composite documents into singular documents.

To facilitate descriptive metadata collection and to reduce domain expert input requirements, the author employed a crosswalk⁶³ between the TEI header elements and the (simple) Dublin Core metadata schema [97]. **Table 1** below displays the “match ups” between the two schemas; where the TEI paths delineate the elements and the (sub)elements that must be traversed to reach the descriptive content.

⁶³ DSpace’s implementation of crosswalks cannot be utilized in this case, since TEI XML is not a “flat” metadata schema; instead Java programming was employed to implement the crosswalk.

| Table 1: Dublin Core to TEI Crosswalk. | |
|---|--|
| Dublin Core Element | TEI Header Element⁶⁴ |
| title | TEI/teiHeader/fileDesc/titleStmt/ title |
| creator | TEI/teiHeader/fileDesc/titleStmt/ author |
| subject | TEI/teiHeader/profileDesc/textClass/keywords/list/ item |
| description | TEI/teiHeader/encodingDesc/ projectDesc |
| publisher | TEI/teiHeader/fileDesc/publicationStmt/ publisher |
| contributor | TEI/teiHeader/fileDesc/titleStmt/ editor TEI/teiHeader/fileDesc/titleStmt/ sponsor TEI/teiHeader/fileDesc/titleStmt/ funder TEI/teiHeader/fileDesc/titleStmt/ principal |
| date | TEI/teiHeader/fileDesc/publicationStmt/ date |
| format | TEI/teiHeader/fileDesc/ extent |
| identifier | TEI/teiHeader/fileDesc/publicationStmt/ idno |
| source | TEI/teiHeader/fileDesc/sourceDesc/ bibl |
| language | TEI/teiHeader/profileDesc/langUsage/ language |
| relation | TEI/teiHeader/fileDesc/seriesStmt/ title ⁶⁵ TEI/teiHeader/fileDesc/sourceDesc/recordingStmt/ recording |
| rights | TEI/teiHeader/fileDesc/publicationStmt/ availability |

The Dublin Core fields, *coverage* and *type* do not have a one-to-one correlation in TEI XML. However, since the anticipated content of the TEI files is text-based, the *type* field may be set to the string constant “**text**”.

⁶⁴ The traversal path starting with the root element TEI.

⁶⁵ Indicates the title of the series to which the publication belongs.

With respect to the body of a TEI document, the functional components of a text are “marked up” inline, utilizing such elements as <event>, <person>, <place>, <interp> (i.e. interpretation) etc. Mechanisms in TEI XML exist to encode “the complexities of scholarly texts ... for example the critical apparatus, marginal notes, changes of language and script” [42]. Moreover, notes can be rooted in the main text, “and separate indexes can easily be made for the different languages in a multilingual text” [42]. The TEI also supports linguistic and interpretive analysis, “permitting more than one analysis to be given for a text (or segment of text), even if these analyses conflict with each other” [42]. TEI XML can also embed images and point to locations within audio/video files; however, SMIL XML [6] is better suited. It was designed to allow content “authors to write interactive multimedia presentations” and to control the timing and the layout of these presentations.

XML (regardless of the schema) “does have one problem which is particularly apparent in humanities material. It tends to assume that a document is a single hierarchic structure and that each element nests neatly within another element” however, “multiple parallel hierarchies are very common in existing texts” [42]. Consider narrative data, a single event although it is the same event may be described from multiple perspectives within the same text. The Griotte handles this *multiple inheritance*⁶⁶ situation by resorting to the graph topology and the merging capabilities of topic maps – events with the same name (or subject reference) are merged. The implication being that they are the same event. The different perspectives are preserved via the scope mechanism of the topic map standard.

7.3 The Fundamentals of Topic Maps

Computer statements are constructed according to syntactical (i.e. grammatical) rules. In designing semantic web applications the question that arises is, “How can syntax become semantic?” Or rather, “How do you assemble computer statements that

⁶⁶ The term *multiple inheritance* has a different meaning in the humanities than it does in the field of computer science. It implies parallel hierarchies or a network topology in the humanities context, which is the intended meaning here.

describe the relationships between things and the characteristics of things for representation on the Web?” As mentioned above Tim Berners-Lee proposed RDF to accomplish this task; however for the aforementioned reasons (XML) topic maps are utilized in this research⁶⁷. (See **Section 3.1.5** for a comparison between RDF and topic maps.) In this subsection, the following topic map concepts which are pertinent to the Griotte are discussed: 1) topics, associations and occurrences; 2) types and type hierarchies; 3) the system’s ontology; 4) scope; 5) Public Subject Indicators (PSIs); 6) topic merging; and 7) the querying of topic maps.

7.3.1 Topics, Associations and Occurrences – *The TAO of Topic Maps*

Obviously a key concept in the topic map standard is that of a topic. Generally, a topic is an abstraction of a subject; meaning a subject is “the real world ‘thing’” that the digital topic represents. The relationship between topics and subjects should be one-to-one, “with every topic representing a single subject and every subject being represented by just one topic” [78]. Nonetheless, to be referenced a subject must have an (machine-readable) address (e.g. a Uniform Resource Identifier (URI)), which in the case of real world entities and concepts often does not exist. Therefore, within topic map instances subjects are often described by subject indicators – pointers (usually URIs) to resources on the Web that identify and disambiguate the subject. The relationship between topics and subject indicators is one-to-many, since many descriptors may exist that are pertinent to the actual subject.

The topic map standard also makes provisions for names of topics.

It recognizes the need for some form(s) of name to be defined in a standardized way, in order for applications to be able to do something meaningful with them, and at the same time the need for complete freedom and extensibility to be able to define application-specific name types. [78]

⁶⁷ For the record, RDF XML and XTM are not competing technologies, as previously mentioned topic maps can be serialized using RDF XML. Actually, one could think of topic maps as a data model.

Thus, multiple (base) names may be assigned to a single topic and each of these names may be assigned variants. Furthermore, different base names may be valid within different contexts (i.e. scopes). “A corollary of this feature is the *topic naming constraint*, which states that no two topics can have exactly the same base name in the same scope” [78].

“A topic may be linked to one or more information resources that are deemed to be relevant to the topic in some way. Such resources are called occurrences of the topic.” Examples of occurrences are: definitions or textual descriptions of the topic; an image or a video portraying the topic; a letter or diary entry related to the topic; and so forth. Occurrences may be internal, for instance a definition or a description may be included in the topic map (file) or they may be external, i.e. “pointed to” via URIs. “One of the advantages of using topic maps is that the (source) documents themselves do not have to be touched.” [78]

Relationships between two or more topics are expressed via a construct called topic association. “Each topic that participates in an association plays a *role* in that association called the association role” [78]. Associations are commutative in that it is nonsensical to state “that A is related to B” and B is not related to A, “B must, by definition be related to A.” Hence, it is important to identify the role a topic plays in an association, since no directionality may be assumed. Topic names, occurrences, and roles in associations are considered characteristics (i.e. properties) of topics. To see how these concepts are applied in the Griotte reference **Section 7.3.3** below.

7.3.2 Types and Type Hierarchies

The topic map standard supports typing or grouping of topics, occurrences and associations into rudimentary classes. “The relationship between a topic and its type is a typical *class-instance* relationship” [78]. According to the standard, topic types are implemented as topics. As one might imagine topic types must be defined prior to their instantiation. With regard to occurrences, their type(s) is also a topic “which further characterizes the nature of the occurrence’s relevance to its subject” [78]. Association

types identify why or how topics are related, they too are implemented as topics. Additionally, associations are independent of occurrences; thus a topic map containing topics and associations along with their respective types is an information asset in and of itself. The relationships alone contain valuable data. Since types are implemented as topics, the ontology of a topic map may be contained within the topic map; this could facilitate navigation, querying and cross referencing between ontologies.

The XTM implementation of topic maps also supports class-subclass relationships, in essence making available topic or class hierarchies and improving the semantics of ontologies. In particular, the topic types that are provided for this purpose are *superclass-subclass* (the association type), *superclass* and *subclass* (both serve as association roles). This ends our coverage of basic topic map constructs; next we will use these concepts to delineate the Griotte's ontology.

7.3.3 The Griotte Ontology

The first step in developing the Griotte's ontology was to determine the subjects of interest. With respect to previous work completed in this area (e.g. the HEML Project, in **Section 4.3.1**), subjects of interest include; events, periods, dates, locations, participants, keywords and evidence (i.e. references). TEI XML expands upon these subjects in its Names and Dates module with roughly fifty additional elements; plus the address, date and time elements contained in its Core module. The Griotte uses these TEI elements as topics (actually as data types)⁶⁸. In the remainder of this subsection we employ tables to depict the core topic types, the naming types, the occurrence types, the association types and their constituent association roles. The columns of each table list the base types (i.e. the super classes), the “matching” CIDOC CRM entities⁶⁹

⁶⁸ For each TEI XML instance document processed by the Griotte, its TEI elements are “searched for” in the ontology and an instance topic is created for each element “found”. Furthermore, the instance topic's (base) type is the “matching” topic from the ontology. (See **Section 7.4** for details.)

⁶⁹ CIDOC CRM expresses all constructs in the form of entities (i.e. classes) and properties (i.e. characteristics or behaviors).

(implemented as subject indicators for cross referencing⁷⁰), and the derived types (i.e. the subclasses), respectively. The exception being **Table 5**, the association types table which delineates the relations, the corresponding CIDOC CRM properties and the constituent association roles.

| Table 2: [Core] Topic Types. | | |
|-------------------------------------|------------------------------|---|
| Base Types | CIDOC CRM Entities | Derived Types |
| event | E5 Event | <ul style="list-style-type: none"> • birth (E67 Birth) • death (E69 Death) |
| date | E50 Date | |
| time | E61 Time Primitive | |
| place | E53 Place | residence |
| location | E27 Site | |
| person | E21 Person | |
| personGrp | E74 Group | |
| persState | E3 Condition State (general) | <ul style="list-style-type: none"> • affiliation⁷¹ • education • floruit • occupation • state |
| org(anization) | E40 Legal Body | |
| evidence | E31 Document | |

⁷⁰ The syntax of the actual CIDOC CRM subject indicators is http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E##.Entity_Name or http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P##.property_name: where ## represents the number assigned to the entity or property.

⁷¹ TEI is intended for in-depth analysis and is therefore far more detailed than CIDOC CRM with respect to subjects. For this reason several of the derived (TEI) types do not have a corresponding entity or property in the CIDOC CRM.

| Table 2: Continued. | | |
|----------------------------|---------------------------|---|
| Base Types | CIDOC CRM Entities | Derived Types |
| role | E55 Type | user defined roles |
| respons(ibility) | E7 Activity | |
| image | E38 Image | <ul style="list-style-type: none"> • graphic • binaryObject |

| Table 3: Name Types. | | |
|-----------------------------|---------------------------|---|
| Base Types | CIDOC CRM Entities | Derived Types |
| name | E41 Appellation | <ul style="list-style-type: none"> • placeName • persName (E82 Actor Appellation) • orgName • eventName • rs (referencing string) |
| placeName | E44 Place Appellation | <ul style="list-style-type: none"> • address (E45 Address) • bloc • country • district • geogName (E48 Place Name) • region • settlement |

Table 4: Occurrence Types.

| Base Types | CIDOC CRM Entities | Derived Types |
|------------|--------------------|---|
| placeTrait | E55 Type | <ul style="list-style-type: none"> • climate • population • terrain • trait • geogFeat • geo (E47 Spatial Coordinates) • offset |
| persTrait | E55 Type | <ul style="list-style-type: none"> • age • faith • langKnowledge • langKnown • nationality (E74 Group) • sex • socecStatus • trait |
| sourceType | E55 Type | <ul style="list-style-type: none"> • transactional-record • selective-record • archaeological-artifact (E24 Physical Man-Made Thing) • recollection-reflection • historical-analysis • other |
| datePart | E55 Type | <ul style="list-style-type: none"> • calendar (E49 Time Appellation) • when (E61 Time Primitive) • notBefore (E61 Time Primitive) • notAfter (E61 Time Primitive) • from (E61 Time Primitive) • to (E61 Time Primitive) |

| Table 4: Continued. | | |
|----------------------------|---------------------------|---|
| Base Types | CIDOC CRM Entities | Derived Types |
| timePart | E55 Type | duration (E54 Dimension) |
| persNamePart | E55 Type | <ul style="list-style-type: none"> • addName (E41 Appellation) • forename (E41 Appellation) • genName • nameLink • roleName (E41 Appellation) • surname (E41 Appellation) |
| evidencePart | E55 Type | <ul style="list-style-type: none"> • nature • stance • cert(ainty) • sourceType • source (E31 Document) |
| descriptive-text | E62 String | |

Table 5: Association Types and Association Roles.

| Association Types | CIDOC CRM Properties | Association Roles |
|-------------------------|---|---|
| participated-in | “P11 had participant (participated in)” ⁷² | <ul style="list-style-type: none"> • event • participant (E39 actor) |
| location-of | P7 took place at (witnessed) | <ul style="list-style-type: none"> • event • place |
| located-in | “P59 has section (is located on or within)” | <ul style="list-style-type: none"> • place • location |
| was-born | “P98 brought into life (was born)” | <ul style="list-style-type: none"> • person or • personGrp • birth |
| was-death-of | “P100 was death of (died in)” | <ul style="list-style-type: none"> • person or • personGrp • death |
| parent-child | “P106 is composed of (forms part of)” | <ul style="list-style-type: none"> • parent (E73 Information Object) • child (E73 Information Object) |
| has-time-span | P4 has time-span (is time-span of) | <ul style="list-style-type: none"> • member’s base type⁷³ • timeSpan (E52 Time-Span) |
| occurred-at | P114 is equal in time to | <ul style="list-style-type: none"> • member’s base type • temporalObj (E2 Temporal Entity) |
| occurred-before | P120 occurs before | <ul style="list-style-type: none"> • member’s base type • temporalObj (E2 Temporal Entity) |
| occurred-after | P120I occurs after | <ul style="list-style-type: none"> • member’s base type • temporalObj (E2 Temporal Entity) |
| is-a (represents state) | P44 has condition (condition of) | <ul style="list-style-type: none"> • person • persState |

⁷² The parenthetical expressions represent the reverse relation(s) between the (two) entities.

⁷³ For example, event, person, place, personGrp etc.

| Table 5: Continued. | | |
|---------------------------------|---|---|
| Association Types | CIDOC CRM Properties | Association Roles |
| is-evidence-of | P70 documents (is documented in) | <ul style="list-style-type: none"> • supporting • contradicting • member's base type |
| is-responsible-for | P14 carried out by (performed) | <ul style="list-style-type: none"> • name • resp(onsibility) |
| plays-role-of | P14.1 in the role of | <ul style="list-style-type: none"> • member's base type • role Or • roleName |
| is-an-image-of | P138 represents (has representation) | <ul style="list-style-type: none"> • image • member's base type |
| is-identified-by | "P1 is identified by (identifies)" | <ul style="list-style-type: none"> • member's base type • name Or • persNamePart |
| has-current-or-former-address | P53 has former or current location (is former or current location of) | <ul style="list-style-type: none"> • location • address |
| has-current-or-former-residence | P74 has current or former residence (is current or former residence of) | <ul style="list-style-type: none"> • person Or • personGrp • residence |

Taking a closer look at the ontology's associations, one may notice that the defined relations form assertions similar to the subject-verb-object declarations (i.e. the triples) of RDF. Moreover, the semantic foundations of CIDOC CRM dictate that statements be expressed in the form of entity-property-entity. Where the initial entity is usually the subject, the property is a verb (often followed by a preposition) and the ending entity is the object of the statement. Thus a crosswalk is essentially being formed between TEI's Names and Dates module and CIDOC CRM. For instance, when the relationship *image is-an-image-of object* is established, a corresponding path (using CIDOC CRM terminology) is created, which reads *E38 Image P138 represents E1 CRM Entity*. [24, 25]

To facilitate future enhancement and customization, the Griotte supports augmenting the ontology with user defined types for topic types, and role specifications. To accomplish this, during automatic topic map generation, topics are created for the **values** of the *type*, *subtype* and *role* attributes. Where the new *type topic* is added to the ontology as a subclass of the instance topic's (direct topic) type and the new *subtype topic* is added as a subclass of the (newly added) *type topic*. Also the new *role topic* is added to the ontology as a subclass of the *role* topic type. Thus, the ontology “learns”. As more instance documents are processed, the ontology becomes trained to more appropriately represent the underlying TEI document model. (See **Appendix G** for detailed ontology files.)

7.3.4 Scope

As mentioned earlier (in **Section 4.4**) the construct of scope is employed to contextualize topic maps. Most computer applications are unable to decipher context. For instance, given the search term *dog* the computer usually cannot determine if you meant your favorite show “Dog the Bounty Hunter”, your favorite stuffed toy – Spot, or your pet, Fido. To lessen this ambiguity, “topic maps consider any assignment of a characteristic to a topic, be it a name, an occurrence or a role, to be valid within certain limits, which may or may not be specified explicitly. The limit of validity of such an assignment is called its scope” [78]. “XTM defines scope as a set of subjects, described either by references to topics (using a <topicRef> element) or by references to subject indicators (using a <subjectIndicatorRef> element)” [77]. This set of references called themes is applied to topic characteristics, and could be employed as a filtering mechanism. For instance, a language theme may be utilized to provide multilingual support and the display names of a topic map(s) may be filtered according to the users’ locale (i.e. language) setting(s).

The scoping topics identified in the Griotte are included in the table below.

| Table 6: Scope Types. | | |
|------------------------------|---------------------------|--|
| Base Types | CIDOC CRM Entities | Derived Types |
| language-theme | E56 Language | language codes from ISO 639-2 standard |
| responsible-party | E39 Actor | |
| period | E4 Period | |

The language of a TEI document is recorded in its language header element(s): whereas, the language used to inscribe the textual content of individual elements may be assigned to the *xml:lang* attribute of the elements. Consequently, elements may have a different language from their parent document. To reflect this possibility the value of the *xml:lang* attribute (if given) is assigned as a language theme to an element's corresponding instance topic. Assigning the responsible-party theme works in a similar manner. The `<respStmnt>` element(s) in the TEI document header describes an individual's interpretive or analytical contributions: while elements within the body of a document may have a *resp* attribute, containing a reference(s) to the individual(s) that "marked up" the element (e.g. the editor, the author, the transcriber etc.). Thus, if an element has a *resp* attribute, then its value(s) is saved as a subject indicator(s) of a responsible-party topic – of course, the resulting theme (i.e. reference to the topic) must be assigned to the element's corresponding topic instance.

Lastly, *period* is implemented as an attribute in TEI that contains a URI to a named temporal period (defined "somewhere" on the Web). All of the TEI elements used in the Griotte's ontology have an optional *period* attribute. Accordingly, if a TEI element has been assigned a temporal period, then (a reference to) that *period* is assigned as a theme to its corresponding instance topic.

7.3.5 Public Subject Indicators

Generally, public subject indicators are published subject descriptors with stable URIs made available to the (topic map) developer community to promote common meanings. “A PSI is therefore any resource that has been published in order to provide a positive unambiguous indication of the identity of a subject for the purpose of facilitating topic map interchange and mergeability” [77]. Groups of related PSIs are usually stored in XML files that are accessible online. Presently, OASIS⁷⁴ (Organization for the Advancement of Structured Information Standards) is the standards body responsible for developing globally accepted PSI resources. To date, the organization has posted two sets of published subjects, one for countries (based on ISO 3166 two-letter country codes), and the other for languages (based on ISO 639 three-letter language codes).

In addition to the OASIS PSIs, the Griotte utilizes the online description(s) of CIDOC CRM entities and properties as published subject indicators (see **Section 7.3.3** above). CIDOC CRM though not recognized by the broader topic map community as a (PSI) standard is an ISO standard (ISO 21127:2006), with the objective of providing a “reference ontology for the interchange of cultural heritage information” [19]. Current efforts by the TEI Ontology SIG and the HEML Project to match their elements to CIDOC CRM constructs, affirm its acceptance within the humanities [24, 25].

Lastly, the naming authority files generated by the Griotte will be made available as PSI resources to other developers, to promote name disambiguation across the Web. As mentioned in **Section 4.4** MADS (Metadata Authority Description Schema) is used to structure the naming files as collections of MADS records. Where each MADS record contains an authority element representing the “official name”, which may be followed by optional variant name and related name elements. The schema recommends that

⁷⁴ “OASIS is a not-for-profit consortium that drives the development, convergence and adoption of open standards for the global information society. The consortium produces more Web services standards than any other organization along with standards for security, e-business, and standardization efforts in the public sector and for application-specific markets.” <http://www.oasis-open.org/who/>

different XML files be used for different types of names. Therefore, the Griotte maintains one file for personal names along with an additional file for each of the following: event names, corporate names and place names.

7.3.6 Topic Merging

Topic merging is one of the key characteristics of topic maps that lends itself to the task of comparison and contrast. To increase the evidentiary value of recollections, multiple recollections must be compiled and compared – based on relevant pieces of information. True, using topic maps the machine cannot make the statement that “This phrase means the same as that phrase”, even though the two are worded differently. Nonetheless, topics with common subject descriptors and/or common names within the same scope are merged into a single topic: the implication being “This topic(s) *is about* the same subject as that”. With respect to implementation, “merging requires that a topic exhibit its own characteristics (names, occurrences, and roles played in associations) plus the characteristics of all topics merged with it” [77]. Hence, for related elements (with shared names and/or subject references) scattered across a TEI instance document, their content may be accessed under a single topic, making (visual) comparison possible. Detailed content analysis requires inference rules and queries which are discussed below in **Section 7.3.7**.

7.3.7 Querying Topic Maps

Visualizing the Semantic Web as a database mandates the need for a query language capable of comprehending relationships, types and property values conceptualized in an ontology(s). According to Berners-Lee, “reasoning engines will allow us to manipulate, figure, find and prove logical and numeric things over a wide-open field of applications” [8]. “The disadvantage of using reasoning engines is that, because they can combine data from all over the Web in their search for an answer, it can be too easy to ask an open question that will result in an endless quest” [8].

Presently, a standards body is in the process of adopting an inference and query language that operates on topic map models. Several existing yet competing products –

in various stages of development – are being assessed for the task. The most advanced of these is tolog, a language “inspired by Datalog (a subset of Prolog) and SQL” [32].

“Using tolog one can query a topic map in much the same way as a relational database can be queried with SQL” [32]. A user will “ask tolog in which cases a certain assertion holds true, and tolog will then respond with all the sets of values that make the assertion true” [32]. (Unlike SQL existing topic map query languages cannot update or modify existing topic maps, instead they can only retrieve topic map constructs.)

