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IDENTIFYING ANCESTRAL HAUNTS:
FAMILY HISTORY, GIS, AND INFORMATION NEEDS

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Introduction: Mapping Family History

Imagine the possibility of an online interactive map as an interface, with symbols indicating the location of events in each person’s life, such as the place of birth, marriage, offspring, migration routes, death, and burial site. Add to that links to family photographs, audiovisual material, biographies, and information on the world events that shaped their lives. This is a realistic goal, as evidenced by historians utilizing Geographic Information Systems (GISs) for similar pursuits in picturing the past. Other initiatives demonstrate alternate methods of implementing interactive mapping of chronological events, some incorporating multimedia (Southall & White, 1998; Zerneke, 2003).

The purpose of this paper is to understand the information needs and the process undertaken by family historians, or genealogists, in their quest to build a GIS database for visualizing ancestral haunts. Do online sources provide the geographic information necessary, or are traditional institutions, such as archives and government records offices, the sole keepers of material needed for validating the physical context of past events? What environmental barriers, such as time and cost, exist in locating suitable information? What accessibility and credibility factors are encountered when using online or traditional information sources? It is expected that this research will demonstrate the limitations of both online and traditional research material, indicating an opportunity to build bridges aimed at reducing unnecessary detours in the search for family history.

The first part of this paper provides an overview of the information necessary for building a digital map of past places and related events. It discusses traditional access to relevant material versus that offered by online databases and individual contributors. The search for location evidence is not limited to genealogists; in fact, historians and geographers have similar needs as cited in the literature. A model is presented illustrating the common information needs of these groups and is related to previously published models of information theory and behavior.

The remaining half of this paper describes a preliminary case study completed to identify and evaluate the relevance of information found to map location history, using both traditional and online sources. The study objective was to trace one individual’s lineage back to a known relative living in the American colony of Virginia around the 1700s. Relevance ratings were assigned to each source and are presented along with the findings and unresolved information gaps. Although this study was limited to a small sample, it points to future research opportunities.

Background: Sources for Mapping Family History

Locating historical digital map data is the greatest obstacle shared by historians interested in applying GIS technology to illustrate the past. While digital map data has become plentiful in the past ten years, and includes feature files representing boundaries (e.g., country, state, city, town), locations of interest (e.g., cities, towns, cultural heritage sites), and other physical characteristics (e.g., rivers, roads, mountains), the data available typically represents current geographical conditions. Historical digital map data is usually nonexistent, or if available it is not in the format, time period, or detail required. Many academic and scholarly organizations are working on projects to address this dearth of GIS material for historians (CSISS, 2003; Long,
1998), and in time family historians may benefit from these efforts, as well as become instrumental in assisting with future collaborations.

Currently, building a spatial database from scratch is the only solution to enable the mapping of historical locations in a GIS. A spatial database links complex geographic coordinates to the attributes that describe each feature. Attributes in a family history spatial database would include place names and the events, or points of interest, associated with each location, such as a birth, place of residence, marriage or death. Some of the most challenging historical coordinates to locate include long-ago state, county, and city boundary divisions, which shifted frequently during the colonial period. To ensure an event is visualized in context with its time period, a variety of administrative units ideally should be included in a family historian’s spatial database.

To be successful in tracing an individual’s lineage and in pinpointing locations for mapping, a family historian needs access to a variety of materials administered by such groups as genealogical societies, individual families, libraries, archives, and government records offices. In the brick-and-mortar world, these groups are often physically separated and typically work independently of each other. A presence on the Internet offers them an opportunity to break from this traditional model and work toward a common goal.

The traditional research method for uncovering historical information about an individual involves physically inspecting primary and secondary resources maintained in libraries, archives and government records offices, often requiring out-of-state travel to visit numerous collections. In the early stages of the search for information, genealogical publications and existing family histories are invaluable starting points for locating material likely to pertain to an individual, but establishing authenticity requires finding birth certificates, marriage certificates, military records, deeds, last wills and testaments, and other authoritative documentation (Greenwood, 2000). It is these latter resources that provide credibility and identify historic locales, yet they are the items most difficult to find in a timely and affordable manner using traditional methods.