Let us look at a few examples of how tolog could be applied in the Griotte given the aforementioned ontology description in **Section 7.3.3**. For instance, one could retrieve all events in a particular topic map as follows [33]:

```
instance-of ( $EVENT, event)?
```

Where *instance-of* is a built-in tolog predicate (similar to a programming function) that is capable of connecting a topic instance with each of its topic types. Moreover, *\$EVENT* represents a variable or a place holder, and *event* in this case is the topic type the variable should possess in order to generate a result (i.e. to make the assertion true). (Since *birth* and *death* are subclasses of *event* they too will be returned by this statement.) Note, query statements in tolog end with a question mark (?). The same kind of request could be made for any of the topic types defined above.

As another example, suppose we desired to retrieve the names and descriptions of all events (in this case, only the events) sorted in alphabetical order in a given topic map. For this task we need boolean operators, tolog offers logical and relational operators including AND (using the character “;”), OR (using the character “[|]”) and NOT (simply “not”) as well as =, /= (not equal to), <=, >=, < and >. Accordingly, the query statement should be [33]:

```
direct-instance-of ( $EVENT, event),
is-identified-by ($EVENT : event, $NAME : name),
descriptive-text ($EVENT, $DESC)
order by $NAME?
```

Observe *direct-instance-of* ignores superclass-subclass associations; meaning *birth* and *death* topics are not selected. The *direct-instance-of* predicate is built-in, while *is-identified-by* and *descriptive-text* are association and occurrence types respectively defined in our ontology. Like SQL the result set is a table consisting of rows and columns, also the variable \$EVENT behaves similar to a linking column – rows are generated for matching column values. A powerful feature of tolog is that it supports dynamic predicates for occurrence types and association types. Thus, all of the occurrence and association types listed above may be utilized as predicates.

As a final example, suppose we aspire to glean the participants, location information, date and/or time, along with any evidence pertaining to a named event (e.g. Woodstock). The query to achieve this is as follows [33]:

```
direct-instance-of ( $EVENT, event),
is-identified-by ($EVENT : event, woodstock : name), /* woodstock is a topic id
*/
{descriptive-text ($EVENT, $DESC) |
participated-in ($EVENT : event , $PARTICIPANTS : participant) |
location-of ($EVENT : event, $PLACE : place) |
located-in ($PLACE : place, $LOCATION : location) |
has-time-span ($EVENT : event, $TIMESPAN : timeSpan) |
is-evidence-of ($EVENT : event, $EVIDENCE : evidence)}?
```

The curly braces ({ }) indicate that the encompassed clauses are optional; meaning if the event “Woodstock” is found but has no descriptive text or related information, then the event (topic) is still returned – as long as one of the enclosed conditions is true. Since a query such as this is tedious to type at best and yet particularly useful, we could save this query as an inference rule. To do so requires that the above query be prefixed with the following line (placed directly in front of the descriptive-text clause) [33]:

```
event-info ($EVENT) :-
```

Hence, to retrieve all event information for “Woodstock” using the defined inference rule one could write [33]:

```
direct-instance-of ( $EVENT, event),
is-identified-by ($EVENT : event, woodstock : name),
event-info ($EVENT)?
```

Note we must first identify which event we desire information regarding, before “calling” event-info.

Within the Griotte, all of the inference rules defined to date have been placed in a file in the Java CLASSPATH. Moreover, the “tolog query processor has a Java API” which is employed to evaluate query strings and to process query results [33]. Query responses are returned to users as either tables with one column for each variable, or as topic map fragments which display a resultant topic and all of its characteristics (e.g. names, occurrences, and association roles) in order to establish context.

7.4 Discussion: Automatic Topic Map Generation

Potentially the richest topic maps are those created manually (via an XML editor) by subject experts versed in TEI XML and in XTM. Presently, such individuals are rare. Moreover, the anticipated number of input instance documents (i.e. TEI XML files) is voluminous. For these reasons, automatic generation of topic maps using the TM4J (Topic Maps for Java) open source topic map engine is the approach taken to construct topic maps in the Griotte.

The following (high-level) pseudocode describes the process of generating a topic map for a single TEI instance document.

Initialization:

- Open a TEI XML document for indexing.
- Create a new topic map (file).
- Load the ontology files into the new topic map.

For each element in the input TEI XML document:

1. Process the element's topic type
 - If the element is listed in the ontology then
 - Check if the element is an occurrence type, if so proceed to **Step 4**.
 - Otherwise, create an instance topic for the element.
 - Resolve the instance topic's type. /* Use the element name or type/subtype attributes if provided */
 - Otherwise, skip the element.

2. Process topic name(s)
 - If the current topic's topic type is a name (i.e. identifying type) then
 - Retrieve its (non-empty) text node.
 - Add the text as the base name of the current topic.
 - Search the MADS file(s) for the text.
 - //For multiple matches resolve based on date information.
 - If the text is found then
 - Create a subject indicator to the matching MADS record.

 - Assign scope themes to the base name. //Invoke Step 3

 - If the current element contains the name of its parent element then
 - Create an *is-identified-by* association between the current topic and its parent topic.

3. Process scope themes
 - //Assign scope to topic characteristics
 - If the underlying element has an *xml:lang* attribute then
 - Locate the matching language topic.
 - Assign the language topic as a theme to the current topic characteristic.

 - If the underlying element has a *resp* attribute then
 - Create a responsible-party instance topic.
 - For each URI assigned to the *resp* attribute //separated by whitespace
 - Add a subject indicator with the current *resp* attribute value as a reference.
 - Assign the responsible-party topic as a theme to the current topic characteristic.

 - If the underlying element has a *period* attribute then
 - Locate the matching period topic (by subject indicator).
 - Assign the period topic as a theme to the current topic characteristic.

4. Process occurrences

If the base type of the current TEI element is an occurrence type then
Create an occurrence.

Use the current element's (direct) type as the occurrence type.

Assign the URI of the current element as a resource reference.

Assign scope themes to the occurrence. //Invoke Step 3

Assign the occurrence to the parent element's instance topic.

//Next check for descriptive text

If the current element is a description (i.e. a <desc> element), OR

If the current element contains a (non-empty) text node then

Create an occurrence.

Assign descriptive-text as the occurrence type.

Assign the contents of the description or of the text node as a data resource.

If the current element is a desc(ription) then

Assign scope themes to the occurrence.

Assign the occurrence **to the parent** element's instance topic.

Otherwise, assign the occurrence **to the current** TEI element's instance topic.

5. Process dates and times

If the current TEI element has attributes of the type datePart (e.g. when, not-before, not-after, from, to) then

Create an instance topic of the type datePart.

For each datePart attribute create an occurrence.

Assign the attribute's name⁷⁵ as the occurrence type.

Assign the attribute's value as a data resource.

Assign the occurrence to the datePart instance topic.

If the current element has attributes of the type timePart (e.g. dur, dur-iso) then

Create an instance topic of the type timePart.

For each timePart attribute create an occurrence.

Assign the attribute's name as the occurrence type.

Assign the attribute's value as a data resource.

Assign the occurrence to the timePart instance topic.

6. Process evidence

//Processes both the evidence attribute and the evidence element

If the base type of the current TEI element is evidence, OR

⁷⁵ For example, when, not-before, not-after etc.

If the current TEI element has an evidence attribute then

 Create an evidence instance topic.

For each evidence related attribute (except *sourceType* and *source*)

 Create an occurrence.

 Assign the attribute's name⁷⁶ as the occurrence type.

 Assign the attribute's value as a data resource.

 Assign the occurrence to the evidence instance topic.

For each source URI /*the source attribute consists of URIs to sources, separated by whitespace*/

 Create an occurrence.

 If the sourceType attribute contains a positional match (for the source URI) then

 Assign the sourceType's value as the occurrence type (e.g. transactional-record, selective-record etc.)

 Assign the source URI to the occurrence as a resource reference.

 Assign the occurrence to the evidence instance topic.

7. Process associations

//Search the entire type hierarchy of the current instance topic for association roles.

If the topic type(s) of the parent topic and the topic type(s) of the current topic have an assigned relationship in the ontology then

 Create the appropriate association between the parent instance topic and the current instance topic.

If a datePart topic or a timePart topic was created in **Step 5** then

 Create the appropriate association between the current instance topic and/or the datePart and/or the timePart topics.

If an evidence topic was created in **Step 6** then

 If the evidence attribute was utilized then

 Create an association between the evidence topic and the current instance topic.

 Otherwise, create an association between the evidence topic and the parent instance topic.

Create a parent-child association between the parent instance topic and the current (child) instance topic.

⁷⁶ For example, nature, cert, stance etc.

Finish up:

Serialize the topic map.
Close the TEI document (i.e. file).

Finally, the TEI files referred to in the Initialization step may either be internal (on the same web server as the Griotte) or external: A topic map may be created for any TEI resource locatable via a URI. Moreover, all of the higher level steps – except for the dates/times and the evidence steps – are applicable to topic maps generally; meaning the steps are not ontology specific. Accordingly, new ontology files may be added and others excluded as the system evolves.

7.5 Summary

Topic maps are capable of storing rich knowledge structures and of expressing complex relationships that model real world problems. The keys to achieving these capabilities are a detailed ontology, which accurately represents the problem space and an integrated manual and automatic topic map generation process. (As a side note, from the author's experience manual markup is tedious, time-consuming and error-prone but unfortunately necessary.) To expose or to share this knowledge along with its interrelationships a query language is necessary. To date the tolog query language is one of the most advanced and the best documented (i.e. detailed tutorials are available) [47]. Hence, it is the option chosen for the Griotte.

8. THE EVALUATION OF THE GRIOTTE

A demonstrator system was developed to explore the research question and to serve as a prototype for the Griotte project⁷⁷. The demonstrator system was evaluated via two methods: 1) an in situ Case Study – to identify design flaws and programming errors; and 2) a Usability Survey – to assess such factors as usefulness, ease of use, intent to use, quality of content, quality of site services, impact of social ties, and general attitude toward the system. Hence, the focus of this section is the methods utilized to assess the validity of the underlying premise that is the evidentiary value of historical narratives inclusive of oral histories may be increased by interrelating them with documentary evidence both supporting and contradictory. Accordingly, this section includes the following three key subsections: 1) an overview of the Griotte demonstrator system; 2) a discussion of the Case Study employed to conduct system testing and to populate the system; and 3) an explanation of the survey instrument and the results.

8.1 Griotte Demonstrator System Overview

The demonstrator system may be found online at <http://www.griotte.org>. In this subsection, a high-level description of the demonstrator system is presented in terms of its five major subsystems which are: 1) Data Preparation, 2) Website Listing, 3) Search and Retrieval, 4) Browse, and 5) System Administration.

8.1.1 Data Preparation

As mentioned previously, the system's data must be in XML format, in particular TEI, SMIL, RDF and/or XHTML (i.e. XML compliant HTML). However, the historical source materials required as input are rarely available in one of these formats. Furthermore, the quantity of data one has to convert is often far too voluminous to be transformed manually. Volume 1 of General Vicente Filisola's *Memoirs for the History of the War in Texas* discussed in **Section 5** and cited in **Appendix B [6]** consists of

⁷⁷ It is the author's intention to establish a long term research agenda.

thirty-nine (39) chapters and 222 typed pages (12 point, Times-Roman). Hence, a viable system with a life span beyond prototype phase must have data conversion and data manipulation tools. To address these issues, the demonstrator system offers – template builders, conversion tools, and content generators.

The system provides two template builders, one for TEI XML and the other for SMIL XML. Both template builders are form-based and request Dublin Core values for the following Dublin Core fields: title, language, contributor, publisher, publication date, publisher’s identifier, subject(s) (used as categories within the system), description, rights/licensing, provenance, series information, related materials, source information (citations), format and genre (i.e. type)⁷⁸. Additionally, the TEI Template Builder requests the type of file desired, either text-based (which allows plain text files to be uploaded and included) or image-based – for sources formatted as facsimile images. The SMIL Template Builder offers simple layout commands such as foreground and background color as well as screen dimensions. The resulting files are made available to the user as ZIP files⁷⁹ and after extraction, may be opened in desktop editors such as Notepad++ or a proprietary XML editor for further modification.

While conducting the field study covered in **Section 5** above, the author found that those source materials that were not hard-copy (i.e. printed) were usually available on microfiche instead and could be saved to PDF as text. The result is still PDF but tools are available to convert the resulting file to plain text. Thus, one of the conversion tools offered by the demonstrator system is a PDF to plain text converter. Other conversion tools include (X)HTML to plain text and (X)HTML to TEI (for larger files that need to be subdivided).

With respect to content generation, for the demonstrator to create topic instance elements representing the individual TEI elements within source files, each source

⁷⁸ For TEI, the Dublin Core record generated is saved in the TEI header and uses the “matching” TEI header elements discussed in **Section 7**. For SMIL the Dublin Core record is expressed in RDF XML format as recommended by the Dublin Core Metadata Initiative.

⁷⁹ All files generated in response to user requests are returned as ZIP files, by the Griotte.

element being referenced must have a unique identifier (unique within the XML file). Therefore, the system provides an automatic *xml:id* generator that accepts a source file in XML format and generates an id attribute for each element in the file that has not been assigned an identifier. Moreover, TEI files may contain multiple <TEI> elements each representing a chapter or a major section of the whole. For example, when encoded, General Filisola's diary mentioned above may be divided into thirty-nine <TEI> sections all enclosed in a <teiCorpus> element. Although the demonstrator system is able to process a composite text; to avoid overutilization of computer system resources⁸⁰ and to provide better responses to user requests⁸¹, the decision was made to subdivide aggregate files into smaller TEI files, one per <TEI> element. Accordingly, an Ungroup TEI utility has been added to the demonstrator. Not only does it subdivide a composite file, the utility also creates an index page; containing any Dublin Core fields it finds in the file's header, and an index with hyperlinks to the individual files created. With minor modifications for aesthetics and additional information regarding the source's provenance, vetting, editorial process etc. this index page may become the source's homepage.

8.1.2 Website Listing

This subsystem addresses the amassing of a sizable quantity of input; a necessity if the demonstrator is to evolve into a production quality system. As discussed in **Section 6.2.2** web sites containing historical narratives or historical sources must be suggested via a recommendation form. Though the Griotte has a TEI XML crawler, the system requires a specific type of data. Therefore, human agency and judgment are better suited for this task. In addition to the TEI Resource Recommendation form shown in **Section 6.2.2**, there is a corresponding **SMIL/Multimedia Resource Recommendation** form. This form may be used to list not only SMIL URIs but the web address of any multimedia file may be listed, as long as its metadata record(s) consists of Dublin Core

⁸⁰ The reference here is to operating system resources such as memory and disk space utilization.

⁸¹ For example, it is better to deliver an online chapter in response to a query as opposed to an entire book. Hence, it is an issue of granularity.

fields in RDF XML format. At this time the demonstrator is unable to process other multimedia metadata formats such as MPEG-7. Lastly, the system retrieves the URIs of image files from the TEI files that reference them (in particular, the *url* attribute of <graphic> elements is parsed).

8.1.3 Search and Retrieval

To potentially avoid information overload and to facilitate resource discovery, search and retrieval functions have been added to the Griotte. As mentioned in **Section 7.3.7**, topic maps are searched using the tolog query engine. On the other hand, the Dublin Core field values are saved to the DSpace Metadata Value relational database table and thus are searched using SQL (Structure Query Language). Search fields are derived from the system's ontology which at present consists of over one hundred and fifty (150) topics [Reference **Appendix G**], and from the Dublin Core – DSpace supports a qualified Dublin Core set consisting of over sixty fields (60). Presently the Griotte only offers seven search types including:

1. **Image Search** – “pulls” the images from a document, along with descriptive text if available;
2. **Name Search** – locates names in the Master Index;
3. **Name Instance Search** – searches for instances of authorized names in the indexed documents, allowing users to compare information across multiple documents;
4. **General Search** – offers a boolean search of names, dates, and times across multiple documents, it also allows documents to be sorted by the presence or absence of supporting or contradictory evidence;
5. **Spoken Word Search** – offers a boolean search of names associated with speech related actions; designed to answer such questions as “Who gave the Gettysburg address?” or “What speeches did Martin Luther King, Jr. make?”

6. **Document Search** – boolean search that allows individual documents to be searched by events, people, places, dates, times, organizations and evidence; and
7. **Subject Search** – allows documents to be retrieved based on the value(s) of their Dublin Core subject field.

The author desired to stress semantic search capabilities; therefore, only one Dublin Core field search is provided, as an example.

8.1.4 Browse

The browse features of the demonstrator system primarily expose those browse capabilities that are already present in DSpace. However, instead of drilling down from Community → Collection → Item, we drill down from Category → Collection → Document. The reason being the author anticipates “communities of practice” will evolve around categories or common subjects of interests. [See **Section 6.3.9** for a discussion of communities of practice.] These categories are retrieved from the subject Dublin Core field as documents are processed. Hence, if the Dublin Core *dc.subject* element of a document has been assigned a value, then the document will appear on the browse list when a user browses the assigned subject/category. (“Voila, dynamic communities!”) Lastly, the term Document as opposed to Item is employed merely as a means of simplification.

8.1.5 System Administration

Appendix A, Figure A-2: System Integration – depicts the various “backend” components of the Griotte. Note, the control flow starting with the XML Crawler and ending with the RSS Query Engine. Each of these components has to be executed in the background as a daemon thread. Moreover, they slow the system down when run simultaneously; making user response time unacceptable. Hence, system administration is required to manage these threads. The System Administration Panel is merely a form that allows the system administrator (i.e. the author) to start and stop these threads based on certain selection criteria. For instance, a request may be made to re-index a set of documents that were previously indexed – on, before or after a specific date. The panel

also allows validation and deletion of indexes. Such actions are necessary when a document violates the appropriate XML schema and the error propagates to the index(es). At present, the Search and Retrieval subsystem is unforgiving and will not execute a query if the underlying index file has errors.

System security and access control (i.e. the login process and digital object access privileges), beyond the login required on the administrator's panel has not been activated. These features if deemed necessary in the future will be managed by DSpace. With respect to server (computer) setup, the Griotte is currently running on a shared server hosted by an Internet Service Provider. The author has a dedicated Apache Cocoon, web publishing framework, version 2.11 installed, which has been customized for the Griotte. Cocoon intercepts user requests, directs these requests to the appropriate service(s) and delivers the response(s) back to the user. The web server software installed is the Apache HTTP Server and the operating system is Linux. Additionally, to support Java server side technologies a Java interpreter (or runtime environment), Apache Jakarta Tomcat is installed on the server.

8.2 Case Study: Building a Sample Collection

APPENDIX A. To test the demonstrator system an oral history collection was sought. Several options were considered including the memoirs of the Mexican generals discussed in **Section 5**. For most oral history collections only the finding aid was available online, the corresponding transcripts and/or audio/video tapes were stored in an archive. On a whim or possibly due to desperation, the author decided to search Project Gutenberg online [80]. The search terms included: “underground railroad”, “narratives” and “slavery”. The author was slightly curious about the slave narratives produced by the Works Progress Administration (WPA) journalists during the New Deal Era. However, amongst many the narratives have a negative reputation [11]. Fortunately, Project Gutenberg revealed an alternative, *The Underground Railroad: A Record of Facts, Authentic Narratives, Letters, &c., Narrating the Hardships, Hair-Breadth Escapes and Death Struggles of the Slaves in Their Efforts for Freedom, As Related by Themselves and Others, or Witnessed by the Author* [87].

The author in this case being William Still a free man born of ex-slaves and often called the “Father of the Underground Railroad”. In this subsection, the author’s efforts to use this text as a test-case are documented.

8.2.1 “Who was William Still?”: Justification of Case Selection

The author found William Still and his family to be an extraordinary lot, whose influence continues even to this day. Mr. Still (1821—1902) was an abolitionist who upon moving to Philadelphia, Pennsylvania in 1844 became a clerk for the Pennsylvania Anti-Slavery Society. Later in 1852, the society formed a Vigilance Committee of which Still became the chairman. The objective of the committee was to help runaway slaves – sincere regarding the cause of freedom (hence, the need for vigilance) – who sought refuge in Philadelphia, whether they were staying or passing through. During his tenure as chairman (until 1857), Still kept a detailed journal of “the names (and aliases), ages, physical descriptions, treatment, motivations for seeking freedom, skills, and the details of the physical and emotional journeys of fugitive slaves” [41] aided by the committee. The contents of the journal were later published in 1872 – after the end of slavery – as *The Underground Railroad*. Among the 649 former slaves he assisted one was his own brother Peter Still whom he had not met before, due to the fact that he had been sold to a slave-owner in Alabama as retaliation for their mother’s escape.

At this point, the previous statement regarding the negative reputation of the WPA slave narratives [11] warrants elaboration. In oral history literature there is a concept called “authority” [30] or power which helps to contextualize the relationship between interviewer and interviewee. If the two individuals are from different ethnic or socio-economic backgrounds, especially if the interviewer is from a majority ethnic group and the interviewee a minority group; or if the interviewer appears to be from a higher socio-economic class than the interviewee, then there is a difference in authority between the two individuals and the one wielding the most authority (inadvertently) influences the responses of the individual wielding the least authority. The consequence being the interviewee (assuming he/she wields the least authority) is less likely to be candid and divulges to the interviewer what he/she thinks the interviewer “wants to

hear”. This is the perception held with respect to the WPA slave narratives; many believe that the former slaves told the journalists “what they wanted to hear” and that they “sugar-coated” the reality⁸². In light of this concept of “authority” the narratives recorded by William Still have a higher level of credibility than those produced by the WPA. Though he was a prominent businessman and had never been enslaved his parents had, thus he could express an empathy that encouraged candor; an empathy rooted in a common ethnicity and related life experiences.

8.2.2 Description of Historical Sources

In addition to the *Underground Railroad* digitized manuscript, available from Project Gutenberg (in various formats including plain text, HTML, Kindle e-book etc.), the handwritten journal from which the book was derived was also obtainable online, from the Historical Society of Pennsylvania (HSP) website. The journal is entitled “Journal C of Station No. 2, William Still, 1852-1857”, its digital format is PDF. Also available on the HSP website was an “expense book” documenting the expenditures of the Vigilance Committee from 1854 to 1855. Likewise, this document was available for download in PDF format. Thus the author saved as source material the plain text and HTML versions of *The Underground Railroad* and the two related PDF files. Additionally, the HSP website offered associated reading and study materials for students and educators, however the publication dates on these were far more recent; definitely not eyewitness (or contemporary) testimony. As secondary sources these may have proven useful, but the provenance and vetting process were unclear. So the author decided not to include these materials as sources.

8.2.3 Data Processing: Methodology

The author’s excitement over having found an electronic manuscript quickly turned to concern when the Print Preview of the plain text document revealed a 799 page, page count. “How could one manually markup a document of this size?” Then the

⁸² With respect to ethnicity, there were a few African American WPA journalists, for instance Alice Allison Dunnigan, the first African American female White House correspondent assigned in 1947.

author opened the HTML file: it had a daunting page count of 731 pages.⁸³ However, the HTML source revealed a repeating pattern. Each narrative was enclosed in a <DIV> element with a *class* attribute of “teidiv”. Individual narratives could contain nested div tags; however, each narrative had a main title marked with a <H2> element. Subtitles were demarcated with <H3> elements and letters (i.e. correspondences) were enclosed in <BLOCKQUOTE> tags. Moreover, images were encased in elements each with an “ALT” attribute describing the image and a “SRC” attribute containing the web address of the image. Lastly, div elements were further broken down into paragraphs (<p>) and Cascading Stylesheet (CSS) *style* attributes had been set for some spans () of text. (Pagination markup was also present but a trade-off had to be made between dividing by narrative versus dividing by page.)

The Project Gutenberg website was searched for HTML formatting rules, to ascertain whether the pattern found was indeed the standard. Unfortunately, it is not the standard. Project Gutenberg provides HTML guidelines in the form of a HTML FAQ⁸⁴ web page but no mandates on HTML formatting were provided. Furthermore, the author checked several other HTML files available from Project Gutenberg and to the author’s dismay they did not have the same pattern. Nonetheless, the author moved forward with the information found and developed an XSLT stylesheet to convert (i.e. transform) the manuscript’s HTML file into a TEI XML file.

The result was one large file with multiple <TEI> elements, one for each narrative found. The Ungroup TEI utility discussed in **Section 8.1.1** above was used to subdivide the file, one narrative per file. The utility also produced an index page containing the initial file’s Dublin Core metadata and a hyperlink to each TEI file generated. After the TEI files were generated and uploaded to a website, the demonstrator was used to “crawl” the web directory and to generate both Dublin Core metadata records and XML Topic Map indexes. The process successfully populated the

⁸³ The difference in page count seemed to be due to the need to add more white space for readability, to the plain text version.

⁸⁴ http://www.gutenberg.org/wiki/Gutenberg:HTML_FAQ

demonstrator system. The titles of the narratives appeared on the Browse list. Furthermore, the images were properly associated with the correct narratives. However, more had to be accomplished, intellectual content including names, dates, events, people, times, places etc. had to be marked up as well.

For help the Perseus Digital Library Project was consulted. The project hosted by Tufts University and directed by Gregory Crane, Ph.D. “has focused on developing automatic methods for structuring large document collections, especially in the humanities” [86]. Several papers have been published documenting the project’s efforts and progress. One in particular, entitled “Detecting Events with Date and Place Information in Unstructured Text” [86]; initially appeared to hold some promise with respect to automating the process of identifying intellectual content. The process requires as input a historical source in which the names and dates have already been identified. For such input a matrix is developed that identifies dates and place names along with their proximity and frequency using sentences as the unit of analysis. Thus, if a date and place name appears together often, then probably the value pair is referencing some event.

The notion sounded feasible and the author set out to find name information. On the Perseus web site several digitized issues of the Richmond Dispatch newspaper were available for download as a ZIP file in TEI XML. In the files the names of people, places and organizations along with dates and times were clearly marked (i.e. tagged). However, in spite of the paper on detecting events being published in 2002 [86], there was not a single <event> element in any of the downloaded files. But since obtaining name information was the original goal (and possibly a program could be written to detect events based on the paper) the author trudged forward attempting to match visually the names in the narratives with the names in the newspaper. (There were quite a few ads and articles regarding runaway slaves.) After being unsuccessful the author realized that the following conditions made it impossible to automatically generate names using the digitized Richmond Dispatch, in this case:

1. The former slaves had changed their names – they were using aliases;

2. The individual(s) being sought in the newspaper ads were often referred to or described by physical appearance (not by name); or
3. The “fugitive” slave was referenced by a “slave” name, which often equated to a knick-name e.g. Mama Letti.

Hence, the intellectual content had to be hand-encoded. To date approximately ten (10) of the 230 TEI files are fully encoded.

8.2.4 Discussion: Lessons Learned

At this point, the lesson learned is that more XML tools and utilities are required. Until WYSIWYG (What You See Is What You Get) editors, and editing environments that hide the details of XML altogether are developed, Semantic technologies will have a limited use. The author did experiment with a Browser based editor called BXE; however it only worked for small XML schemas. The multiple file schema of TEI with its many macros (XML entities) caused the BXE editor “to hang”.

8.3 Survey Methodology and Assessment

After the Case Study was conducted a fifty (50) question survey based on a 7-point Likert scale was administered to a college-level Math class, of approximately 20 students (on roll). Fourteen (14) students participated, five (5) were absent and one, only filled out the demographic information and skipped the remaining forty-seven (47) questions. In this subsection, the details of survey construction, the method of administration and an analysis of the survey’s results are presented. [See **Appendix E** to reference the survey instrument and the tasks participants were asked to complete.]

8.3.1 Survey Sources

The questions on the survey were derived from three sources: 1) Jakob Nielsen’s Heuristic Evaluation; 2) Davis’s and Venkatesh’s Technology Acceptance Model 2 (augmented to include social influence); and 3) an Evidentiary Value Rating Scale developed by the author. Descriptions of each of these are provided below.

8.3.1.1 Heuristic Evaluation

Prior research has shown that “the main barrier to [technology] adoption is that few historians feel they have the time to learn a new technology” [50]. Thus in selecting survey instruments, it was important to focus on those that emphasized “ease-of-use”. Though it may be incorporated into a survey the first assessment tool is primarily a best practices list identifying ten principles that should be followed to achieve (web) usability [71, 72, 73]. A cursory description of the “sought after” principles is as follows: 1) Users should be made aware of system status at all times; 2) The vernacular of the system should match that of the primary user group(s); 3) Users should be able to select undo or redo, to correct mistakes quickly; 4) Word and phrase meanings should be unambiguous and consistent with other applications users are familiar with; 5) Users should be warned, or their actions confirmed, in error-prone situations; 6) Recall should be minimized and cues should be available to boost recognition; 7) Expert users should be able to create shortcuts to boost productivity; 8) Dialogues should only contain relevant or necessary information; 9) Error messages should clearly state the problem and propose a solution; and 10) Clear and explicit context-sensitive help should be readily available.

The survey questions gleaned from this assessment tool were written in future tense. For instance, each question starts with the phrase “For Griotte to be effective”. The point being to determine for future versions of the Griotte which of the heuristics should take precedence. Although the design should attempt to achieve all ten principles, in practice trade-offs often must be made.

8.3.1.2 The Technology Acceptance Model 2

According to the Technology Acceptance Model (TAM), when potential users are faced with a new technology they determine how and when they will use this new technology based on two factors: 1) “perceived usefulness” and 2) “perceived ease of use” [20]. “Perceived usefulness” is “the degree to which an individual believes that using a particular system will enhance his or her job performance”; while “perceived

ease of use” is “the degree to which an individual believes that using a particular system will be free of physical and mental effort” [20]. In other words, perceived usefulness references the anticipated throughput and productivity, whereas perceived ease of use addresses system “learnability”, device control and expenditure of mental effort. These perceptions have a significant impact on users’ attitudes toward the system, and whether they intend to continue using it.

The TAM has been used extensively to determine the potential adoption of information technologies in various fields including but not limited to medicine, education, telecommunications, ebusiness, government etc. Moreover, the instrument has been found to be a reliable predictor. Originating in 1989 the model was updated in 2000 to incorporate the impact of social ties and “cognitive instrumental processes” [93, 94]. Generally these newer measures investigate the influence of one’s peers and/or supervisor as well as the consideration of “job relevance and output quality”, in determining perceived usefulness. This updated version is referred to as TAM2 and is the version employed in the survey instrument.

8.3.1.3 Evidentiary Value Rating Scale

To address the concept of the “evidentiarieness” [31] (i.e. the general evidentiary value) of the materials being presented by the demonstrator system, a third survey instrument was devised by the author. The above two instruments do not directly address evidentiary value. Instead the heuristic evaluation broadly asks “How usable is the system?” and the TAM basically raises the question “How likely are you to use the system?” An additional assessment component is required to ask “How trustworthy are the artifacts presented by the system?” Hence, a rating system to assess the composite artifacts returned by the Griotte as search hits was implemented. Whether or not an object(s) represents “proof” depends on relevance, authority (or source of information), and sufficiency (i.e. “Is enough evidence available to lead to a conclusion?”). [21, 31]

Accordingly, the Evidentiary Value Rating Scale (EVRS) is as follows [21]:

Relevance (30 points possible)

- Context, is this the information being sought?
- Historical Significance, is the information returned meaningful?
- Bearing/ Relatedness to search expression

Authority (40 points possible)⁸⁵

- Credibility, is the information returned believable?
- Authenticity, does the information appear altered or mistranslated?
- Provenance, is the information's origin or source apparent?
- Are the results returned organized by authority?

Sufficiency (30 points possible)

- Depth, is this adequate for formulating a conclusion? (i.e. level of detail)
- Clarity, is the information presented clear?
- Quantity/ Amount of information returned (e.g. number of hits)

Overall Presentation (10 points possible)

- Organization of both the results list and the artifacts

Thus, a total score of 100 points is possible.

The EVRS is included in the survey as a series of questions each with a 7-point Likert scale. Survey participants were asked to rate the data sets returned in response to search expressions listed in Task Scenario II. [See **Appendix E** for the list of terms.]

⁸⁵ Borrowed from [21]. Hence, it is the PHRC's Authority criteria but (re)assessed at a finer level of granularity.

8.3.2 Domains of Inquiry

Using a composite of the three assessment instruments covered in the previous subsection, the domains of inquiry were formulated and categorized generally into: quality of content, web usability, the likelihood of future use, service expectations, social influence, and general attitude. In the table below the domains of inquiry, their location within the survey and the source survey instrument are listed:

| Table 7: Domains of Inquiry. | | |
|--|----------------------------------|------------------------------|
| Domain of Inquiry | Survey Questions | Survey Instrument |
| Demographic Information | 1 – 3 | General Questions |
| Perceived Usefulness | 4 – 13 | TAM 2 |
| Perceived Ease of Use | 14 – 23 | TAM 2 |
| Behavioral Intent to Use | 24 – 27 | TAM 2 |
| Quality of Content | 28 – 33 34 – 36 (Anticipated) | EVRS Heuristic Evaluation |
| (Anticipated) Quality of Site Services | 37 – 42 | Heuristic Evaluation |
| Impact of Social Ties | 43 – 46 | TAM 2 |
| General Attitude toward System | 47 – 50 | TAM 2 |

Between the three instruments there was some overlap. Repeated questions were removed. Also if two questions were so closely worded that they might confuse survey participants, the TAM question was given priority, followed by the Heuristic Evaluation question and finally the Evidentiary Value Rating Scale question. This decision was

based on the previously measured success(es) of the assessment tools i.e. which tool had been vetted the most.

8.3.3 Methodology and Results

In this subsection the process used to conduct the survey, along with an analysis of the survey's results are provided.

8.3.3.1 Methodology

Convenience sampling was used to locate the sample population. Hence, the results of the survey cannot be generalized to a broader population. Nonetheless, the responses obtained could provide insight into the feasibility of the Griotte as a mainstream application.

As mentioned at the beginning of this section the survey participants were members of a college level Math class. Twenty students were on the student roster, five were absent and one skipped questions 4 through 50. The course's instructor and his assistant also participated. With respect to age, the range was from eighteen (18) years of age to seventy plus (70+) years of age. However, the data was biased a propos gender, thirteen (13) participants were female and only three (3) participants were male. Hence, a total of sixteen (16) cases exist.

The survey was administered online. Each student (plus the faculty and staff member) was provided the web address of the survey homepage and was directed to read the Information Sheet. If the student agreed to participate he/she was directed to choose a Task Scenario based on his/her likely future interaction with the system. All but one individual chose Task Scenario II.⁸⁶ [See **Appendix E** for Task Scenarios.]

Participants were allowed to print web pages from the Griotte website during the Task Scenario. They were also encouraged to make annotations on the printed pages if something was unclear or did not return the anticipated result. Participants were not

⁸⁶ The purpose of Task Scenario I was to evaluate the XML utilities e.g. the template builders, and to assess the website listing (i.e. recommendation) process.

timed nor were they given any other instructions except those provided on the Griotte website.

After completing a Task Scenario participants were directed to the Griotte Usability Survey. The survey consisted of fifty (50) questions. Questions one through three requested demographic information, in particular age group, gender, and occupation. The remaining questions were derived from the aforementioned assessment instruments and were polled on a 7-point Likert scale; whose possible values were presented to the user as follows:

- 1) strongly disagree
- 2) disagree
- 3) slightly disagree
- 4) neither agree or disagree
- 5) slightly agree
- 6) agree
- 7) strongly agree

Upon completing the survey, participants were asked to turn in their printouts (if they had produced any). The author intended to use these for a qualitative assessment, if enough material was provided (only three printouts were submitted⁸⁷).

8.3.3.2 Results

The Evidentiary Value Rating Scale questions were evaluated first, since these specifically addressed the research question. Descriptive statistics were calculated for each of the six Quality of Content measures (labeled qc1 – qc6). The table below generated by IBM SPSS Statistics 19 shows the results. [Below that the list of Quality of Content questions is shown, for quick reference.]

⁸⁷ One was from the individual who attempted Task Scenario I. His comment read “**can’t understand**” and he signed his name.

Table 8: Quality of Content Descriptive Statistics.

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---------------------------|----------|----------------|----------------|-------------|-----------------------|
| qc1 | 16 | 2 | 7 | 5.13 | 1.310 |
| qc2 | 16 | 3 | 7 | 5.13 | 1.455 |
| qc3 | 16 | 3 | 7 | 5.31 | 1.195 |
| qc4 | 16 | 3 | 7 | 5.13 | 1.147 |
| qc5 | 16 | 4 | 7 | 5.25 | .931 |
| qc6 | 16 | 4 | 7 | 4.94 | 1.063 |
| Valid N (listwise) | 16 | | | | |

Table 9: Quality of Content Survey Questions.**Evidentiary Value Related Questions**

28. The information Griotte returns in response to my search and browse activities is relevant (on topic).

29. The information Griotte returns in response to my search and browse activities is meaningful (it makes sense).

30. The information Griotte returns in response to my search and browse activities is credulous (believable).

31. The information Griotte returns in response to my search and browse activities accurately represents the [original] document(s) (correctly interprets).

32. The information Griotte returns in response to my search and browse activities contains enough detail to determine the appropriateness of the [original] document(s) (i.e. enough information).

33. The information Griotte returns in response to my search and browse activities is ordered by authority (most authoritative to least authoritative).

Note opinions varied; however, the average of the measures was approximately five (5.1) “slightly agree”. Thus participants “slightly agreed” that the composite artifact was reliable. The author surmises that the responses to the sixth Quality of Content question would have been higher, if the author had been able to correctly markup more than ten narratives during the Case Study delineated in **Section 8.2**.

Next the heuristic evaluation questions were analyzed (questions 34 – 42), to determine which of the web usability principles might have a higher priority. Possibly indicating principles of lesser importance that may be sacrificed in future design iterations. In support of Jakob Nielsen’s usability construct all measures were rated equally; receiving a mean score of 6.397 – “agree”, and a range from 6.00 – 6.71. The question receiving the highest average score was

Question 41. For Griotte to be effective it is important for the web site to be easy to navigate.

Next the simple variables were aggregated into their respective domain of inquiry variable. (See **Section 8.3.2** above.) Descriptive statistics including mean, minimum, maximum and standard deviation were calculated for each domain of inquiry. **Table 10** below shows the results of the calculations.

Table 10: Domains of Inquiry Descriptive Statistics.

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---------------------------|----------|----------------|----------------|-------------|-----------------------|
| PU | 16 | 3.30 | 6.56 | 5.4188 | .94716 |
| PEU | 16 | 3.30 | 6.10 | 4.4438 | .73573 |
| BIU | 16 | 3.00 | 6.50 | 4.8750 | 1.07626 |
| QC | 16 | 3.33 | 6.83 | 5.1458 | 1.06784 |
| OQC | 16 | 4.00 | 7.00 | 6.5417 | .80623 |
| QS | 16 | 4.00 | 7.00 | 6.3073 | .79682 |
| SI | 16 | 4.00 | 6.25 | 5.5156 | .67373 |
| ATU | 16 | 4.00 | 7.00 | 5.4531 | .92745 |
| Valid N (listwise) | 16 | | | | |

Quality of Content (QC), Overall Quality of Content (OQC) (labeled as overall since the questions are applicable to the entire site but it is a future tense construct) and Quality of Service (QS) have already been covered, as grouped simple variables. Observe Perceived Ease of Use (PEU), having the lowest mean appears to indicate an issue with ease-of-use and possibly an effect on Behavioral Intent to Use (BIU) which has the next lowest mean. The remaining constructs Perceived Usefulness (PU), Impact of Social Ties (SI for social influence) and [General] Attitude Toward Use (ATU) all weigh in roughly at 5.5, between “slightly agree” to “agree”. Thus far the data seems to imply that participants do perceive the Griotte as being “a good idea” however, it is somewhat difficult to use especially with respect to navigation. Furthermore, this difficulty may (negatively) impact their decision to adopt the system in the future.

To determine what could happen if we increased the evidentiary value of the artifacts presented a bivariate analysis using Pearson’s coefficient was computed, for each pair wise combination of the domains of inquiry. **Table 11** below lists the results of this analysis:

Table 11: Domains of Inquiry Correlations.

| | | PU | PEU | BIU | QC | OQC | QS | SI | ATU |
|---|---------------------|--------|-------|--------|--------|--------|--------|--------|-------|
| PU | Pearson Correlation | 1 | .096 | .791** | .615* | .193 | .384 | .674** | .558* |
| | Sig. (2-tailed) | | .723 | .000 | .011 | .473 | .142 | .004 | .025 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| PEU | Pearson Correlation | .096 | 1 | .325 | .564* | -.211 | -.119 | .305 | -.243 |
| | Sig. (2-tailed) | .723 | | .219 | .023 | .432 | .660 | .251 | .363 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| BIU | Pearson Correlation | .791** | .325 | 1 | .798** | .083 | .339 | .532* | .390 |
| | Sig. (2-tailed) | .000 | .219 | | .000 | .759 | .199 | .034 | .135 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| QC | Pearson Correlation | .615* | .564* | .798** | 1 | .005 | .244 | .541* | .223 |
| | Sig. (2-tailed) | .011 | .023 | .000 | | .984 | .362 | .030 | .406 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| OQC | Pearson Correlation | .193 | -.211 | .083 | .005 | 1 | .903** | .362 | .467 |
| | Sig. (2-tailed) | .473 | .432 | .759 | .984 | | .000 | .168 | .068 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| QS | Pearson Correlation | .384 | -.119 | .339 | .244 | .903** | 1 | .539* | .479 |
| | Sig. (2-tailed) | .142 | .660 | .199 | .362 | .000 | | .031 | .060 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| SI | Pearson Correlation | .674** | .305 | .532* | .541* | .362 | .539* | 1 | .395 |
| | Sig. (2-tailed) | .004 | .251 | .034 | .030 | .168 | .031 | | .130 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| ATU | Pearson Correlation | .558* | -.243 | .390 | .223 | .467 | .479 | .395 | 1 |
| | Sig. (2-tailed) | .025 | .363 | .135 | .406 | .068 | .060 | .130 | |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| ** . Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | |
| * . Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | |

All of the statistically significant correlations with a p-value of .05 or less are highlighted in the Correlations table above. Note the assumption regarding the relationship between Perceived Ease of Use and Behavioral Intent to Use is incorrect.

However, consider the significant correlations involving Quality of Content (QC).

Quality of Content has a significant correlation to: Perceived Usefulness (PU); Perceived Ease of Use (PEU); Behavioral Intent to Use (BIU); and Impact of Social Ties (SI). Each of these PU, PEU, BIU and SI has a positive relationship with QC; meaning “**if X increases then Y increases and if X decreases then Y decreases**”, where in this case X is QC (i.e. evidentiary value) and Y represents the other dependent variables.

Using the results of the Pearson correlations, the following statements can be made:

- If the evidentiary value of historical narratives increases, the perceived usefulness (of historical narratives) increases as well and vice versa.
- If the evidentiary value of historical narratives increases, the perceived ease of use (of historical narratives) increases as well and vice versa.
- If the evidentiary value of historical narratives increases, the [behavioral] intent to use (historical narratives) increases as well and vice versa.
- If the evidentiary value of historical narratives increases, the impact of social ties or social influence increases as well and vice versa. This statement reminds the author of how she learned about Google; it was recommended by a co-worker as an excellent search engine. (Generally, if the artifact improves more people are likely to champion it.)

8.4 Summary of Results

Consequently, the answer to the research question: **“How does linking [personal] recollections with related historical sources influence the evidentiary value of recollections?”** Is **“Linking [personal] recollections with related historical sources increases the evidentiary value of recollections”**. This is indeed the expected result. The author’s enthusiasm is somewhat tempered by the fact that these results cannot be generalized to a broader population. However, the results indicate that the research effort was not in vain and that further study in this area is warranted.

9. CONCLUSION AND FUTURE WORK

In this section, the contributions of the research, proposals for future work and closing remarks are provided. The body of work presented represents exploratory research. Accordingly, the influence it will have on its intended audience, oral historians, is not yet known. Nonetheless, the technical merits of this research have been identified and they, along with the author's plans for the Griotte, are discussed below. This section ends with some issues that need to be raised, regarding the future of the Semantic Web.

9.1 Contributions

At this point in the research agenda, it is too early to make sweeping assumptions concerning the Griotte's impact on the discipline of oral history. However, the described process identifies major user interface design flaws and semantic errors as well as provides insight into how extending the oral history collection model – to incorporate corroborating resources – will influence the evidentiary value of oral history collections. Futuristically speaking, the author anticipates that the Griotte will contribute to the production of high quality digital oral history collections that meet the reliability assurance of scholars. If this is indeed the case, the Griotte may serve as a beneficial tool in expanding the boundaries of historical research, by increasing the inclusion of cultural and social dimensions of inquiry.