The online research method, which involves the use of content and tools provided primarily by genealogical and digital library Web sites, holds promise for streamlining the traditional procedure. Genealogical sites are often commercial ventures (Ancestry.com, 2003), which encourage registered, paying members to create family trees for sharing with members and nonmembers alike. Online family trees are a good place to start, but the user contributions are far from ideal; duplicate and incomplete records are unmonitored, contradictions are common, biographical material is scarce, and credible sources are rarely cited to resolve any discrepancies. An added disincentive is the commercial nature of many genealogy sites, where a paid membership is necessary to access proprietary databases of dubious worth and coverage. Even the few genealogical sites that represent themselves as not-for-profit (GenWeb, 2003; LDS, 2003) in the end ultimately point you in the direction of these same fee-based commercial sources.

Online digital libraries, on the other hand, are typically maintained by nonprofit organizations such as archives, libraries, and government records institutions (KY, 2003; VA, 2003). The online content, presented and physically maintained by these authoritative institutions, ideally could resolve ambiguities found on genealogical Web sites by providing access to highly coveted images of original documents. Regrettably, at present, their coverage and areas of interest are diverse and often incomplete for satisfying a family historian’s research needs.

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1 Archives for this research study include those maintained by libraries, museums, families, and local historical societies.

2 Government records offices refers to federal, state, and local authority establishments charged with maintaining public records for use by the general public.
In either research approach, once dates and places of events surrounding an individual have been identified, the next challenge is in preparing the data for use in a GIS. This entails interpreting and converting the locations identified into present-day geographical coordinates for display by a GIS. One tool suited for finding coordinates is a gazetteer, a type of geographical dictionary that indexes place names accompanied by descriptions and location information, including the necessary longitude and latitude information (GNIS, 2003; 2003; US Gazetteer, 2003). Not all gazetteers document the provenance of a place name, adding to the challenge of verifying past versus present-day locations. For example, in the 1600s the town of Harrod’s Creek was in Virginia, but by the mid-1700s that same town had been incorporated into the newly formed state of Kentucky. In other instances town names were changed to suit the preferences of political interests of the time.

Problem Statement: Information Sources

The greatest benefit of the Internet is its ability to build bridges seamlessly across multiple resources, yet this advantage appears to be underutilized by many Web sites, including those provided by genealogical sites and digital libraries. While genealogy sites have a strong and growing user base, indicating a robust interest in family history research (Quinn, 1991; Ridge, 2000), they lack standardization, authentication, adequate search filters, and access to mapping tools, leaving room for improvement. Digital libraries, on the other hand, have a reputation and the expertise for presenting suitable resources, which could compliment this growing demand. Unfortunately, the majority of emerging online tools are merely duplicates of the traditional research model, each organization focusing on a small piece of a larger puzzle with cursory, if any, consideration to each other’s complimentary areas of expertise.

Literature Review

Maps: A Common Tool for Geographers, Historians, and Genealogists

Geographers, as well many historians, have traditionally relied on maps to place into context their findings and aid in the visualization of chronological events. Paper maps have been a primary source for illustrating such changes over time (Sauer, 1940). With advances in technology, the use of GISs has emerged as a viable tool for accomplishing this task. For example, Knowles’s (2002) compilation of essays demonstrates how geography and GISs are being used in real-life projects and suggests this method “contribute[s] a good deal to historical research.” Rumsey and Williams (2002) echo this belief in their opening chapter by giving an overview of the potential GISs offer to historical researchers.