Another Griotte contribution is in the area of organizing metadata on the World Wide Web [46]. The benefit being the system improves the ability of historical researchers and enthusiasts “to discover, access, retrieve and assimilate” historical information “on the Internet through the use of metadata” [46]. This contribution was wrought through the customization of an XML schema for the oral history domain, namely the augmentation of the TEI schema to include evidence elements which may be used to increase the evidentiary value of historical narratives. Also Semantic Web technologies that provided a detailed historical context were put into practice, which

entailed the use of Topic Maps⁸⁸ and the development of an extensive domain specific ontology (expressed in a formal language) – one with cross-references to CIDOC CRM, a standard ontology utilized in the cultural heritage and museum industries.

Another contribution in the area of organizing Internet content involves automatic metadata transformation. Generating metadata manually is expensive, time consuming and error prone. Thus tools are required to convert resources from existing Web technologies to Semantic Web technologies. In particular, formal tools (customizable to document models) should be developed to transform (X)HTML resources to XML resources. In this project the author used an XSLT stylesheet to transform a Project Gutenberg [80] HTML document into TEI XML. The author realizes this exercise has limited use – since not even all Project Gutenberg HTML files adhere to a single structural format. However, by establishing a few (additional) guidelines, such as adding TEI related class attributes – e.g. “teifront”, “teibody”, “teiback” to <div> elements – the XSLT stylesheet could be applied to a corpus of documents. Presently, this type of conversion work is outsourced to foreign countries e.g. India.

Lastly in the area of organizing Web content a contribution has been made toward providing (smart) ontology-based searches, focused on the domain of history. Here we only emphasized a subdiscipline of history, historical narratives. However, the tools that were developed to expand this information and to keep it up-to-date – namely the TEI Crawler, The Dublin Core Metadata Processor, the Topic Map Generator, etc. – are not domain specific. Accordingly, the author considers this as a major step toward the “Historical Web” and potentially extendable to the Semantic Web. If we continue along this path, soon casual web surfers will be able to ask questions such as “Who made the Gettysburg address and what were the circumstances surrounding that address?”

⁸⁸ The author contends that although topic maps and its implementation (or serialization) in XML are often overlooked as Semantic Web technologies, these are indeed Semantic Web technologies that are capable of being expressed in RDF XML. Moreover, topic maps facilitate the expression of complex relationships far easier than RDF XML.

9.2 Future Work

In this section, foreseeable risks, future work and potential publishing opportunities will be discussed. Some of the anticipated issues include: concern over the loss of intellectual property; the technical competency of participants; legal and copyright ambiguities involving tradition bearers and historical analyses; and the absence of viable digital preservation strategies. Another concern may be system security. Though Internet technologies are being utilized, it is anticipated that the final system(s) will run behind the firewall of an educational or cultural institution (e.g. on an intranet). At most, access via an extranet should be allowed. This is in addition to the utilization of role-based user access control [28] supported by DSpace (requiring user authentication). Future research will investigate these issues.

Long term goals for the Griotte involve future research to:

- Produce a stable production release that will allow scholars to conduct full-fledged case studies, resulting in high quality digital oral history collections.
- Develop best case practices for digital oral history collections – covering compilation, organization, and presentation.
- Investigate collaborative translation, in particular its potential for increasing the reliability and the validity of translations of primary texts.
- Improve the work environment of the Griotte by adding a shared annotation system that will allow users to communicate work requests and organize work assignments.

The anticipated research findings are likely to lead to publication in journals focusing on the following disciplines: computer and information sciences (especially, digital libraries and digital scholarship); oral history; humanities; and cultural informatics.

9.3 Closing Thoughts

The Semantic Web is in its early stages of development and we have not determined in any detail where its potential pitfalls may lie. The computer science community is in that euphoric stage at the beginning of a relationship when all one can visualize is the positive attributes of the object of one's affections. The author hopes the research presented will at least start a dialogue on the subject of realistic expectations of the human agency, technical acumen – not merely that of application developers but of system users too – and costs (in manpower and finances) required to advance or “to mainstream” the Semantic Web.

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APPENDIX A

SYSTEM DIAGRAMS

Appendix A contains Griotte System Diagrams per the discussion in **Section 6**, which covers the conceptual design of the Griotte. The first diagram, System Architecture highlights the relationship(s) between system services and human agency, both are necessary. The second diagram, System Integration depicts the “software stack” used to implement the Griotte’s system services.

SYSTEM ARCHITECTURE

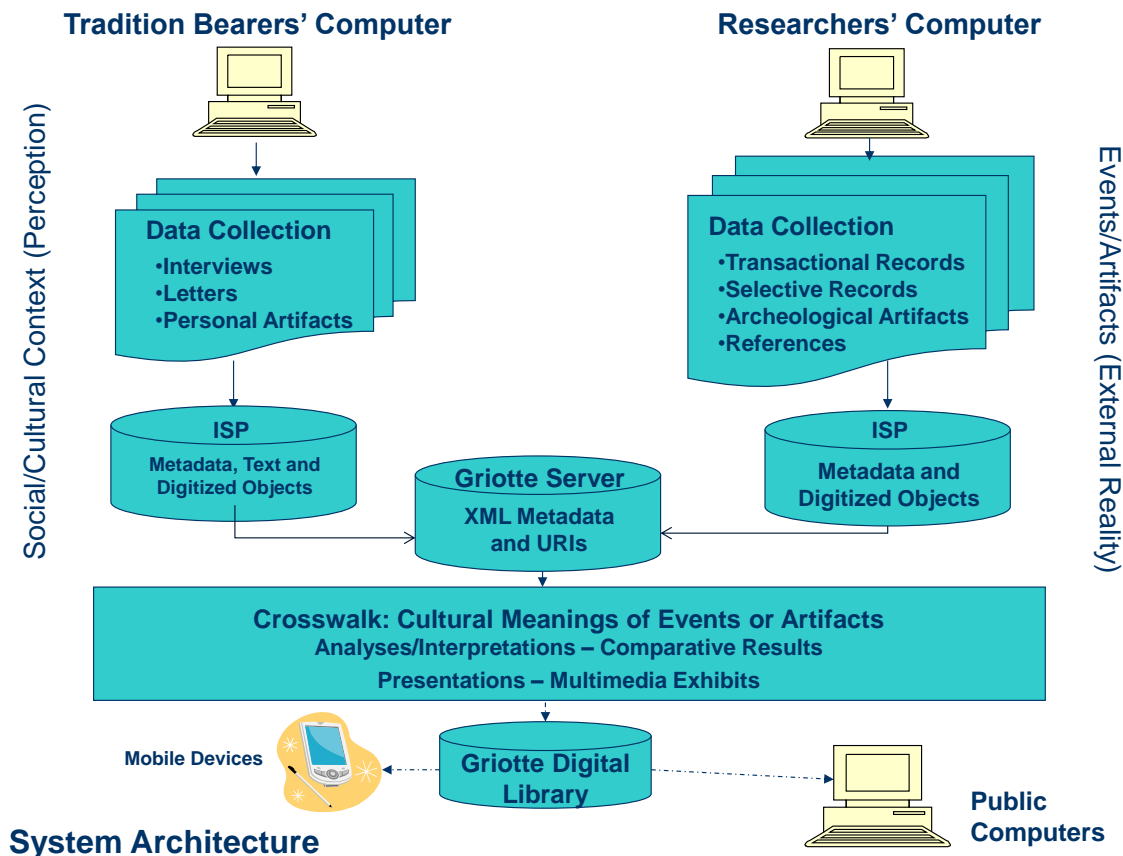
**System Architecture**

Figure A-1: Griotte Computer System Architecture. Tradition Bearers and Researchers upload digital content to their respective Internet Service Providers (ISPs).

The Griotte has a TEI XML Crawler service (as well as online listing forms) that retrieves the Uniform Resource Identifiers (URIs) of digital content and automatically generates XML metadata – based on the content. This metadata forms a crosswalk between events (and/or artifacts) and their meanings.

SYSTEM INTEGRATION

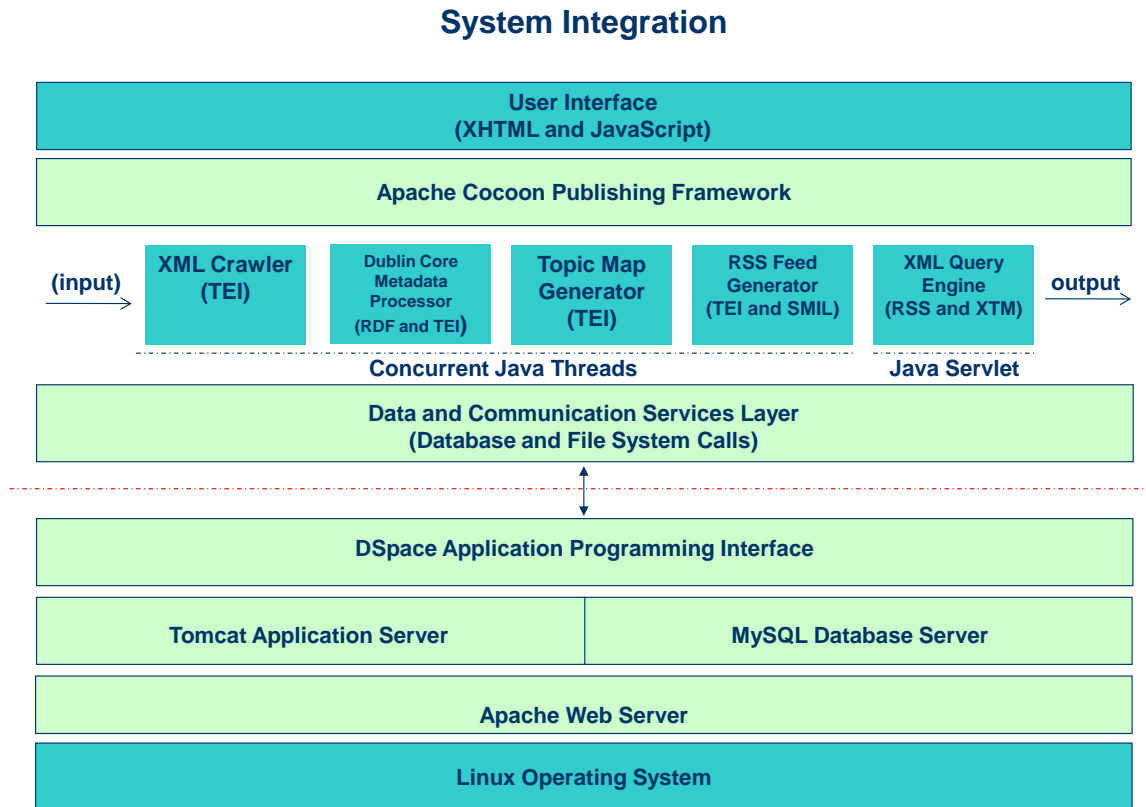


Figure A-2: Griotte Software Integration. Except for Apache Cocoon which was used as a Web framework, all of the software above the lengthwise dotted line was primarily developed by the author.

All software below the dotted line is pre-packaged and supported by the author's Internet Service Provider (except for DSpace). The text enclosed in parentheses indicates what type of input is anticipated by the given module – TEI, RDF, SMIL, RSS and/or XTM (i.e. topic maps). All are XML schemas. Note output is generated dynamically in response to (public) user queries.

APPENDIX B
GRIOTTE FIELD STUDY
DETAILED STUDY DESCRIPTION

Appendix B contains a detailed Study Description for the qualitative field study discussed in **Section 5**, Practicing Social Informatics. The study description was submitted and approved as part of an IRB Application, required by Texas A&M University's Institutional Review Board. It documents the proposed research protocol. This appendix ends with a Reference list of sources utilized during this portion of the research⁸⁹.

⁸⁹ The "References" list at the end of this appendix applies to both appendices **B** and **C**.

IRB APPLICATION, PART II: DETAILED STUDY DESCRIPTION

1. Selection of Subjects

- a. Source and number: Texas A&M University will serve as the source for study participants. Specifically, the staff of Cushing Memorial Library and Texas A&M alumni affiliated with Cushing Library. The anticipated number of study participants is five (5).
- b. Method of recruitment and selection: The sampling method used will be snowball sampling. Among those recommended, the selection criteria will be the level of interest or knowledge of the subject matter; in particular the activities of the Mexican army after the Battle of San Jacinto.
- c. Ages and gender: Forty-five (45) to seventy-five (75) years of age. The expected gender is both, male and female participants.
- d. Compensation: There is no compensation.
- e. Location and duration of experiment: The study will consist of a series of interview sessions which will occur in participants' homes and/or offices as well as over the Internet via web cameras and video capture software. The anticipated duration of the study is one year (i.e. twelve months).
- f. Specific steps to ensure confidentiality or anonymity of responses of results: The responses may be utilized as interpretive material in public exhibits hosted by Cushing Library. However, in the consent form interviewees will have the option of having their responses used for research purposes only or for private use only. In these cases the interviewee will not be identified and the principal researcher's copy(s) of the interview responses will be destroyed after the study is complete.
- g. The investigator's relationship to subjects: The investigator has no relationship(s) to the subjects.

2. Purpose of study: To conduct a qualitative study investigating the work practices of members of the target population. My dissertation project involves developing a digital humanities system that will facilitate historical researchers' efforts in compiling, analyzing and presenting historical narratives.
3. Research Procedures: Potential study participants will be contacted via e-mail or telephone to inquire about their interest in participating. Those that respond in the affirmative will be mailed a consent form. After a signed consent form has been received by the principal investigator, the subject will be contacted and an interview session scheduled.

The investigator will conduct at least one in-depth interview with the subject, which will be video recorded. The session duration will be approximately one hour in length; if more material needs to be covered additional sessions will be scheduled – lasting at most one hour. An interview guide will be used and all interviewees will be asked questions related to the topics on the guide. Interviewees will have the option of viewing the tapes and of providing feedback. For interviewees who choose the research only option their tapes will be analyzed and destroyed. For those who select the private option their tapes will be given to them and any related interview materials destroyed: hence, these materials will not be utilized by the investigator for analysis.

- a. Physical/Behavioral Aspects: There are none.
 - b. Deception or Coercion: There is none.
4. Risks and Benefits to Subjects
 - a. A description of any potential risks or discomforts to the subject. The foreseeable risks to the subject(s) are minimal. They include the possibility of being misinterpreted and potential discomfort related to sitting for long periods of time.
 - b. A definition of benefits to the research subject or alternatives for participation in the study. There are no personal benefits to the research subject for participation.

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APPENDIX C

INTERVIEW GUIDE AND SAMPLE INTERVIEW SCRIPTS

Appendix C contains the Interview Guide used in the field study covered in **Section 5**, Practicing Social Informatics. The interview guide was submitted and approved as part of an IRB Application, required by Texas A&M University's Institutional Review Board for research involving human subjects. Interview scripts were constructed from the interview guide. Two of the interview scripts used during the field study are included in this addendum. The scripts were e-mailed to the subjects at least one week prior to their interviews.

INTERVIEW GUIDE

Note: Since the events being investigated occurred in 1836, the “narrators”/eyewitness participants are not available for interviews. Thus subject matter experts will be interviewed, in essence providing analyses and interpretations of the events in question.

Topics to be discussed:

- The people involved (i.e. the primary narrators); their identities, nationalities, military ranks, demographic attributes, etc.;
- The narrators’ personalities and how their personalities impacted their decisions;
- Relationships between narrators and how those relationships triggered certain events or outcomes;
- What if scenarios;
- Provenance and authentication of artifacts (i.e. process used for verification), included in the collection;
- The political, economic, technological and/or social state/condition of the two nations, Mexico and the U.S. in 1836;
- The meaning(s) of the events that occurred after the Battle of San Jacinto, to both cultures, Mexican and Texian;
- How recently discovered archeological artifacts may modify those meanings/understandings;
- The demographics and (social/administrative) structures of the two “armies”, Mexican and Texian;
- The geography, topography and climate that formed a backdrop for the covered events;

- Military skill and strength of both sides, prior to and after the Battle of San Jacinto; and
- Myths surrounding the after events of the Battle of San Jacinto, which have persisted to this day.

INTERVIEW SCRIPT (DOCUMENTARY TREATMENT)

SAMPLE I

1. Set Description

- a. Location: The home of interview subject during the morning hours of 10:00am – 12:00pm on July 28th, 2007.
- b. General Atmosphere: Scholarly/academic
- c. Room Setting: Subject should be seated at a desk with an uncovered window to the left (or right depending on the position of the sun) of the subject. The subject may be centered with the window or the window may be slightly to the front of the subject.

Behind the subject should be a wall. This “back” wall should be a solid color (no stripes or flowers i.e. wallpaper patterns), preferably non-white. A bookshelf or mounted credentials may be situated behind the subject to mask the back wall, if the wall is white or patterned. The subject should be seated far enough away from the back wall that his shadow falls on the floor or at least below the top of the desk.

On the “back” wall or on the ceiling above the subject there should be a light e.g. a wall sconce or track lighting; if available (car window reflectors may be used instead).

- d. Best color for desk/table: Something neutral e.g. browns/tans. Best color for back wall: Green or blue.
- e. Camera Position: 90 degrees, centered directly in front of the subject. Shots will be close-ups and head-and-shoulders only (i.e. range – from the top of the desk to the top of the subjects head – leaving a small space between the subject’s head and the top of the frame). For focus, only the interviewee will be shown and cue card prompts will be used.

f. Subject Wardrobe: Please wear a solid (i.e. no patterns), colored shirt; any color except white. White throws the camera off! (Don't worry I am not a makeup artist and will not attempt to apply makeup. However, the lights used during video recording may cause you to sweat so you may desire to take that into consideration. We can always stop for a brow wiping.)

2. Premise (of the Interview Session)

a. Objective of first interview: To establish context i.e. "to set the stage" for the activities that followed the Battle of San Jacinto, from the Mexican perspective.

b. General topics (Cue card prompts in the order they should be presented):

- 1) the turbulent beginnings of the "United Mexican States",
- 2) federalists vs. centralists,
- 3) the rise of Santa Anna,
- 4) Santa Anna's divisive policies,
- 5) the insurgencies caused by his policies,
- 6) the Mexican army's efforts to squelch the rebellions,
- 7) Santa Anna's top men,
- 8) descriptions of these men – also examine within the context of federalists vs. centralists (i.e. their political stance), and
- 9) the strength and organization of both armies – for Mexico stress the presence of the women, children and noncombatants as well as the toll of the ongoing civil unrest.

3. Background [13]⁹⁰

a. Early Republic of Mexico Timeline

- 1) Declaration of independence from Spain in 1810: The revolt was led by Catholic priest Miguel Hidalgo y Costilla (he was captured and executed by opposing forces).
- 2) Long War with Spain (as well as infighting): continued for eleven years.
- 3) “Official recognition of independence from Spain, in 1821”: Resulted in “the creation of the first Mexican Empire”; its first emperor Gen. Agustin Iturbide (1822 -1823). (He was dethroned via a revolt.)
- 4) The United Mexican States was established in 1824:
 - i. Its first president was Guadalupe Victoria (1824 -1829). (He seemingly stepped down at the end of his term.)
 - ii. The second president was Vicente Guerrero (1829). (He “won the electoral vote but lost the popular vote.”)
 - iii. The third president was Gen. Anastasio Bustamante (1830 -1832). (He led a revolt against the existing government to become president.)
 - iv. The fourth president was Gen. Manuel Gomez Pedraza (1832). (He was the winner of the popular vote back in 1828. Santa Anna overthrew Bustamante and declared Pedraza as the “true” president.)

⁹⁰ The contents of this section were disputed by one of the participants who is considered an expert on the history of Mexico. The Wikipedia article from which this information is derived was also “marked” as having “multiple issues”. However, the point of providing this information was to establish talking points in either direction, supporting or contradicting.

- v. The fifth president was Antonio Lopez de Santa Anna, (1832 – 1836). (Elections were held in 1832 and he was elected president. Actually he was elected a total of 11 times.)

- 5) Santa Anna annulled the federal constitution in 1834: This caused insurgencies in the “northernmost portion of the northern state of Coahuila y Tejas” (Coahuila and Texas). “Both areas sought independence from the Mexican government.”
- 6) Texan militias defeated the Mexican army and won independence in 1836: “The inhabitants of Tejas, calling themselves Texans and led mainly by relatively recently-arrived English-speaking settlers, declared independence from Mexico at Washington-on-the-Brazos, giving birth to the Republic of Texas.”

- b. A Brief History of the Northern-most State of Mexico, “Coahuila y Tejas
Coahuila y Tejas was one of the constituent states of the newly established United Mexican States under its 1824 Constitution”. “For administrative purposes, the state was divided into three districts: Béxar (the entire area covered by Tejas), Monclova (northern Coahuila), and Río Grande Saltillo (southern Coahuila).”

“It remained in existence until the adoption of the 1835 “Constitutional Bases” (Santa Anna’s mandate), whereby the federal republic was converted into a centralized one, and the nation’s states (estados) were turned into departments (departamentos): the State of Coahuila y Tejas was split in two and became the Department of Coahuila and the Department of Tejas. The latter later seceded to become the independent Republic of Texas.”

Both Coahuila “and Texas seceded from Mexico because of Santa Anna’s attempts to centralize the government, with Texas forming the Republic of Texas and Coahuila joining with Nuevo Leon, and Tamaulipas to form the short-lived Republic of the Rio Grande.” [See map of Coahuila below.]

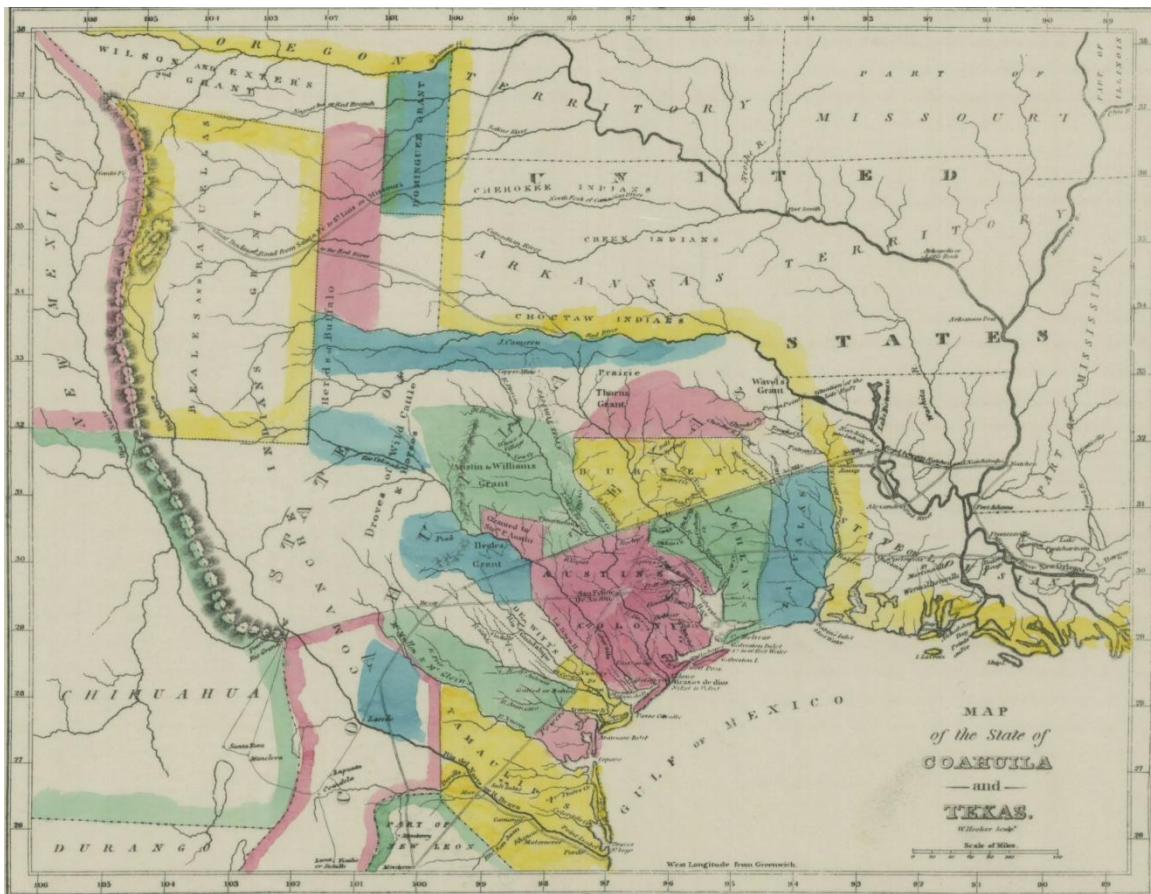


Figure C-1: Map of the State of Coahuila and Texas. Source:
http://upload.wikimedia.org/wikipedia/commons/c/c1/Map_of_Coahuila_and_Texas_in_1833.jpg.
 Licensing: Free content, for details reference <http://commons.wikimedia.org/wiki/Licensing>

c. The “English-speaking” Become Residents of Mexico

“Soon after achieving its independence” from Spain, “the Mexican government, in an effort to populate” some of its sparsely-settled northern land claims, “awarded extensive land grants” in a remote area of the state of Coahuila y Tejas “to thousands of immigrant families from the United States, on the condition that the settlers convert to Catholicism and” assume Mexican citizenship. It also “forbade the importation of slaves”, a condition that, like the others, was “largely ignored”.

4. Questions from Interview Guide

- a. Who were the primary people involved (i.e. the primary narrators); their identities, nationalities, military ranks, demographic attributes, etc.?

Key talking points:

- Senior staff including Santa Anna and his generals.
- Which generals were captured with Santa Anna and which remained free?
- Who took over after Santa Anna's capture?

- b. Describe the narrators' personalities and how their personalities impacted their decisions (prior to the Battle of San Jacinto).

Key talking points:

- Only cover those seven who met in Filisola's tent at Madame Powell's.

- c. What were the demographics and (social/administrative) structures of the two "armies", Mexican and Texan?

Key talking points:

- Mexican – roles of women, children and noncombatants
- Texans – Where were the women and children? Structure: Were they the "rick-tick" bunch Santa Anna assumed them to be? Was the victory at San Jacinto just luck?

- d. Talk about the military skill and strength of both sides, prior to (and after) the Battle of San Jacinto.

Key talking points:

- Mexican – the impact of the civil war(s); the lack of supplies, maps, and boats/transportation; the lack of a central base of operations; the weakness of the central government; etc.

- Texans – morale after Goliad and the Alamo; Goliad may need explanation especially Urrea's role; and the anger both battles spurred that spilled over into the Battle of San Jacinto. (Most people know the story of the Alamo but the Goliad massacre is a mystery to many.)

*Note: In session 2, we should start with the condition of the Mexican Army after the Battle of San Jacinto and go on-site to film some of the campsites...

INTERVIEW SCRIPT (DOCUMENTARY TREATMENT)

SAMPLE II

1. Set Description

To visualize the difference between a “good” set versus a “bad” set go to <http://strobist.blogspot.com/2007/05/how-to-improve-your-cheapo-webcams.html>. The online article entitled *How to Improve Your Cheapo Webcam's Picture Quality* provides images and directions on how best to set-up your space for videoconferencing using a consumer quality webcam. The first picture portrays utilizing a webcam with a typical blue computer screen, and without a backdrop. The second picture uses the same webcam, however, the subject is wearing a white shirt; is using a desk lamp (on a shelf above the computer monitor); and is using a grey backdrop. The subject is also sitting further away from the webcam. [14]

Accordingly, to obtain a quality webcam set the guidelines are as follows:

- a. Use a desk lamp as your frontal light source. If you are like me mid-40s or above, to soften the light tape a white sheet of paper over the front of the lamp. If you are afraid of starting a fire don't use the paper, instead point the lamp toward the wall behind your desk.
- b. Dim the brightness and the contrast of your computer monitor. You may need your IT person to assist you with this. The reason for this step is to avoid having the reflection of computer screen appear in your eyes or glasses.
- c. Wear a white shirt. The webcam needs it to focus.
- d. Make sure your background is neat. Webcams have a wide range and may actually record from floor to ceiling. Your media department may have a grey, blue or brown backdrop or a portable screen to conceal your background if you prefer.

Camera Position: 90 degrees, centered directly in front of the subject. For focus, turn the camera on, position yourself and pause for about five seconds to allow the camera to adjust.

2. Objective of Interview

To discuss generally the contribution of José Enrique de la Peña's writings, to the telling of the *Sea of Mud* narrative.

3. Questions (Interview Guide)

a. Introduction:

At the beginning of the interview I will ask you to introduce yourself (including your name and position) and to describe your research/background with respect to the Battle of San Jacinto. Then we will conduct the question and answer session. Please feel free to add or change any of the questions listed below; merely e-mail to me your changes prior to the interview. Also, if you prefer we could conduct a practice session first.

b. Questions and topics:

- i. Peña's writings were invaluable in the telling of the *Sea of Mud* narrative; however some question the provenance and the authenticity of these writings. Discuss the provenance and the authenticity of de la Peña's memoirs (i.e. the three drafts of his diary).
- ii. Describe the relationship between Urrea's diary, *Diario de las operaciones militares de la division que al mando del General José Urrea* and the various drafts of Peña's diary.
- iii. Discuss the proper translation of "Pasamos por el lugar en que acampamos el 26, dimos un cuarto de conversion por la izquierda y continuamos la marcha." How does this statement support (or not support) the argument that the Mexican Army traveled north along the San Bernard River toward the *Sea of Mud*?

- iv. Peña uses the term “clabasons” to refer to nails discarded by the Mexican Army on the morning of April 29th, 1836, to lighten the load. What is the significance of using the term “clabasons” as opposed to the term “clavos”?
- v. What are common mistakes in translating from Spanish to English made by contemporary scholars as they attempt to translate 19th century Mexican documents? Are these errors in translation due to a misunderstanding of the culture being investigated?
- vi. What popular beliefs are incorrect regarding the events prior to and after the Battle of San Jacinto? Or rather what are the persistent myths you hope to dispel with your work?

*Note: The duration of the interview should be approximately one hour to an hour and a half.

APPENDIX D
GRIOTTE USABILITY STUDY
DETAILED STUDY DESCRIPTION

Appendix D contains a detailed Study Description for the computer system evaluation covered in **Section 8**, The Evaluation of the Griotte. The study description was submitted and approved as part of an IRB Application, required by Texas A&M University's Institutional Review Board. It documents the proposed research protocol. This addendum ends with a Reference list of sources used to inform the study.⁹¹

⁹¹ The "References" list at the end of this appendix applies to both appendices **D** and **E**.

IRB APPLICATION, PART II: DETAILED STUDY DESCRIPTION

1. Selection of Subjects
 - a. Source and number: Texas A&M University will serve as the source for study participants; in particular, students and faculty of the Department of Educational Administration and Human Resource Development and of the Department of History. The anticipated number of study participants is ten (10). However, permission has been granted for a maximum of twenty (20).
 - b. Method of recruitment and selection: The sampling methods used will be snowball sampling and convenience sampling. Faculty members who have been recommended by members of my advisory committee will be contacted regarding participation in the study. Those who respond in the affirmative will be asked if a presentation may be made to their students as well. Faculty and students who desire to participate will be directed to a website to evaluate the system.
 - c. Ages and gender: Twenty-one (21) to sixty-five (65) years of age. The expected gender is both, male and female participants.
 - d. Compensation: There is no compensation.
 - e. Location and duration of experiment: The study will consist of a set of tasks and task assessments conducted online. Participants' responses will be submitted via an online survey (powered by Survey Monkey). Thus the location could be anywhere Internet access is available. The anticipated duration of the usability study is one year (twelve months).
 - f. Specific steps to ensure confidentiality or anonymity of responses of results: Personal information will be stored in an encrypted database and accessible only to the principal investigator. All communications with other participants within the system environment will contain usernames only, as identifiers. The IP

address of participants' computers will not be recorded. Each completed survey will be given a unique code number and participants' names will not be included with the surveys during storage.

- g. The investigator's relationship to subjects: The investigator has no relationship(s) to the subjects.
2. Purpose of study: To conduct a study using both quantitative and qualitative methods, to determine if linking (or associating) narrative data such as personal letters, memoirs and oral accounts to supporting documentary sources and archeological artifacts, will increase the evidentiary value (i.e. credibility) of narrative data: The point being to advance the use of narratives as suitable historical sources.
 3. Research Procedures: Generally, testers will be asked to execute a prescribed set of (system) tasks (approximately 12 to 20 steps per task scenario) and to complete a follow-up survey to assess their experiences. Specifically, testers will be given two (2) task scenarios each representing an anticipated primary user role of either content development or searching and browsing. For content development, tasks will consist of using XML template builders and editing tools to convert, annotate and format historical data. Search and browse tasks will involve exploring the system's contents by topic (or subject) and evaluating the system's responses to inquiries. None of the tasks described requires special training or skills; basic computer literacy is sufficient.
 - a. Physical/Behavioral Aspects: There are none.
 - b. Deception or Coercion: There is none.
 4. Risks and Benefits to Subjects
 - a. A description of any potential risks or discomforts to the subject. The foreseeable risks to the subject(s) are minimal. Nonetheless, a large percentage of this research is being conducted over the Internet; therefore absolute confidentiality

cannot be guaranteed due to the limited protections of Internet access. To minimize this risk, the computer server will utilize secure file transfer protocols to protect data in transit and a network firewall, along with an encrypted database to protect identifiable data provided by participants.

- b. A definition of benefits to the research subject or alternatives for participation in the study. There are no personal benefits to the research subject for participation.

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APPENDIX E

SURVEY/ASSESSMENT INSTRUMENTS

Appendix E contains the Survey/Assessment Instrument used in **Section 8**, The Evaluation of the Griotte. This instrument was submitted and approved as part of an IRB application. The application was required by Texas A&M University's Institutional Review Board to protect human subjects in research. Other assessment tools included in this addendum are the two Task Scenarios mentioned in **Appendix D**, Griotte Usability Study: Detailed Study Description.

GRIOTTE USABILITY SURVEY

DIRECTIONS

Brief System Description: Griotte is a digital humanities system which assists historical researchers in compiling, analyzing and presenting narrative data. Moreover, the system provides search and browse features that allow general users to retrieve this historical data as meaningful comparative output.

Instructions: Please rate the Griotte according to the following criteria, based on your experiences with the system thus far. [2, 3, 5, 6]

- Usefulness
- Ease of Use
- Intent to Use
- Quality of Content
- Quality of Site Services
- Impact of Social Ties
- General Attitude toward System

(At this point you should have completed two (2) task scenarios.)

Please read the Information Sheet prior to completing the survey. For each question select the answer that most closely reflects your opinion. Be honest. There is a total of fifty (50) questions. The progress bar at the bottom of your screen will track your advancement. When you are finished select the DONE button at the bottom of your screen.

GRIOTTE USABILITY SURVEY

QUESTIONS

I. Participant Demographics

1. What is your age?

18-25 years

26-44 years

45-60 years

61-70 years

Over 70 years

2. What is your gender?

Male

Female

3. What is your current occupation?

Student

Faculty

Staff

The possible answers for the remaining questions are given in the form of a 7-point Likert scale, with the following values:

| | | | | | | |
|----------------------|----------|----------------------|---------------------------------|-------------------|-------|-------------------|
| Strongly Disagree | Disagree | Slightly Disagree | Neither Agree or Disagree | Slightly Agree | Agree | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

II. Perceived Usefulness

4. Using Griotte would likely improve the quality of the historical research that I do.

5. Using Griotte would likely give me greater control over my research efforts.

6. Griotte would enable me to accomplish tasks more quickly.

7. Griotte would support critical aspects of my historical research.

8. Using Griotte would likely increase my productivity.

9. Using Griotte would likely improve my work performance.
10. Using Griotte would likely allow me to accomplish more work than would otherwise be possible.
11. Using Griotte would likely enhance my research effectiveness.
12. Using Griotte would make it easier to conduct historical research.
13. Overall, I would likely find Griotte useful in gathering historical information.

III. Perceived Ease of Use

14. I find Griotte cumbersome to use.
15. Learning to operate Griotte is easy for me.
16. Interacting with Griotte is often frustrating.
17. I find it easy to get Griotte to do what I want it to do.
18. Griotte is rigid and inflexible to interact with.
19. It is easy for me to remember how to perform tasks using Griotte.
20. Interacting with Griotte requires a lot of mental effort.
21. My interaction with Griotte is clear and understandable.
22. I find it takes a lot of effort to become skillful at using Griotte.
23. Overall, I find Griotte easy to use.

IV. Behavioral Intention to Use

24. I intend to use Griotte to list websites containing historical content.
25. I intend to use Griotte to search for historical information frequently.
26. I intend to use Griotte's template builders to generate content for the Internet.
27. I intend to use Griotte to do a task, whenever it has a feature (available) to help me perform it.

V. Quality of Content

28. The information Griotte returns in response to my search and browse activities is relevant (on topic).

29. The information Griotte returns in response to my search and browse activities is meaningful (it makes sense).

30. The information Griotte returns in response to my search and browse activities is credulous (believable).

31. The information Griotte returns in response to my search and browse activities accurately represents the [original] document(s) (correctly interprets).

32. The information Griotte returns in response to my search and browse activities contains enough detail to determine the appropriateness of the [original] document(s) (i.e. enough information).

33. The information Griotte returns in response to my search and browse activities is ordered by authority (most authoritative to least authoritative).

34. For Griotte to be effective it is important for the content to be understandable.

35. For Griotte to be effective, it is important for the content to be accurate (error free).

36. For Griotte to be effective, it is important for the content to be organized and uncluttered (on the screen).

VI. Quality of Site

37. For Griotte to be effective, it is important for it to recognize my errors and instruct me on how to fix them.

38. For Griotte to be effective it is important for it to provide online help and documentation.

39. For Griotte to be effective it is important for the service to be reliable (available).

40. For Griotte to be effective it is important for the service to be adequately fast (quick responses).

41. For Griotte to be effective it is important for the web site to be easy to navigate.

42. For Griotte to be effective it is important for it to make me aware of its current status (i.e. what's it doing?).

VII. Social Influence

43. I would likely use Griotte if it is strongly championed and advocated by my supervisor or professor.

44. I would likely use Griotte if my supervisor or professor repeatedly refers to the importance of using it for historical research.

45. Griotte would be very appealing to me if the majority of my friends used it.

46. I would likely use Griotte if my co-workers or classmates supported it.

VIII. Attitude Toward Using

47. All things considered, using Griotte in my work is a **HARMFUL** idea.

48. All things considered, using Griotte in my work is a **GOOD** idea.

49. All things considered, using Griotte in my work is a **POSITIVE** idea.

50. All things considered, using Griotte in my work is a **FOOLISH** idea.

TASK SCENARIO I
RESEARCHERS' SCENARIO

Imagine that you are a researcher that has been asked to contribute to an online digital collection. Your goals are to use the Griotte system to:

- Convert, annotate and format a document; and
- List a document in the system's database.

A sample task list (a PDF file) has been created for you, to access it *click on this link*. You may print the PDF file if you believe you will have difficulty maneuvering between multiple windows. In order to accomplish your goals, you will be asked to perform the tasks on the list.

A sample document file (a TXT file) has also been created for you to use in the sample tasks. To save the document to your computer *click on this link*. Select Save in the resulting dialog box. Save the sample document to a folder on your computer. Write down the location of your saved file. (The investigator assumes you are using a version of Microsoft Windows. If you are using a different operating system please consult your system's documentation, for assistance with saving files.)

If you get absolutely stuck and cannot go on, move to the next task on the list. If you have any questions before you begin, please feel free to ask them now; provided a facilitator is present, otherwise contact the principal investigator via e-mail at rtd6399@neo.tamu.edu or the faculty advisor at leggett@library.tamu.edu.

To participate in this usability test you must have Internet access and a web browser installed on your computer. (Mozilla Firefox is the recommended web browser.)

Click the following link to continue,

(Link)

SAMPLE TASKS (PDF File) – Researchers:

1. Read the sample document downloaded from the Task Scenario.
2. Make note of the metadata fields (title, author, subject etc.) at the top of the document.
3. Go to <http://www.griotte.org>.
4. Go to the Template Builders page (“Create a Template” on the navigation menu).
5. Next create a TEI Template (Read the Template Builder’s page to understand what you are being asked to do.)
6. Select the file-type of the document. In this case it is Text-Based.
7. Upload your document. (Use Browse to find it on your computer.)
8. Enter the metadata from the top of the sample document into the template input form (fields).
9. When you are done Generate your TEI File.
10. Save the Zip file to your computer.
11. Find the Zip file and open it (double click on it).
12. Open the TEI template file. (Use either Notepad or Notepad++ available on the Template Builders page.)
13. Mark up the file, identify events, people, places, dates and times. (See Template Builders page for examples.)
14. Save your changes. The name of your file should be the same as the original except the file extension should be .xml NOT .txt.
15. Next go to the Griotte Listing Page. (“List a Resource” on the navigation menu.)
16. Make the document available to other users. (Select “List a TEI File” on the navigation menu.)

17. Enter “http://www.griotte.org/narratives/sample_collection” for the Collection’s Home Page.
18. Enter
http://www.griotte.org/narratives/sample_collection/”*your_filename_with_xml_extension* for the TEI file’s URL.
19. Submit your listing.

TASK SCENARIO II
PUBLIC USERS' SCENARIO
(ENVIRONMENT: AN EDUCATIONAL SETTING)

Imagine that as a University student you have been given a research assignment by your instructor. Also your instructor has directed you to a website (<http://www.griotte.org>) to look up source materials. Your goal in this scenario is to:

- Find and retrieve documents by such topics as events, dates, times, people and places.
- Browse detailed indexes of documents highlighting the occurrences of events, dates, times, people and places.

A sample task list (a PDF file) has been created for you, to access it *click on this link*. You may print the PDF file if you believe you will have difficulty maneuvering between multiple windows. In order to accomplish your goals, you will be asked to perform the tasks on the list.

If you get absolutely stuck and cannot go on, move to the next task on the list. If you have any questions before you begin, please feel free to ask them now; provided a facilitator is present, otherwise contact the principal investigator via e-mail at rtd6399@neo.tamu.edu or the faculty advisor at leggett@library.tamu.edu.

Click the following link to continue,

(Link)

SAMPLE TASKS (PDF File) – Public Users:

1. Go to <http://www.griotte.org>.
2. Go to the Search section of the Griotte web site. (Visit the different Search pages to see the types of searches available.)
3. Make a note of the search terms below. (You may also use the Lookup buttons on the search forms to see what type(s) of information has already been indexed.)
4. Search for the terms listed below and others available in the system that interests you. (Pay attention to the types of your search terms e.g. event, name, place etc.)
5. Skim the results returned. Note the order, and detail (e.g. the evidence).
6. Skim a few of the documents in the results list, for your search terms.
7. When viewing a document, skim its related materials, if they exist.
8. Next use the Browse features of the Griotte. ('Browse" on the navigation menu.)
9. Select an available collection from the "Categories" list.
10. Next select an Item (i.e. document).
11. Select the various Topics (subjects) found in the Item e.g. events, people, groups, dates, times, evidence etc.
12. Skim the information returned for coherence.
13. Next evaluate your experiences by completing the previously mentioned Usability Survey. Select "Information Sheet" on the navigation menu located on the "Survey(s)" page to begin.

SEARCH TERMS (PDF File) – Public Users, Continued:

- MAY 15th, 1854 (enter in numeric form)
- Mrs. Louisa White
- Arrival by Steamer (event)
- Richmond Despatch (general name) – spelled incorrectly
- Henry W. Quarles
- Catharine (place)
- 3:00 am (time)
- Aunt Hannah Moore

APPENDIX F
CONSENT FORMS

Appendix F contains the consent forms for both IRB Applications. The forms are presented in the order they were used during the research project. Hence, the consent form for the field study discussed in **Section 5** is presented first; followed by the consent form and information sheet for the system evaluation covered in **Section 8**. These forms were required and approved by the Institutional Review Board of Texas A&M University, as a component of human subjects' research.

CONSENT FORM

The Activities of the Mexican Army after the Battle of San Jacinto: A case study to evaluate the Griotte, a digital storyteller

You have been asked to participate in a research study designed to build a digital collection of both documentary and material evidence focusing on the activities of the Mexican Army shortly after the Battle of San Jacinto (fought on April 21st, 1836) – the decisive battle for Texas’s independence. You were selected to be a possible participant because of your knowledge of the events or of the culture being studied. A total of ten people have been asked to participate in this study. The purpose of this study is to determine if linking (via Internet-based hyperlinks) narrative data such as personal letters, memoirs and oral accounts to supporting documentary sources and to archeological artifacts, will increase the evidentiary value (i.e. credibility) of narrative data: The point being to advance the use of narratives as suitable historical sources.

If you agree to be in this study, you will be asked to perform the following activities:

- ❖ To respond to questions – while being audio/video taped – related to the activities of the Mexican Army or the Texians after the Battle of San Jacinto;
- ❖ To verify that the context and the word meanings of machine translated text, from Spanish to English are correct; and/or
- ❖ To provide references for quoted sources.