The importance that geography plays in historical research is evidenced by the commission of Gregory (2002), a geographer, by the History Data Service to develop a practical guide for historians on how to use GIS in their research. There are also projects utilizing various forms of interactive mapping (Fitch & Ruggles, 2003) for the display of chronological events relative to geographical locations, and others incorporating multimedia, using maps to communicate the unfolding of historical events (Hoppe, 2003; Mohr & Nicols, 1997).

For the genealogist, maps are a “must” according to Greenwood (2000). They help in visualizing the larger relationships between cities, towns, and counties in respect to their proximity to ancestral habitats. This information can suggest additional places to search for material related to past relations, since records may be located in different jurisdictions, “especially if the place your ancestors lived happened to lie near a boundary line” (Greenwood, 2000). Helmbold (1976) corroborates the importance of maps in genealogical research, particularly topographic maps for
understanding existing transportation routes of the time period and the physical barriers, such as mountain passes that would have limited interaction between communities. For a particular locality, detailed maps are extremely valuable, such as city street maps and land ownership maps.

**Information-Seeking Behavior of Historians**

Case (1991) synthesized the findings of several studies related to “what historians say they do” when researching a project. Although each study used different terminology, they appear to agree that historians typically focus on research related to either a particular time, a particular subject, or a particular place. Case (1991) further summarized these studies, illustrating that each fell into one of three types of research focus: “chronological (divisions by centuries, decades, periods, eras, and specific range of years), topical (persons, events, and themes), and [or] geographical (continents, regions, countries, states, provinces, cities, and so on (pp. 65–6)).” Case (p. 73) also noted that scholarly historians seek primary resources in support of their research, yet libraries and historians hold different views as to what constitutes a primary resource:

what is secondary and tertiary to the scholar is primary to the librarian…the books, bibliographic databases, and reference tools that we [libraries]…provide are not the source materials that scholars most often seek…original evidence is especially important to historians, who make a strong distinction between primary and secondary material.

For the historian, the primary material is to be found in the archives.

Numerous studies have focused on the tasks historians engage in when searching for historical material (Delgadillo & Lynch, 1999; Jones, Chapman, & Woods, 1972), while others have specifically assessed the use of archival material by historians (Case, 1991; Duff & Johnson, 2002). Holdsworth’s (2003) research indicates that historical geographers have comparable information needs and utilize similar search strategies. A common thread echoed in these studies is the task-intensive nature of the traditional “hunt” for historical information and the barriers encountered such as cost, physical location, credibility, and the limitations of search tools or archival finding aids.

**A Branch of History: Genealogy and Family History**

Greenwood (2000, pp. 1-2, 8-9) defines genealogy as “that branch of history which involves a scientific study for the determination of family relationships…” Though a branch of history, genealogy is a subject which you cannot approach in the same way you would approach most other branches. In genealogy you cannot make a brief general summary of a historical period—but must consider the details of each ancestral problem individually and thoroughly…This is not done by copying but rather by research.” He further clarifies his definition as only applicable “to genealogy when it is properly practiced. However, as practiced by many it falls short in some respects. We can truthfully say that genealogy should be a science…but the methods of some tend to lower it to the level of a mere pastime built upon false premises…So many compiled genealogical records lack credibility and so many printed family histories and genealogies are pure tripe…”

Like Greenwood, Null (1985) groups genealogists into two types, the hobbyist versus the scientific researcher. The former he refers to as a genealogist, the latter as a family historian. In Null’s view genealogists are less rigorous in their research and tend to record dubiously documented basic facts such as births, marriages, and deaths of direct descendants in their rush to construct a family tree. Family historians, on the other hand, seek to verify meticulously not
only these basic facts, but also extended relationships, along with locating contextual material such as biographical sketches and historical events that define the time period.

The information-seeking behavior of the more rigorous family historian mirrors that of the professional historian (Null, 1985). While family historians focus on both topical research (related to a particular person or family) and chronological (covering many generations), they rely on the same resources and behave in the same manner as other historians when searching for material relevant to their area of study. Family historians typically begin their query employing a surname search, then they utilized the places, dates, and events uncovered as filters in subsequent searches to bolster their findings.