This study will take approximately twelve months to complete, during that period scheduled interview sessions will be from 45 minutes to an hour in length. The risks associated with this study are with respect to analysis and interpretation of interviews, in such cases misinterpretations may occur. To minimize this risk, the interviewee will be asked to provide feedback during the interview editing process as well as approval of the final interview. There are no other known risks. There are no personal benefits of participation in this research. Moreover, you will receive no monetary compensation, for participating in this study.

You have three choices regarding the audiotape, videotape, and/or transcript of the interview. The materials may be designated either “**public**”, “**for research only**”, or “**private.**”

If you designate the materials “**public**”, the audiotape(s), videotape(s), and/or transcript(s) will be accessible to members of the community through the Cushing Memorial Library of Texas A&M University. The Cushing Memorial Library of Texas A&M University may use the materials from the interview(s) for future exhibits (located onsite, offsite and online) and your materials will remain part of its permanent collection.

If you designate the materials “**for research only**”, your audiotape(s), videotape(s), and/or transcript(s) will be analyzed by the researcher and your information will be used to complete the research study. Your information will be reported in a way that does not identify you and your materials will be destroyed after the study is complete.

If you designate the materials “**private**”, the audiotape(s), videotape(s), and/or transcript(s) will be given to you and never released to the Cushing Memorial Library of Texas A&M University. The only records of the interview will belong solely to you.

If in the future you wish to change the status of your audiotape(s), videotape(s), and/or transcript(s), you may contact the Cushing Memorial Library of Texas A&M University:

Cushing Memorial Library
Texas A&M University
College Station, TX 77843-5000
(979) 845-1951
cushing-library@tamu.edu

Please check one of the following options:

I hereby designate the materials as **public** and give permission for my audiotape(s), videotape(s), and/or transcript(s) to be used by the Cushing Memorial Library of Texas A&M University.

I hereby designate the audiotape(s), videotape(s), and/or transcript(s) **for research only** and give my permission for the researcher to use my materials as part of the research study. I want my materials to be reported so that they will not identify me and destroyed when the study is complete.

I hereby designate these materials as **private** and do NOT give my permission for my audiotape(s), videotape(s), and/or transcript(s) to be used by the Cushing Memorial Library of Texas A&M University. The materials will be given to you for your own private use.

Your decision whether or not to participate will not affect your current or future relations with Texas A&M University. If you decide to participate, you are free to refuse to answer any of the questions that may make you uncomfortable. You can withdraw at any time without your relations with the University, job, benefits, etc., being affected. You can contact the principal investigator, Rhonda T. Dunn by telephone at (832) 758-1082 (or via e-mail at rtd6399@neo.tamu.edu) or the faculty advisor, Dr. John Leggett by telephone at (979) **458-4116** (or via e-mail at leggett@library.tamu.edu) with any questions about this study.

This research study has been reviewed by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Melissa McIlhane, IRB Program Coordinator, Office of Research Compliance, (979) 458-4067, mcilhane@tamu.edu.

Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in the study.

Signature of Participant: _____

Date: _____

E-mail Address of Participant: _____

Please mail the signed Consent Form to:

Rhonda T. Dunn, Ph.D. Student
Center for the Study of Digital Libraries, Department of Computer Science
Mail Stop 3112
HR Bright Bldg.
Texas A&M University
College Station, TX 77845
(832) 758-1082
rtd6399@neo.tamu.edu

CONSENT FORM

The Griotte Usability Study

You have been asked to participate in a research study designed to evaluate the usability of a website developed to support the collection, analysis and presentation of historical narratives. You were selected to be a possible participant for one of the following reasons: your knowledge of the events or of the culture being presented; your knowledge of library/archival science and practice; or your enrollment in a class that is studying the events or culture being investigated. Please read the information below and ask questions about anything you don't understand before deciding whether or not to take part. Your participation is entirely voluntary and you can withdraw at any time without your relations with the University, job, benefits, etc., being affected.

General Objective of Research Study:

To perform a web-based software evaluation of the Griotte, a digital humanities system

Principal Investigator(s) (including faculty sponsor) and Texas A&M University affiliation:

Principal Investigator: Rhonda T. Dunn, Ph.D. Student, Department of Computer Science, Center for the Study of Digital Libraries

Faculty Supervisor: John Leggett, Ph.D., Professor, Department of Computer Science and Associate Dean, Texas A&M University Libraries, Digital Initiatives

What is the purpose of this study?

The purpose of this study is to determine if linking (via Internet-based hyperlinks) narrative data such as personal letters, memoirs and oral accounts to supporting documentary sources and archeological artifacts, will increase the evidentiary value (i.e. credibility) of narrative data: The point being to advance the use of narratives as suitable historical sources. The sample size is approximately 20 participants.

What will be done if you take part in this research study?

The duration of this study is approximately 12 months. During this time you will be asked to participate in a usability session. Participants will be asked to perform a series of tasks using the Griotte online application; while online the system may digitally document your website navigation path. In addition, some sessions may be recorded using screen capture tools, however you will **not** be photographed, or video/audio taped. After the goals are completed or time is up, the participant will be asked a series of questions via online surveys regarding system usefulness, information quality and reliability, and/or interface quality. At the close of the session, participants will be encouraged to discuss any issues they have with the Griotte system and any additional thoughts they may have

about the application's performance. Depending on the user group you may be assigned to, the duration of a usability session could be 25 – 35 minutes, 30 – 45 minutes or 90 – 120 minutes in length.

What are the possible discomforts and risks?

There have been no risks identified at this time. Due to the nature of this study, no risks are anticipated in association with participating in the study as it involves only computer interaction and verbal communication with the principal investigator.

What are the possible benefits to you or to others?

There are no personal benefits to you from participating in this study. The data obtained from the study will be published as a part of the principal investigator's dissertation. Overall, the test will provide valuable feedback which can be integrated into the next application release. Finally, this usability test will allow students, faculty and staff to provide valuable feedback on the application in a non-intrusive environment.

If you choose to take part in this study, will it cost you anything?

There are no costs associated with this study.

Will you receive compensation for your participation in this study?

Participants will not be compensated for their involvement in this case study.

If you do not want to take part in this study, what other options are available to you?

Participation in this study is entirely voluntary. You are free to refuse to be in the study, and your refusal will not influence current or future relationships with Texas A&M University. If you decide to participate, you are free to refuse to answer any of the questions that may make you uncomfortable.

How will your privacy and the confidentiality of your research records be protected?

Your research records will not be released without your consent unless required by law or a court order. Otherwise, this study is confidential. If the results of this research are published or presented at scientific meetings, your identity will not be disclosed. Your personal information will be stored in an encrypted database and accessible only to the principal investigator, Rhonda T. Dunn. The IP address of your computer will not be recorded. All questionnaires will be given a code number and your name will not be associated in any manner with the code number. In all publications arising from this research, results will be given anonymously and in group form only. Should you withdraw from this study your personal record will be deleted. Personal data of participants completing the case study will be kept for three years after dissertation publication, in a locked file and then destroyed.

Who should you contact if you have questions regarding this study?

You can contact the principal investigator, Rhonda T. Dunn by telephone at (832) 758-1082 (or via email at rtd6399@neo.tamu.edu) or the faculty advisor, Dr. John Leggett by telephone at (979) 458-4116 (or via email at leggett@library.tamu.edu) with any questions about this study.

This research study has been reviewed by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Melissa McIlhane, IRB Program Coordinator, Office of Research Compliance, (979) 458-4067, mcilhane@tamu.edu.

Signatures:

Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in the study.

Signature of Participant: _____ Date: _____

E-mail Address of the Participant: _____

Please mail the signed Consent Form to:
Rhonda T. Dunn, Ph.D. Student
Center for the Study of Digital Libraries, Department of Computer Science
Mail Stop 3112
HR Bright Bldg
Texas A&M University
College Station, TX 77845
(832) 758-1082
rtd6399@neo.tamu.edu

INFORMATION SHEET

Welcome to the Griotte Usability Study!

Thank you for participating in the Griotte Usability Study. The purpose of this study is to determine if linking (via Internet-based hyperlinks) narrative data such as personal letters, memoirs and oral accounts to supporting documentary sources and archeological artifacts, will increase the evidentiary value (i.e. credibility) of narrative data: The point being to advance the use of narratives as suitable historical sources. To test our premise a computer application entitled Griotte – in West African culture a griotte is a female professional storyteller – was developed.

This study is being conducted in order to provide feedback to the principal investigator about the system's user interface, and information retrieval quality. Your participation and feedback will be extremely helpful for identifying ways of improving the Griotte and for planning future versions of the application.

We have chosen you to participate in this study because we believe you represent an important type of potential user of the Griotte system. This study will involve approximately twenty (20) Internet users, who are over eighteen years of age. Your participation will take about 45-60 minutes. Do not add your name or other identifying data to the assessment tools that will be provided.

During your participation in this study, you will be asked to do three (3) things. If you click on the link below you will be directed to a web page containing hyperlinks to task scenarios. You will be asked to complete two task scenarios: 1) designed to simulate the experience of a typical contributor using the Griotte system and 2) designed to simulate the experience of a general user searching the system for information. Third, you will be asked to complete a fifty (50) question survey to assess your experience(s) using the system.

If a facilitator is present he/she will observe and take notes as you carry out tasks using the Griotte system. We also may use a screen-capture application to record your interaction with the Griotte system. Please understand that we are not studying **you**, we are studying the design of the user interface. Mistakes are anticipated, since we are not providing training on the system. It is useful for us to see where the interface is confusing so that future designs can be improved.

Below are a few general guidelines to follow as you work on the tasks:

1. Try to work efficiently, but not at the expense of accuracy. Try to work at the pace you normally would if you were trying to use this system in real life.
2. We will not be providing training on the system, and as you work through the tasks we will not interfere or demonstrate the tasks. If a facilitator is present you

may ask questions, but please understand that we will not answer most questions. Please try to figure things out on your own as if no one was available to help you.

3. Also if a facilitator is present, please **think out loud** as you try to do each task. Tell him/her what you will try and why, what you think will happen, what you think the terms you encounter mean, what terms you would have expected to be used and what you may be confused about.

Please note the following characteristics of this study:

- your participation is voluntary;
- this study is confidential;
- the IP address of your computer will not be recorded;
- you can elect to withdraw at any time without penalty;
- there are no positive or negative benefits from responding to this survey;
- there is no compensation;
- the results will be used for research;
- the results will be printed and kept for three years in a locked file and then destroyed;
- the data obtained from the questionnaires may be published;

If you have any questions you can contact the principal investigator, Rhonda T. Dunn by telephone at (832) 758-1082 (or via e-mail at rtd6399@neo.tamu.edu) or the faculty advisor, Dr. John Leggett by telephone at (979) 458-4116 (or via e-mail at leggett@library.tamu.edu).

This research study has been reviewed by the Institutional Review Board – Human Subjects in Research, of Texas A&M University. For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Melissa McIlhaney, IRB Program Coordinator, Office of Research Compliance, (979) 458-4067, mcilhaney@tamu.edu.

If you agree with the above information, please access the link below. Clicking on the link will be understood to represent your consent to participate in this session.

Thank you for participating!

(Link)

APPENDIX G

ONTOLOGY FILES

Appendix G includes the PSI files that provide the historical vocabulary used by the Griotte to construct a historical web of events, periods, people, places and more. In other words, this addendum contains the Griotte's ontology employed to describe concepts and relationships that exist within the historical realm. For the sake of maintainability and understandability the ontology has been divided into eleven modules. Many of the topics were derived from Chapter 13 **Names, Dates, People, and Places** of the *P5: Guidelines for Electronic Text Encoding and Interchange* (TEI). Also wherever synonymous terms were found, cross-references were established between TEI and CIDOC Conceptual Reference Model (CRM) concepts. Lastly, since CIDOC CRM is an ISO standard the author used its terminology as descriptive text in topic definitions. [14, 19]

BASE TYPES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-base-types-psi-core" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <topic id="type">
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E55.Type"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-type-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>type</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-type-description">Type: This class may be used to specify
abstract types which are not instantiated but serve as base types for other types.</resourceData>
    </occurrence>
  </topic>

  <topic id="subtype">
    <instanceOf>
      <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-subtype-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>subtype</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-subtype-description">Subtype: This class may be used to
qualify abstract types which are not instantiated.</resourceData>
    </occurrence>
  </topic>

```

```

    </occurrence>
  </topic>

  <topic id="topic-type">
    <instanceOf>
      <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-topic-type-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>topic type</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-topic-type-description">Topic Type: This class is used to
identify objects which when instantiated should be treated as topics, as opposed to associations
or occurrences.</resourceData>
    </occurrence>
  </topic>

  <topic id="association-type">
    <instanceOf>
      <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-association-type-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>association type</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-association-type-description">Association Type: This class is
used to identify association or relation types used to classify instantiated
associations.</resourceData>
    </occurrence>
  </topic>

  <topic id="occurrence-type">

```

```

    <instanceOf>
      <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-occurrence-type-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>occurrence type</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-occurrence-type-description">Occurrence Type: This class is
used to identify descriptive elements that should be instantiated as occurrences of topics; where
the parent topic often corresponds to the respective parent element. </resourceData>
    </occurrence>
  </topic>

  <topic id="basename-type">
    <instanceOf>
      <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-basename-type-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>basename type</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-basename-type-description">Basename Type: This class is
used to identify names, titles and labels which become basenames upon
instantiation.</resourceData>
    </occurrence>
  </topic>

  <topic id="identifying-type">
    <instanceOf>
      <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="#psi-identifying-type-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>identifying type</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-identifying-type-description">Identifying Type: Instance
topics of this class are used to identify other topics by name or title.</resourceData>
    </occurrence>
    </topic>

    <topic id="theme-type">
        <instanceOf>
            <topicRef xlink:href="#type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-theme-type-description" xlink:type="simple"
/>
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>theme type</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-theme-type-description">Theme Type: Instance topics of this
class are used to identify themes which when combined represent the scope of other
topics.</resourceData>
        </occurrence>
    </topic>

    <topic id="role-type">
        <instanceOf>
            <topicRef xlink:href="#type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-role-type-description" xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>

```



```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>role type</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-role-type-description">Role Type: This class is used to
identify roles or role players in associations.</resourceData>
    </occurrence>
</topic>

<topic id="link-type">
    <instanceOf>
        <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-link-type-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>link type</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-link-type-description">Link Type: This class is used to
identify instances of hyperlinks.</resourceData>
    </occurrence>
</topic>

<!-- Used to identify structural types e.g. p, l, s, cb, pb, ab, fw, lb, milestone etc. -->
<topic id="structural-type">
    <instanceOf>
        <topicRef xlink:href="#type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-structural-type-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>structural type</baseNameString>
    </baseName>
    <occurrence>

```

```

        <resourceData id="psi-structural-type-description">Structural Type: This class is
used to identify instances of structural or layout elements in the underlying
documents.</resourceData>
        </occurrence>
    </topic>
    <topic id="spoken-type">
        <instanceOf>
            <topicRef xlink:href="#type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-spoken-type-description"
xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>spoken type</baseNameString>
        </baseName>
    </occurrence>
        <resourceData id="psi-spoken-type-description">Spoken Type: This class is used to
identify instances of spoken elements e.g. utterances, pauses, etc. within
documents.</resourceData>
        </occurrence>
    </topic>

    <topic id="image-type">
        <instanceOf>
            <topicRef xlink:href="#type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E38.Image"
xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-image-type-description" xlink:type="simple"
/>
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>image type</baseNameString>
        </baseName>
    </occurrence>

```

```

    <resourceData id="psi-image-type-description">Image Type: This class provides a
    base class for "inline graphics, illustrations, or figures. Note: only electronic media (i.e. a file(s))
    is being referenced."</resourceData>

```

```

    </occurrence>
  </topic>

```

```

<!-- begin: Superclass-Subclass Declarations of the Griotte -->

```

```

<topic id="superclass-subclass">
  <subjectIdentity>
    <subjectIndicatorRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-subclass"/>
    </subjectIndicatorRef>
  </subjectIdentity>
  <baseName>
    <baseNameString>superclass-subclass</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#superclass"/></scope>
    <baseNameString>superclass of</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#subclass"/></scope>
    <baseNameString>subclass of</baseNameString>
  </baseName>
</topic>

```

```

<topic id="superclass">
  <subjectIdentity>
    <subjectIndicatorRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/>
    </subjectIndicatorRef>
  </subjectIdentity>
  <baseName>
    <baseNameString>superclass</baseNameString>
  </baseName>
</topic>

```

```

<topic id="subclass">
  <subjectIdentity>
    <subjectIndicatorRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/>
    </subjectIndicatorRef>
  </subjectIdentity>
  <baseName>
    <baseNameString>subclass</baseNameString>
  </baseName>
</topic>
<!-- end: Superclass-Subclass Declarations of the Griotte -->
</topicMap>

```

CORE TYPES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-core-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- Object: This is an abstract base type for all instantiated topic types. Also, this is used as
a placeholder for any type. Comment out or use the appropriate type during implementation. -->

  <topic id="object">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E1.CRM_Entity"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-object-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>object</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-object-description">Object: "This [abstract] class comprises
all things in the universe of discourse of the CIDOC Conceptual Reference Model. It is an
abstract concept. With the exception of E59 Primitive Value, all other classes within the CRM
are directly or indirectly specializations of E1 CRM Entity."</resourceData>
    </occurrence>
  </topic>

  <topic id="iso-format">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-iso-format-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>

```

```

        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>iso format</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-iso-format-description">ISO Format: This class indicates
that the text of an attribute or of an element is in ISO (International Organization for
Standardization) format.</resourceData>
    </occurrence>
</topic>

<!-- associate role attribute with parent topic using plays-role-of assoc. -->
<topic id="role">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-role-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>role</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-role-description">Role: This class “may be used to specify
further information about (i.e. a qualifier) an entity referenced by a name, for example the
occupation of a person, or the status of a place”.</resourceData>
    </occurrence>
</topic>

<topic id="event">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E5.Event"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-event-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>event</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-event-description">Event: "This class comprises changes of
states in cultural, social or physical systems, regardless of scale, brought about by a series or
group of coherent physical, cultural, technological or legal phenomena."</resourceData>
    </occurrence>
</topic>

<topic id="date">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E50.Date"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-date-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>date</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-date-description">Date: This class "contains dates in any
format".</resourceData>
    </occurrence>
</topic>

<topic id="time">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E61.Time_Primitive" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-time-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>

```

```

        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>time</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-time-description">Time: This class “contains phrases
defining the time of day in any format”.</resourceData>
    </occurrence>
</topic>

<topic id="place">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E53.Place"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-place-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>place</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-place-description">Place: “This class comprises extents in
space, in particular on the surface of the earth, in the pure sense of physics: independent from
temporal phenomena and matter.”</resourceData>
    </occurrence>
</topic>

<topic id="location">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
    </instanceOf>
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E27.Site"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-location-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>location</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-location-description">Location: This class “defines the
locations of places as sets of geographical coordinates, in terms of other named geo-political
entities, or as addresses”.</resourceData>
</occurrence>
</topic>

    <topic id="person">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E21.Person"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-person-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>person</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-person-description">Person: Instances of this class “provide
information about an identifiable individual, for example a participant in a language interaction,
or a person referred to in a historical source”.</resourceData>
</occurrence>
</topic>

    <topic id="personGrp">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>

```



```

    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E74.Group"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-personGrp-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>personal group</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-personGrp-description">Personal Group: This class
“describes groups of individuals treated as a single person for analytic
purposes”.</resourceData>
    </occurrence>
  </topic>

  <topic id="org">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E40.Legal_Body"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-organization-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>organization</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-organization-description">Organization: Instances of this
class “provide information about an identifiable organization such as a business, a tribe, or any
other grouping of people”.</resourceData>
    </occurrence>
  </topic>

```

```

<topic id="evidence">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E31.Document"
xlink:type="simple" />
    <subjectIndicatorRef xlink:href="#psi-evidence-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>evidence</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-evidence-description">Evidence: This class consists of
relevant identifiable and/or digitized material items “that make propositions about
reality”.</resourceData>
  </occurrence>
</topic>

<topic id="birth">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E67.Birth"
xlink:type="simple" />
    <subjectIndicatorRef xlink:href="#psi-birth-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>birth</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-birth-description">Birth: This class encompasses “the births
of human beings” or the beginnings of non-living entities.</resourceData>
  </occurrence>
</topic>

```

```

    <topic id="death">
      <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#topic-
type"/>
      </instanceOf>
      <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E69.Death"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-death-description" xlink:type="simple" />
      </subjectIdentity>
      <baseName>
        <scope>
          <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>death</baseNameString>
      </baseName>
      <occurrence>
        <resourceData id="psi-death-description">Death: "This class comprises the deaths
of human beings" or the destruction/end of non-living entities.</resourceData>
      </occurrence>
    </topic>

    <!-- Set up event superclass to subclass associations. -->
    <association>
      <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
      </instanceOf>
      <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#event"/>
      </member>
      <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#birth"/>
      </member>
    </association>

    <association>
      <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
      </instanceOf>

```

```
<member>
  <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
  <topicRef xlink:href="#event"/>
</member>
<member>
  <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
  <topicRef xlink:href="#death"/>
</member>
</association>

<!-- end -->
</topicMap>
```

NAMES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-names-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- Declare naming topic types and use with association is-identified-by. -->
  <topic id="name">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E41.Appellation"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-name-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>name</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-name-description">Name: "This class comprises all proper
names, words, phrases or codes, either meaningful or not, that are used or can be used to identify
a specific instance of some class within a certain context."</resourceData>
    </occurrence>
  </topic>

  <topic id="placeName">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E44.Place_Appellation" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-placeName-description" xlink:type="simple"
/>
  </topic>

```

```

    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>place name</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-placeName-description">Place Name: "This class comprises
any sort of identifier characteristically used to refer to an E53 Place."</resourceData>
    </occurrence>
  </topic>

  <topic id="persName">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E82.Actor_Appellation" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-persName-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>person name</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-persName-description">Person Name: Instances of this class
"contain a proper noun or proper-noun phrase referring to a person, possibly including any or all
of the person's forenames, surnames, honorifics, added names, etc."</resourceData>
    </occurrence>
  </topic>

  <topic id="orgName">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-orgName-description" xlink:type="simple" />
    </subjectIdentity>

```

```

    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>organization name</baseNameString>
    </baseName>
  </occurrence>
  <resourceData id="psi-orgName-description">Organization Name: This class
contains the names of organizations or institutions.</resourceData>
</occurrence>
</topic>

<topic id="eventName">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-eventName-description" xlink:type="simple"
/>
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>event name</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-eventName-description">Event Name: This class contains
the names (or labels) of temporal events.</resourceData>
  </occurrence>
</topic>

<topic id="rs">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-rs-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>

```

```

        <baseNameString>referencing string</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-rs-description">Referencing String: This class “contains
general purpose names or referring strings”.</resourceData>
    </occurrence>
</topic>

<topic id="nymRef">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-nymRef-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>nym or name reference</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-nymRef-description">Nym Reference: This class “contains
the definitions for canonical names or name parts of any kind”.</resourceData>
    </occurrence>
</topic>

<!-- Personal Name Parts -->
<topic id="persNamePart">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-persNamePart-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>personal name part</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-persNamePart-description">Source Type: This class acts as
an abstract base class used to group the parts of a personal name e.g. forename(s), surname,
additional names, etc.</resourceData>
    </occurrence>
</topic>

```



```

    </occurrence>
  </topic>

  <topic id="addName">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E41.Appellation"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-addName-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>additional name</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-addName-description">Additional Name: This class
“contains additional name components, such as nicknames, epithets, or aliases, or any other
descriptive phrases used within personal names”.</resourceData>
    </occurrence>
  </topic>

  <topic id="forename">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E41.Appellation"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-forename-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>forename</baseNameString>
    </baseName>
    <occurrence>

```

```

        <resourceData id="psi-forename-description">Forename: Instances of this class
“contain a forename, given or baptismal name”.</resourceData>
    </occurrence>
</topic>

<topic id="genName">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-genName-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>generational name component</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-genName-description">genName: Instances of this class
“contain a name component used to distinguish otherwise similar names on the basis of the
relative ages or generations of the persons named”, e.g. Jr. or Sr.</resourceData>
    </occurrence>
</topic>

<topic id="nameLink">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-nameLink-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>name link</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-nameLink-description">Name Link: Instances of this class
“contain a connecting phrase or link used within a name but not regarded as part of it, such as
van der or of”.</resourceData>
    </occurrence>
</topic>

```

```

    </occurrence>
  </topic>

  <topic id="roleName">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E41.Appellation" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-roleName-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en" xlink:type="simple" />
      </scope>
      <baseNameString>role name</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-roleName-description">Role Name: Instances of this class “contain a name component which indicates that the referent has a particular role or position in society, such as an official title or rank”.</resourceData>
    </occurrence>
  </topic>

  <topic id="surname">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E41.Appellation" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-surname-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en" xlink:type="simple" />
      </scope>
      <baseNameString>surname</baseNameString>
    </baseName>
    <occurrence>

```

```

        <resourceData id="psi-surname-description">Surname: Instances of this class
        “contain a family (inherited) name, as opposed to a given, baptismal, or nick
        name”.</resourceData>
        </occurrence>
    </topic>

    <!-- Place Names -->
    <topic id="address">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
            psi.xtm#occurrence-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
            erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E45.Address"
            xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-address-description" xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
                xlink:type="simple" />
            </scope>
            <baseNameString>address</baseNameString>
        </baseName>
        </occurrence>
        <resourceData id="psi-address-description">Address: “This class comprises
        identifiers expressed in coding systems for places, such as postal addresses used for
        mailing.”</resourceData>
        </occurrence>
    </topic>

    <topic id="geogName">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
            psi.xtm#identifying-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
            erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E48.Place_Name"
            xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-geogName-description" xlink:type="simple"
            />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
                xlink:type="simple" />
            </scope>
        </baseName>
    </topic>

```

```

        </scope>
        <baseNameString>geographical name</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-geogName-description">Geographical Name: This class
“contains names associated with geographical features such as” the Grand Canyon or Mount
Rushmore.</resourceData>
    </occurrence>
</topic>

<topic id="bloc">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-bloc-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>bloc</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-bloc-description">Bloc: Instances of this class “contain the
name of a geo-political unit consisting of two or more nation states or
countries”.</resourceData>
    </occurrence>
</topic>

<topic id="country">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-country-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>country</baseNameString>
    </baseName>
    <occurrence>

```

```

    <resourceData id="psi-country-description">Country: Instances of this class
    “contain the name of a geo-political unit, such as a nation, country, colony, or commonwealth,
    larger than or administratively superior to a region and smaller than a bloc”.</resourceData>

```

```

    </occurrence>

```

```

</topic>

```

```

<topic id="district">

```

```

  <instanceOf>

```

```

    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
    psi.xtm#occurrence-type"/>

```

```

  </instanceOf>

```

```

  <subjectIdentity>

```

```

    <subjectIndicatorRef xlink:href="#psi-district-description" xlink:type="simple" />

```

```

  </subjectIdentity>

```

```

  <baseName>

```

```

    <scope>

```

```

      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
      xlink:type="simple" />

```

```

    </scope>

```

```

    <baseNameString>district</baseNameString>

```

```

  </baseName>

```

```

  <occurrence>

```

```

    <resourceData id="psi-district-description">District: Instances of this class “contain
    the name of any kind of subdivision of a settlement, such as a parish, ward, or other
    administrative or geographic unit”.</resourceData>

```

```

    </occurrence>

```

```

</topic>

```

```

<topic id="region">

```

```

  <instanceOf>

```

```

    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
    psi.xtm#occurrence-type"/>

```

```

  </instanceOf>

```

```

  <subjectIdentity>

```

```

    <subjectIndicatorRef xlink:href="#psi-region-description" xlink:type="simple" />

```

```

  </subjectIdentity>

```

```

  <baseName>

```

```

    <scope>

```

```

      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
      xlink:type="simple" />

```

```

    </scope>

```

```

    <baseNameString>region</baseNameString>

```

```

  </baseName>

```

```

  <occurrence>

```

```

    <resourceData id="psi-region-description">Region: Instances of this class “contain
    the name of an administrative unit such as a state, province, or county, larger than a settlement,
    but smaller than a country”.</resourceData>

```

```

    </occurrence>

```

```

</topic>

<topic id="settlement">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-settlement-description" xlink:type="simple"
/>
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>settlement</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-settlement-description">Settlement: Instances of this class
“contain the name of a settlement such as a city, town, or village identified as a single geo-
political or administrative unit”.</resourceData>
  </occurrence>
</topic>

<!-- Set up naming superclass to subclass associations. -->
<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#name"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#placeName"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>

```

```

    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#name"/>
    </member>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#persName"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#name"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#orgName"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#name"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#eventName"/>
  </member>
</association>

<association>
  <instanceOf>

```



```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#name"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#rs"/>
        </member>
    </association>

    <!-- persNamePart superclass subclass relationships -->
    <association>
        <instanceOf>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#persNamePart"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#addName"/>
        </member>
    </association>

    <association>
        <instanceOf>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#persNamePart"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#forename"/>
        </member>
    </association>

```

```

</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persNamePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#genName"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persNamePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#nameLink"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persNamePart"/>
  </member>
  <member>

```

```

        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#roleName"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#persNamePart"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#surname"/>
    </member>
</association>

<!-- Set up placeName superclass to subclass associations -->
<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#placeName"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#address"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>

```

```

        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#placeName"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#bloc"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#placeName"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#country"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#placeName"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#district"/>
    </member>
</association>

<association>
    <instanceOf>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#placeName"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#geogName"/>
        </member>
    </association>

    <association>
        <instanceOf>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#placeName"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#region"/>
        </member>
    </association>

    <association>
        <instanceOf>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#placeName"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#settlement"/>
        </member>
    </association>

```

```
<!-- end -->  
</topicMap>
```

DATES AND TIMES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org/DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-dates-times-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- Date and Time Primitives -->
  <topic id="datePart">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-datePart-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>date primitive</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-datePart-description">Date Part: This class serves as a base
class for date and time primitives.</resourceData>
    </occurrence>
  </topic>

  <topic id="timePart">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-timePart-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>time primitive</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-timePart-description">Time Part: This class serves as a base
class for date and time primitives.</resourceData>
    </occurrence>
  </topic>

```

```

    </occurrence>
  </topic>

  <topic id="calendar">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E49.Time_Appellation" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-calendar-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>calendar name</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-calendar-description">Calendar: Instances of this class
“identify the calendar, date information is respective to”.</resourceData>
    </occurrence>
  </topic>

  <topic id="when">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E61.Time_Primitive" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-when-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>when</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-when-description">When: Instances of this class represent
the date and possibly the time a phenomenon took place.</resourceData>

```



```

    </occurrence>
  </topic>

  <topic id="notBefore">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E61.Time_Primitive" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-notBefore-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>not before</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-notBefore-description">Not Before: Instances of this class
represent the date and possibly the time a phenomenon occurs after or simultaneous
to.</resourceData>
    </occurrence>
  </topic>

  <topic id="notAfter">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E61.Time_Primitive" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-notAfter-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>not after</baseNameString>
    </baseName>
    <occurrence>

```

```

        <resourceData id="psi-notAfter-description">Not After: Instances of this class
represent the date and possibly the time a phenomenon occurs before or simultaneous
to.</resourceData>
        </occurrence>
</topic>

<topic id="from">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E61.Time_Primitive" xlink:type="simple" />
    <subjectIndicatorRef xlink:href="#psi-from-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>from</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-from-description">From: Instances of this class represent the
date and possibly the time a phenomenon started e.g. the beginning of a time
span.</resourceData>
  </occurrence>
</topic>

<topic id="to">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E61.Time_Primitive" xlink:type="simple" />
    <subjectIndicatorRef xlink:href="#psi-to-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>to</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-to-description">To: Instances of this class represent the
date and possibly the time a phenomenon ended e.g. the end of a time
span.</resourceData>
  </occurrence>
</topic>

```

```

    </baseName>
    <occurrence>
      <resourceData id="psi-to-description">To: Instances of this class represent the date
and possibly the time a phenomenon ended e.g. the end of a time span.</resourceData>
    </occurrence>
  </topic>

  <topic id="duration">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E54.Dimension"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-duration-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>duration</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-duration-description">Duration: Instances of this class
represent the duration i.e. the length of time of a phenomenon.</resourceData>
    </occurrence>
  </topic>

  <!-- datePart superclass subclass relationships -->
  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#datePart"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#when"/>
    </member>
  </association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#datePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#notBefore"/>
  </member>
</association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#datePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#notAfter"/>
  </member>
</association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#datePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>

```

```

        <topicRef xlink:href="#from"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#datePart"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#to"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#timePart"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#duration"/>
    </member>
</association>
<!-- end -->
</topicMap>

```

PERSONAL CHARACTERISTICS ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-personal-states-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- persState is an abstract base type for affiliation, education, occupation, etc. -->
  <topic id="persState">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E3.Condition_State"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-persState-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>personal state</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-persState-description">Personal State: This class comprises
“the states of” people “characterized by a certain condition over a time-span”.</resourceData>
    </occurrence>
  </topic>

  <!-- Personal States -->
  <topic id="affiliation">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-affiliation-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>affiliation</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-affiliation-description">Affiliation: Instances of this class
“contain an informal description of a person's present or past affiliation with some organization,
for example an employer or sponsor”.</resourceData>
    </occurrence>
</topic>

<topic id="education">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-education-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>education</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-education-description">Education: Instances of this class
“contain a description of the educational experience of a person”.</resourceData>
    </occurrence>
</topic>

<topic id="floruit">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-floruit-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>floruit</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-floruit-description">Floruit: Instances of this class
“contain a description of the professional experience of a person”.</resourceData>
    </occurrence>
</topic>

```

```

    </baseName>
    <occurrence>
      <resourceData id="psi-floruit-description">Floruit: Instances of this class “contain
information about a person's period of activity” or contemporaries. </resourceData>
    </occurrence>
  </topic>

  <topic id="occupation">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-occupation-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>occupation</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-occupation-description">Occupation: Instances of this class
“contain an informal description of a person's trade, profession or occupation”.</resourceData>
    </occurrence>
  </topic>

  <topic id="residence">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-residence-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>residence</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-residence-description">Residence: Instances of this class
“describe a person's present or past places of residence”.</resourceData>
    </occurrence>
  </topic>

```



```

</topic>

<topic id="state">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-state-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>state</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-state-description">State: Instances of this class “contain a
description of some status or quality attributed to a person, place, or organization at some
specific time”.</resourceData>
  </occurrence>
</topic>

<!-- Personal Traits -->
<topic id="trait">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-trait-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>trait</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-trait-description">Trait: Instances of this class “contain a
description of some culturally-determined and in principle unchanging characteristic attributed to
a person or place”.</resourceData>
  </occurrence>
</topic>

<!-- Used as an abstract base type for age, faith, langKnowledge etc. -->

```

```

<topic id="persTrait">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-persTrait-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>personal trait</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-persTrait-description">Personal Trait: Instances of this class
“describe generally unchanging physical or socially-constructed characteristics of a person, for
example hair-color, ethnicity, or sex”.</resourceData>
  </occurrence>
</topic>

<topic id="age">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-age-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>age</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-age-description">Age: Instances of this class “specify the
age of a person”.</resourceData>
  </occurrence>
</topic>

<topic id="faith">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="#psi-faith-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>faith</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-faith-description">Faith: Instances of this class “specify the
faith, religion, or belief set of a person”.</resourceData>
    </occurrence>
</topic>

<topic id="langKnowledge">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-langKnowledge-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>language knowledge</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-langKnowledge-description">Language Knowledge:
Instances of this class “summarize the state of a person's linguistic knowledge”.</resourceData>
    </occurrence>
</topic>

<topic id="langKnown">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-langKnown-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>language known</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-langKnown-description">Language Known: Instances of this
class “summarize the state of a person's linguistic competence, e.g. knowledge of a single
language”.</resourceData>
</occurrence>
</topic>

<topic id="nationality">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E74.Group"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-nationality-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>nationality</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-nationality-description">Nationality: Instances of this class
“contain an informal description of a person's present or past nationality or
citizenship”.</resourceData>
    </occurrence>
</topic>

<topic id="sex">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-sex-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>sex</baseNameString>
        </baseName>
        <occurrence>
        <resourceData id="psi-sex-description">Sex: Instances of this class “specify the sex
of a person”.</resourceData>
        </occurrence>
    </topic>

    <topic id="socecStatus">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
            </instanceOf>
            <subjectIdentity>
                <subjectIndicatorRef xlink:href="#psi-socecStatus-description" xlink:type="simple"
/>
            </subjectIdentity>
            <baseName>
                <scope>
                    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
                    </scope>
                    <baseNameString>socio-economic status</baseNameString>
                </baseName>
                <occurrence>
                    <resourceData id="psi-socecStatus-description">Socio-economic Status: Instances
of this class “contain an informal description of a person's perceived social or economic
status”.</resourceData>
                </occurrence>
            </topic>

        <!-- Set up persState superclass to subclass associations. -->
        <association>
            <instanceOf>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
            </instanceOf>
            <member>
                <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
                <topicRef xlink:href="#persState"/>
            </member>
            <member>
                <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>

```

```

        <topicRef xlink:href="#affiliation"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#persState"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#education"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#persState"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#floruit"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#persState"/>
    </member>

```

```

    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#occupation"/>
    </member>
  </association>

  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#persState"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#state"/>
    </member>
  </association>

  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#persState"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#residence"/>
    </member>
  </association>

  <!-- personal trait superclass subclass relationships -->
  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>

```

```

        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#persTrait"/>
        </member>
        <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#age"/>
        </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#faith"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#langKnowledge"/>
  </member>
</association>

<association>
  <instanceOf>

```



```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#persTrait"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#langKnown"/>
        </member>
    </association>

    <association>
        <instanceOf>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#persTrait"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#nationality"/>
        </member>
    </association>

    <association>
        <instanceOf>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
        </instanceOf>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
            <topicRef xlink:href="#persTrait"/>
        </member>
        <member>
            <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
            <topicRef xlink:href="#sex"/>
        </member>
    </association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#socecStatus"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#persTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#trait"/>
  </member>
</association>

<!-- end -->
</topicMap>

```

PLACE TRAITS ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-place-traits-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- Place Traits -->
  <!-- Abstract base class for climate, population, terrain, etc. -->
  <topic id="placeTrait">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-placeTrait-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>Place Trait</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-placeTrait-description">Place Trait: Instances of this class
“describe the unchanging traits” e.g. characteristics of a place.</resourceData>
    </occurrence>
  </topic>

  <topic id="climate">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-climate-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>climate</baseNameString>

```

```

    </baseName>
    <occurrence>
      <resourceData id="psi-climate-description">Climate: Instances of this class
“contain information about the physical climate of a place”.</resourceData>
    </occurrence>
  </topic>

  <topic id="population">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-population-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>population</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-population-description">Population: Instances of this class
“contain information about the population or inhabitants of a place”.</resourceData>
    </occurrence>
  </topic>

  <topic id="terrain">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-terrain-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>terrain</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-terrain-description">Terrain: Instances of this class “contain
information about the physical terrain of a place”.</resourceData>
    </occurrence>
  </topic>

```

```

</topic>

<topic id="trait">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-trait-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>trait</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-trait-description">Trait: Instances of this class “contain a
description of some culturally-determined and in principle unchanging characteristic attributed to
a person or place”.</resourceData>
  </occurrence>
</topic>

<topic id="geogFeat">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-geogFeat-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>geographical feature name</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-geogFeat-description">Geographical Feature Name:
Instances of this class “contain a common noun identifying some geographical feature contained
within a geographic name, such as valley, mount, etc.”</resourceData>
  </occurrence>
</topic>

<topic id="geo">
  <instanceOf>

```

```

        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E47.Spatial_Coordinates" xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-geo-description" xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>geographical spatial coordinates</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-geo-description">Geographical Spatial Coordinates: "This
class comprises the textual or numeric information required to locate specific instances of E53
Place within schemes of spatial identification."</resourceData>
        </occurrence>
    </topic>

    <topic id="offset">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-offset-description" xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>offset</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-offset-description">Offset: Instances of this class "denote
that part of a relative temporal or spatial expression which indicates the direction (or the
distance) of the offset between the two place names, dates, or times involved in the
expression".</resourceData>
        </occurrence>
    </topic>

    <!-- superclass subclass relationships for occurrence types -->
    <association>

```

```

    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#placeTrait"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#climate"/>
    </member>
  </association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#placeTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#population"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#placeTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#terrain"/>
  </member>

```

```

</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#placeTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#trait"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#placeTrait"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#geogFeat"/>
  </member>
</association>

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#placeTrait"/>
  </member>
  <member>

```



```

        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#geo"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#placeTrait"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#offset"/>
    </member>
</association>

<!-- end -->
</topicMap>

```

EVIDENCE ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-evidence-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- Historical Source Types -->
  <!-- Used as a base class for Moss's taxonomy, used as an occurrence type if no match with
Moss's taxonomy is found for sourceType attribute. -->
  <topic id="sourceType">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-sourceType-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>source type</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-sourceType-description">Source Type: This class serves as a
base class for historical source types.</resourceData>
    </occurrence>
  </topic>

  <topic id="transactionalRec">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-transactionalRec-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>transactional record</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-transactionalRec-description">Transactional Record: This
class represents documentary evidence in the form of legal documents e.g. marriage licenses,
birth and death certificates etc.</resourceData>
</occurrence>
<occurrence>
    <instanceOf>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E60.Number"
xlink:type="simple" />
    </instanceOf>
    <resourceData id="psi-transactionalRec-value">1</resourceData>
</occurrence>
</topic>

<topic id="selectiveRec">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-selectiveRec-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>selective record</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-selectiveRec-description">Selective Record: This class
represents documentary evidence in the form of electronic recordings e.g. news reports.
Although recorded at the time of an event, due to the limitations of recording devices, these
records are unable to capture an entire event i.e. the event is filtered.</resourceData>
    </occurrence>
    <occurrence>
        <instanceOf>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E60.Number"
xlink:type="simple" />
        </instanceOf>

```

```

        <resourceData id="psi-selectiveRec-value">.5</resourceData>
    </occurrence>
</topic>

<topic id="archeological">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E24.Physical_Man-
Made_Thing" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-archeological-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>archeological artifact</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-archeological-description">Archeological Artifact: This class
represents physical or material evidence e.g. munitions, tools etc.</resourceData>
    </occurrence>
    <occurrence>
        <instanceOf>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E60.Number"
xlink:type="simple" />
        </instanceOf>
        <resourceData id="psi-archeological-value">.333</resourceData>
    </occurrence>
</topic>

<topic id="recollection">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-recollection-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>a recollection which may or may not include
reflection</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-recollection-description">Recollection: This class represents
narrative accounts in the form of letters, diaries, memoirs etc. The accounts may include
reflection i.e. lessons learned in hindsight.</resourceData>
        </occurrence>
        <occurrence>
            <instanceOf>
                <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E60.Number"
xlink:type="simple" />
            </instanceOf>
            <resourceData id="psi-recollection-value">.225</resourceData>
        </occurrence>
    </topic>

    <topic id="analysis">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-analysis-description" xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>historical analysis</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-analysis-description">Historical Analysis: This class
represents the analyses of historical sources. These are produced by domain
experts.</resourceData>
        </occurrence>
        <occurrence>
            <instanceOf>
                <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E60.Number"
xlink:type="simple" />
            </instanceOf>
            <resourceData id="psi-analysis-value">.167</resourceData>
        </occurrence>
    </topic>

```

```

    </occurrence>
  </topic>

  <topic id="unknown">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-unknown-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>the source type is unknown or cannot be
classified</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-unknown-description">Unknown Source Type: This class
represents (historical) sources that do not fit into the other categories yet provide valuable or
useful information.</resourceData>
    </occurrence>
    <occurrence>
      <instanceOf>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E60.Number"
xlink:type="simple" />
      </instanceOf>
      <resourceData id="psi-unknown-value">.143</resourceData>
    </occurrence>
  </topic>

  <topic id="cert">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-cert-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>degree of certainty</baseNameString>

```

```

    </baseName>
    <occurrence>
      <resourceData id="psi-cert-description">Degree of Certainty: This class represents
the degree to which the individual providing the evidence is certain of its accuracy or
authenticity; possible values include high, or low.</resourceData>
    </occurrence>
  </topic>

<!-- Evidence Attributes -->
<!-- Use as an abstract base class for evidence parts e.g. nature, stance, etc. -->
<topic id="evidencePart">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-evidencePart-description"
xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>evidence part</baseNameString>
  </baseName>
  <occurrence>
    <resourceData id="psi-evidencePart-description">Evidence Part: This class acts as
an abstract base class used to group the various attributes i.e. characteristics of user-provided
evidence.</resourceData>
  </occurrence>
</topic>