Greenwood (2000, p. 11) substantiates that history and genealogical research are intertwined. “Genealogy and history (religious, economic, social and political) cannot be separated. Men cannot be dissociated from the times and places in which they lived and still be understood. It is impossible to recognize the full extent of research possibilities if you are not aware of the background from which your ancestors came.” He explains that knowledge of history provides the clues needed for determining the types of records that existed, whether they survived, and which institutions currently maintain the documents still in existence.

The interest in genealogy research is steeped in tradition and has continued to grow steadily (Kemp, 1997; Null, 1985). It is clear the Internet is playing a role in this phenomenon (Howells, 1999; Tedeschi, 2002) as evidenced by projects aimed at building digital indexes focused on ancestral research (Austen et al., 2003; “Business Wire,” 2002; Goeken, Nguyen, Ruggles, & Sargent, 2003; Oka & LaGuardia, 2002). The demand for improved access to these resources appears to be going unnoticed by many of the academic library and archive communities holding relevant material. They frequently view family research as a mere hobby, worth limited attention (Kniffel, 1993; Manley, 1996; Null, 1985). Others in the field point to the research value and benefits of catering to this substantial audience (Boyns, 1999; Cadell, 2002; Kemp, 1999b; Null, 1985; Quinn, 1991). In fact, family history research offers many benefits such as the ability to document a family’s medical history (Greene, 2003) or build upon knowledge in the field of social sciences (Brunet & Bideau, 2000; Fitch & Ruggles, 2003; Null, 1985).

One alarming trend indicates that certain libraries are granting exclusive rights to commercial ventures to digitize ancestral public records. Once digitized, these electronic records are only accessible to paying members (Nakada, 2001). It seems that the tables should be turned and these commercial ventures should be paying libraries for the privilege to publish these holdings, and be required to adopt a standardized format to ensure interoperability with ongoing and future digitizing initiatives.

This study is interested in genealogy as a scientific study of family relations, as defined by Greenwood (2000) and by Null’s (1985) synonymous description of a family historian. Both terms, genealogist and family historian, are used throughout this paper and should be construed as meaning those researchers intent on seeking the highest level of authentic material available in their pursuit to document and map the location of family events.

Although the information seeking process and sources used to map ancestral place locations is the focus of this study, each location is inextricably tied to the events that occurred in a family member’s life, such as the place of birth, marriage, or death. It is the knowledge concerning these events that adds meaning to the locations that the researcher ultimately wishes to map. The information needs of the genealogist entail identifying people and the events, places, and dates that reflect their lives. Once this data is gathered, geographic coordinates can be construed to enable mapping of ancestral habitats for display in a GIS.
Problem Defined: Information Needs Model & Definitions

To begin a search, historians typically start by looking for information related to a known item, as substantiated in Duff and Johnson’s (2002) research. They cite an early study that contends 90 percent of archive researchers can associate their information needs to a person’s name or an organization. They also established that search terms such as ‘date, place, and from,’ were used almost as frequently (p. 476). These findings agree with several other studies that have identified persons, places, events and dates as key search terms used by historians and genealogists alike (Greenwood, 2000; Helmbold, 1976).

Table 1: Conceptual Model of Genealogical Information Needs

The conceptual model presented in Table 1 puts into context the information needs of a family historian intent on mapping locations inhabited by their ancestors. The process starts by identifying one person in the lineage. The objective is to verify events in that individual’s life, such as birth or marriage, by documenting the date and specific place of each occasion, followed by establishing relationships to other persons. The model defines a circular pattern that continues until there are no more associations to explore, or the information trail disappears. For each step in the procedure, primary documents, as defined by Case (1991) earlier, should be located to verify each event. If official documents do not exist, multiple sources must be consulted to substantiate an event, its date, and its place, thereby serving as a surrogate in lieu of primary documentation.