<topic id="nature">
  <instanceOf>
    <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
  </instanceOf>
  <subjectIdentity>
    <subjectIndicatorRef xlink:href="#psi-nature-description" xlink:type="simple" />
  </subjectIdentity>
  <baseName>
    <scope>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>nature</baseNameString>
  </baseName>
  <occurrence>

```

<resourceData id="psi-nature-description">Nature: This class indicates the scope of the intervention or interpretation. Possible values include: “internal, external, or conjecture”.</resourceData>

</occurrence>

</topic>

<topic id="stance">

<instanceOf>

<topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#occurrence-type"/>

</instanceOf>

<subjectIdentity>

<subjectIndicatorRef xlink:href="#psi-stance-description" xlink:type="simple" />

</subjectIdentity>

<baseName>

<scope>

<topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en" xlink:type="simple" />

</scope>

<baseNameString>stance</baseNameString>

</baseName>

<occurrence>

<resourceData id="psi-stance-description">Stance: This class indicates the position of the evidence, which is either supporting or contradicting.</resourceData>

</occurrence>

</topic>

<topic id="source">

<instanceOf>

<topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#occurrence-type"/>

</instanceOf>

<subjectIdentity>

<subjectIndicatorRef xlink:href="http://www8.informatik.uni-erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E31.Document" xlink:type="simple" />

<subjectIndicatorRef xlink:href="#psi-source-description" xlink:type="simple" />

</subjectIdentity>

<baseName>

<scope>

<topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en" xlink:type="simple" />

</scope>

<baseNameString>source</baseNameString>

</baseName>

<occurrence>

<resourceData id="psi-source-description">Source: Instances of this class “contain a list of one or more pointers (URIs) indicating the sources which support the given reading”. Here

it is possible to have E31 Document refer to multiple documents due to a commonality in interpretation between TEI and CIDOC CRM.</resourceData>

```

    </occurrence>
  </topic>

  <!-- sourceType superclass subclass relationships -->
  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#sourceType"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#transactionalRec"/>
    </member>
  </association>

  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#sourceType"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#selectiveRec"/>
    </member>
  </association>

  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>

```

```

        <topicRef xlink:href="#sourceType"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#archeological"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#sourceType"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#recollection"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#sourceType"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#analysis"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>

```

```

    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#sourceType"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#unknown"/>
    </member>
  </association>

  <!-- evidencePart superclass subclass relationships -->
  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#evidencePart"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#nature"/>
    </member>
  </association>

  <association>
    <instanceOf>
      <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
      <topicRef xlink:href="#evidencePart"/>
    </member>
    <member>
      <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
      <topicRef xlink:href="#stance"/>
    </member>
  </association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#evidencePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#cert"/>
  </member>
</association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#evidencePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#sourceType"/>
  </member>
</association>

```

```

<association>
  <instanceOf>
    <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
  </instanceOf>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
    <topicRef xlink:href="#evidencePart"/>
  </member>
  <member>
    <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
    <topicRef xlink:href="#source"/>
  </member>

```

```
        </member>
    </association>
<!-- end -->
</topicMap>
```

DESCRIPTIVE TEXT ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-descriptive-text-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <topic id="descriptive-text">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E62.String"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-descriptive-text-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>descriptive text</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-descriptive-text-description">Descriptive Text: "This class
comprises the instances of E59 Primitive Values used for documentation such as free text
strings, descriptions, definitions etc."</resourceData>
    </occurrence>
  </topic>

  <topic id="label">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#identifying-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-label-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>label text</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-label-description">Label Text: This class comprises
instances of identifying labels.</resourceData>
    </occurrence>
</topic>

<topic id="head">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <instanceOf>
        <topicRef xlink:href="#descriptive-text"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-head-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>header text</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-head-description">Header Text: "This class comprises
instances of E59 Primitive Values used for highlighting." </resourceData>
    </occurrence>
</topic>

<topic id="desc">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#occurrence-type"/>
    </instanceOf>
    <instanceOf>
        <topicRef xlink:href="#descriptive-text"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-desc-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>description</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-desc-description">Description: "This class comprises the
instances of E59 Primitive Values used for documentation such as free text strings, descriptions,
definitions etc."</resourceData>
    </occurrence>
</topic>

<!-- Set up superclass to subclass associations -->
<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#descriptive-text"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#head"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#descriptive-text"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#label"/>
    </member>
</association>

<association>

```



```
<instanceOf>
  <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
</instanceOf>
<member>
  <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
  <topicRef xlink:href="#descriptive-text"/>
</member>
<member>
  <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
  <topicRef xlink:href="#desc"/>
</member>
</association>
<!-- end -->

</topicMap>
```

IMAGES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-images-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- Used to identify a generic image. -->
  <topic id="image">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E38.Image"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-image-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>image</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-image-description">Image: Instances of this class “indicate
the location of an inline graphic, illustration, or figure. Note only electronic media (i.e. files) are
being referenced.”</resourceData>
    </occurrence>
  </topic>

  <!-- Image Topic Types -->
  <topic id="graphic">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#image-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-graphic-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>

```

```

        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>graphic</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-graphic-description">Graphic: Instances of this class
“indicate the location (URI) of an inline graphic, illustration, or figure”.</resourceData>
    </occurrence>
</topic>

<topic id="binaryObject">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#image-
type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-binaryObject-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>binaryObject</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-binaryObject-description">Binary Object: Instances of this
class “provide encoded binary data representing an inline graphic or other
object”.</resourceData>
    </occurrence>
</topic>

<!-- Set up image superclass to subclass associations. -->
<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#image"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>

```

```

        <topicRef xlink:href="#graphic"/>
    </member>
</association>

<association>
    <instanceOf>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass-
subclass"/>
    </instanceOf>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#superclass"/></roleSpec>
        <topicRef xlink:href="#image"/>
    </member>
    <member>
        <roleSpec><topicRef
xlink:href="http://www.topicmaps.org/xtm/1.0/core.xtm#subclass"/></roleSpec>
        <topicRef xlink:href="#binaryObject"/>
    </member>
</association>

<!-- end -->
</topicMap>

```

LINKING ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-linking-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin -->
  <!-- linking topic types -->
  <topic id="ptr">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#link-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-ptr-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>pointer to another location</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-ptr-description">Pointer: Instances of this class “define a
pointer to another location”.</resourceData>
    </occurrence>
  </topic>

  <topic id="ref">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#link-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-ref-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>a reference to another location</baseNameString>
    </baseName>
  </topic>

```

```
<occurrence>
  <resourceData id="psi-ref-description">Ref(erence): Instances of this class “define a
reference to another location, possibly modified by additional text or
comment(s)”.</resourceData>
</occurrence>
</topic>
<!-- end -->
</topicMap>
```

THEMES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-themes-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin: Scope Types (i.e. Themes) of Griotte Names and Dates Concepts -->

  <!-- Use to identify base topic type for languages that will be added to the ontology, from
xml:lang attributes. -->
  <topic id="language">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#theme-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E56.Language"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-language-description" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>language</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-language-description">Language: "This class is a
specialization of E55 Type and comprises the natural languages in the sense of
concepts."</resourceData>
    </occurrence>
  </topic>

  <topic id="responsible-party">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#theme-
type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E39.Actor"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-responsible-party-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>responsible party</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-responsible-party-description">Responsible Party: "This
class comprises people, either individually or in groups, who have the potential to perform
intentional actions for which they can be held responsible."</resourceData>
</occurrence>
</topic>

    <topic id="period">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#theme-
type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E4.Period"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-period-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>period</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-period-description">Period: "This class comprises sets of
coherent phenomena or cultural manifestations bounded in time and space."</resourceData>
</occurrence>
</topic>

    <!-- end: Scope Types (i.e. Themes) of Griotte Names and Dates Concepts -->
</topicMap>

```


ASSOCIATION TYPES ONTOLOGY

```

<?xml version="1.0"?>
<!DOCTYPE topicMap PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
"http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap id="griotte-assoc-types-psi" xmlns="http://www.topicmaps.org/xtm/1.0/"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <!-- begin: Association Types and Roles of Griotte Names and Dates Concepts -->
  <!-- Association Role Definitions -->
  <topic id="participant">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E39.Actor"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-participant-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>participant</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-participant-description">Participant: Instances of this class
“contain individuals, groups or organizations that participated in or witnessed some
phenomenon”.</resourceData>
    </occurrence>
  </topic>

  <topic id="parent">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E73.Information_Object" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-parent-description" xlink:type="simple" />
    </subjectIdentity>
  </topic>

```

```

    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>parent</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-parent-description">Parent: This class is intended to establish
containment e.g. the parent-child relationship between elements is propagated to their respective
topics.</resourceData>
    </occurrence>
  </topic>

  <topic id="child">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E73.Information_Object" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-child-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>child</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-child-description">Child: This class is intended to establish
containment e.g. the parent-child relationship between elements is propagated to their respective
topics.</resourceData>
    </occurrence>
  </topic>

  <topic id="timeSpan">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#E52.Time-Span"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-timeSpan-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>time span</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-timeSpan-description">Time Span: "This class comprises
abstract temporal extents, in the sense of Galilean physics, having a beginning, an end and a
duration."</resourceData>
    </occurrence>
</topic>

    <topic id="temporalObj">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#E2.Temporal_Entity" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-temporalObj-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>temporal object</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-temporalObj-description">Temporal Object: "This class
comprises the time component of all phenomena, such as the instances of E4 Periods, E5 Events
and states, which happen over a limited extent in time."</resourceData>
    </occurrence>
</topic>

    <topic id="supports">
    <instanceOf>

```

```

        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-supports-description" xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>supporting evidence</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-supports-description">Supporting Evidence: "This class
identifies affirming documentation in a P70 (is documented in) type document
relationship."</resourceData>
        </occurrence>
    </topic>

    <topic id="contradicts">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-psi.xtm#role-
type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="#psi-contradicts-description" xlink:type="simple"
/>
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>contradictory evidence</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-contradicts-description">Contradictory Evidence: "This class
identifies opposing or dissenting documentation in a P70 (is documented in) type document
relationship."</resourceData>
        </occurrence>
    </topic>

    <!-- Association Types -->
    <topic id="participated-in">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>

```

```

    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P11.had_participant" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P11I.participated_in" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-participated-in-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>participation</baseNameString>
    </baseName>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#event"
xlink:type="simple" />
      </scope>
      <baseNameString>had participant(s)</baseNameString>
    </baseName>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="#participant" xlink:type="simple" />
      </scope>
      <baseNameString>participated in</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-participated-in-description">Participation: "This property
describes the active or passive participation of instances of E39 Actors (or their subclasses) in an
E5 Event."</resourceData>
    </occurrence>
  </topic>

  <topic id="location-of">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P7.took_place_at"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P7I.witnessed"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-location-of-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>location of</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#event"
xlink:type="simple" />
        </scope>
        <baseNameString>took place at</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#place"
xlink:type="simple" />
        </scope>
        <baseNameString>witnessed</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-location-of-description">Location Of: "This property i.e.
relation describes the spatial location of an instance of E4 Period or its subclasses (e.g. E5
Event)."</resourceData>
    </occurrence>
</topic>

    <topic id="located-in">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
        </instanceOf>
    </subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P59.has_section"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P59I.is_located_on_or_within" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-located-in-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>located in</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#place"
xlink:type="simple" />
        </scope>
        <baseNameString>is located within (or on)</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#location"
xlink:type="simple" />
        </scope>
        <baseNameString>has section(or sector)</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-located-in-description">Located In: "This property links an
area to the instance of E18 Physical Thing (or its subclasses), upon which it is
found."</resourceData>
    </occurrence>
</topic>

<topic id="birth-of">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
</subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P98.brought_into_life" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P98I.was_born"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-birth-of-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>birth of</baseNameString>
</baseName>
<baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#birth"
xlink:type="simple" />
    </scope>
    <baseNameString>brought into life</baseNameString>
</baseName>
<baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#person"
xlink:type="simple" />
    </scope>
    <baseNameString>was born</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-birth-of-description">Birth of: "This property links an E67
Birth event to an E21 Person in the role of offspring."</resourceData>
</occurrence>
</topic>

    <topic id="death-of">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P100.was_death_of"
xlink:type="simple" />

```



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        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P100I.died_in"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-death-of-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>death of</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#death"
xlink:type="simple" />
        </scope>
        <baseNameString>was death of</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#person"
xlink:type="simple" />
        </scope>
        <baseNameString>died in</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#personGrp"
xlink:type="simple" />
        </scope>
        <baseNameString>perished in</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-death-of-description">Death of: "This property links an E69
Death event to an E21 Person (or person group) that died."</resourceData>
    </occurrence>
</topic>

<topic id="parent-child">
    <instanceOf>

```

```

        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P106.is_composed_of" xlink:type="simple" />
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P106I.forms_part_of" xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-parent-child-description" xlink:type="simple"
/>
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>parent to child</baseNameString>
        </baseName>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
                <topicRef xlink:href="#parent" xlink:type="simple" />
            </scope>
            <baseNameString>is composed of</baseNameString>
        </baseName>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
                <topicRef xlink:href="#child" xlink:type="simple" />
            </scope>
            <baseNameString>forms part of</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-parent-child-description">Parent to Child: This property
represents a parent child relationship usually between topics; primarily used to maintain the
structural relationship "is composed of".</resourceData>
        </occurrence>
    </topic>

    <!-- Use with from, to and duration. -->
    <topic id="has-time-span">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>

```

```

    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P4.has_time-span"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P4I.is_time-
span_of" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-has-time-span-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>time-span of</baseNameString>
    </baseName>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="#temporalObj" xlink:type="simple" />
      </scope>
      <baseNameString>has time-span</baseNameString>
    </baseName>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="#timeSpan" xlink:type="simple" />
      </scope>
      <baseNameString>is time-span of</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-has-time-span-description">Time-span: "This property
describes the maximum period of time within which an E52 Time-Span falls with respect to
some phenomenon."</resourceData>
    </occurrence>
  </topic>

  <!-- use with when -->
  <topic id="occurred-at">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P114.is_equal_in_time_to" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-occurred-at-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>occurred at</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-occurred-at-description">Occurred At: "This property i.e.
relation is used when the E52 Time-Span is unknown, however the date or time is
known."</resourceData>
    </occurrence>
</topic>

<!-- Use with notBefore. -->
<topic id="occurred-before">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P120.occurs_before" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-occurred-before-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>occurred before</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-occurred-before-description">Occurred Before: "This
property identifies the relative chronological sequence of a temporal entity."</resourceData>
    </occurrence>
</topic>

<!-- use with notAfter -->
<topic id="occurred-after">

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```

    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P120I.occurs_after"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-occurred-after-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>occurred after</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-occurred-after-description">Occurred After: "This property
identifies the relative chronological sequence of a temporal entity."</resourceData>
    </occurrence>
  </topic>

  <!-- Use to relate persState (i.e. condition) to person or personGrp. -->
  <topic id="has-a">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P44.has_condition"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P44I.condition_of"
xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-has-a-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>has a(n) (represents state)</baseNameString>
    </baseName>
    <baseName>
      <scope>

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                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
                <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#person"
xlink:type="simple" />
            </scope>
            <baseNameString>has condition</baseNameString>
        </baseName>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
                <topicRef xlink:href="http://www.griotte.org/psi/1.0/personal-characteristics-
psi.xtm#persState" xlink:type="simple" />
            </scope>
            <baseNameString>is condition (or state) of</baseNameString>
        </baseName>
        <occurrence>
            <resourceData id="psi-has-a-description">Has A: "This property records an E3
Condition State (i.e. persState) for some E18 Physical Thing (i.e. an E21
Person)."</resourceData>
        </occurrence>
    </topic>

    <topic id="is-evidence-of">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P70.documents"
xlink:type="simple" />
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P70I.is_documented_in" xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-is-evidence-of-description"
xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>has evidence for (or against)</baseNameString>
        </baseName>
        <baseName>
            <scope>

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        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="#supporting" xlink:type="simple" />
    </scope>
    <baseNameString>is supporting evidence of</baseNameString>
</baseName>
<baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="#contradictory" xlink:type="simple" />
    </scope>
    <baseNameString>is contradictory evidence of</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-is-evidence-of-description">Evidence Of: "This property
describes the association, CRM Entities (i.e. objects) documented by instances of E31
Document" (e.g. documentary evidence, in particular historical sources).</resourceData>
    </occurrence>
</topic>

<topic id="plays-role-of">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P14.carried_out_by"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P14I.performed"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-plays-role-of-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>plays the role of</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />

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        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#role"
xlink:type="simple" />
        </scope>
        <baseNameString>in the role of</baseNameString>
    </baseName>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/names-psi.xtm#roleName"
xlink:type="simple" />
        </scope>
        <baseNameString>in the role of</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-plays-role-of-description">Plays the Role of: "This class
identifies the roles (P14.1) performed or the nature of Actors' participation."</resourceData>
    </occurrence>
</topic>

    <topic id="is-an-image-of">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P138.represents"
xlink:type="simple" />
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P138I.has_representation" xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-is-an-image-of-description"
xlink:type="simple" />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            </scope>
            <baseNameString>has representation</baseNameString>
        </baseName>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
                <topicRef xlink:href="http://www.griotte.org/psi/1.0/images-psi.xtm#image"
xlink:type="simple" />

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        </scope>
        <baseNameString>represents</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-is-an-image-of-description">Is an Image Of: "This property
establishes the relationship between an E36 Visual Item and the entity that it visually
represents."</resourceData>
    </occurrence>
</topic>

<topic id="is-identified-by">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P1.is_identified_by"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P1I.identifies"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-is-identified-by-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        </scope>
        <baseNameString>is identified by</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/names-psi.xtm#name"
xlink:type="simple" />
        </scope>
        <baseNameString>identifies</baseNameString>
    </baseName>
    <baseName>
        <scope>
            <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/names-
psi.xtm#persNamePart" xlink:type="simple" />
        </scope>

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```

        <baseNameString>identifies</baseNameString>
    </baseName>
    <occurrence>
        <resourceData id="psi-is-identified-by-description">Is Identified By: "This property
    establishes the relationship between (identifies) from E28 Conceptual Object to E75 Conceptual
    Object Appellation."</resourceData>
        </occurrence>
    </topic>

    <topic id="address-of">
        <instanceOf>
            <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
    psi.xtm#association-type"/>
        </instanceOf>
        <subjectIdentity>
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
    erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
    crm_090330_5_0_1.owl#P87.is_identified_by" xlink:type="simple" />
            <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
    erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P87I.identifies"
    xlink:type="simple" />
            <subjectIndicatorRef xlink:href="#psi-address-of-description" xlink:type="simple"
    />
        </subjectIdentity>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
    xlink:type="simple" />
            </scope>
            <baseNameString>address of</baseNameString>
        </baseName>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
    xlink:type="simple" />
                <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#location"
    xlink:type="simple" />
            </scope>
            <baseNameString>has current or former address</baseNameString>
        </baseName>
        <baseName>
            <scope>
                <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
    xlink:type="simple" />
                <topicRef xlink:href="http://www.griotte.org/psi/1.0/names-psi.xtm#address"
    xlink:type="simple" />
            </scope>
            <baseNameString>is former or current address of</baseNameString>

```

```

    </baseName>
    <occurrence>
      <resourceData id="psi-address-of-description">Address of: "This property allows
an instance of E44 Place Appellation (i.e. the superclass of address) to be associated as the
former or current location of an instance of E18 Physical Thing (i.e. location)."</resourceData>
    </occurrence>
  </topic>

  <topic id="residence-of">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P74.has_current_or_former_residence" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P74.is_current_or_former_residence_of" xlink:type="simple" />
      <subjectIndicatorRef xlink:href="#psi-residence-of-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>residence of</baseNameString>
    </baseName>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#person"
xlink:type="simple" />
      </scope>
      <baseNameString>has current or former residence</baseNameString>
    </baseName>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#personGrp"
xlink:type="simple" />
      </scope>
      <baseNameString>has current or former residence</baseNameString>
    </baseName>

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    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/personal-characteristics-
psi.xtm#residence" xlink:type="simple" />
      </scope>
      <baseNameString>is current or former residence of</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-residence-of-description">Residence of: "This property
describes the relationship between a current or former E53 Place of residence and an E39
Actor. The residence may be either the Place where the Actor resides, or a legally registered
address of any kind."</resourceData>
    </occurrence>
  </topic>

  <topic id="has-calendar">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
      <subjectIndicatorRef xlink:href="#psi-has-calendar-description"
xlink:type="simple" />
    </subjectIdentity>
    <baseName>
      <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
      </scope>
      <baseNameString>calendar to which the date belongs</baseNameString>
    </baseName>
    <occurrence>
      <resourceData id="psi-has-calendar-description">Calendar: This class establishes a
relationship to the system or calendar to which the date represented by the content of the
underlying element belongs.</resourceData>
    </occurrence>
  </topic>

  <!-- is-related-to association for TEI global linking attributes -->
  <topic id="is-related-to">
    <instanceOf>
      <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>

```

```

        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-crm_090330_5_0_1.owl#P67.refers_to"
xlink:type="simple" />
        <subjectIndicatorRef xlink:href="http://www8.informatik.uni-
erlangen.de/IMMD8/Services/cidoc-crm/erlangen-
crm_090330_5_0_1.owl#P67I.is_referred_to_by" xlink:type="simple" />
        <subjectIndicatorRef xlink:href="#psi-is-related-to-description" xlink:type="simple"
/>
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>is related to</baseNameString>
</baseName>
<baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/core-psi.xtm#object"
xlink:type="simple" /> <!-- replace object with any topic type -->
    </scope>
    <baseNameString>refers to or is associated with</baseNameString>
</baseName>
<occurrence>
    <resourceData id="psi-is-related-to-description">Is Related To: "This property
describes the CRM Entities (i.e. objects) referred to by other objects."</resourceData>
</occurrence>
</topic>

<topic id="relation">
    <instanceOf>
        <topicRef xlink:href="http://www.griotte.org/psi/1.0/base-types-
psi.xtm#association-type"/>
    </instanceOf>
    <subjectIdentity>
        <subjectIndicatorRef xlink:href="#psi-relation-description" xlink:type="simple" />
    </subjectIdentity>
    <baseName>
    <scope>
        <topicRef xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"
xlink:type="simple" />
    </scope>
    <baseNameString>relationship</baseNameString>
</baseName>
<occurrence>

```

```
      <resourceData id="psi-relation-description">Relationship: "This property describes
any kind of relationship or linkage amongst a specified group of participants."</resourceData>
    </occurrence>
  </topic>

  <!-- end: Association Types of Griotte Names and Dates Concepts -->
</topicMap>
```

VITA

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