Information Need: Person

The search for ancestors begins with locating information related to one person in the family lineage. A surname (last name) search is a good place to start and can be done online or in published indexes. Unless the surname is very rare, such as Zubl (LDS, 2003), finding the right person can be difficult, especially if family records no longer exist to provide clues about unique events in that individual’s life, such as a birth date or birthplace. It is especially challenging when working with a common surname such as Smith, or dealing with variant spellings of family surnames such as Brinckerhoff or Brinkerhof. Variants occurred frequently for numerous reasons. For example, some family surnames were anglicized upon arrival in the American colonies, either for personal reasons or due to recording errors. Misspellings were also common due to low literacy levels and variations in native language, leading to the apparent legal acceptance of phonetically equivalent spellings.

To narrow the initial surname search the use of additional qualifiers, such as a person’s first or middle name, spousal name, year of birth or state of residence may help. Without some background details, focusing the hunt can be quite difficult and time consuming. Ideally one ought to start by interviewing family members, recording both oral recollections and examining
family archived keepsakes, such as old letters, news clippings, and photo albums, to identify unique facts related to past generations. From there research should focus on the most current generation and proceed backward to establish links sequentially to each preceding generation. With background information providing the benchmarks, surname indexes, both online and traditional, become useful tools for identifying likely relations and eliminating those with incompatible event characteristics, such as an incorrect birth date or place.

**Information Need: Events**

Primary events in a person’s life include birth, marriage, and death. Additional events may include the schools attended, residences occupied, careers, and membership affiliations, including professional organizations, social clubs, or churches. Events can represent time periods, such as the Great Depression, or military actions, such as the Civil War. These latter attributes are ideally suited for visualizing the historical influences surrounding each generation. The goal of this study was to locate primary documents, or the equivalent, for each individual along the branch of a particular family tree (e.g., birth certificate, marriage certificate(s) and death certificate), if available.

For relatives that lived prior to the 1800s, locating proof of these three events will rarely be easy. Many states had not implemented mandatory recording of vital records until the early 1800s or later. Locating church records or digging deeper into family archives may be the only option. It is the verification of these key events that provides the crucial evidence needed and clues for continuing with the information seeking process.

**Information Need: Dates**

In order to map events for chronological display in a GIS, a date must be linked to each event and the place it occurred. Dates also add another level of confirmation in documenting a person’s familial relationship; for example, it would be unlikely that a person born in 1880 was the parent of someone born in 1885. Dates can be explicit, such as a birth date; a range of time, such as the years a particular school was attended; or continuous, such as from a certain date to the present. Contradictions may exist between multiple information sources, and each case should be documented for later analysis and resolution.

For relatives living in the year 1752, the Gregorian Calendar replaced the use of the Julian Calendar in the British American colonies that year, resulting in an adjustment of eleven days. Helmbold (1976, p. 37) warns that

because of differing customs among the settlers, the new year began on 25 March or on 1 January. When the calendar was changed, the Parliament also established 1 January 1752 as the legal New Year’s Day. Birthdays of people then had to be expressed as Old Style or New Style. For example, a date would be written as 14 February 1727/8. This means that the event took place in 1727 if the year was thought to begin on 25 March but the birth date was in 1728 if the year was thought to begin on 1 January. Since the 25 March date is the turning point, only dates from 1 January to 24 March have to be indicated in the above way.

**Information Need: Places**

The most important information required to enable GIS mapping is knowledge of the place, or location, where an event occurred. There are several levels of location precision that need to be considered, not only in the context of a particular time period but in terms of scale. Scale
determines the level of detail available for mapping. For example, while identifying the state and county an ancestor inhabited is essential, it is even more desirable to map locations at the city or town level, as well to identify land holding and pinpoint actual street addresses.

Once a place name and its attributes have been identified, the geographic coordinates can be determined. These coordinates are what enable a GIS to display symbols representing the physical location of recorded events on a map. For example, places may include symbols of countries, regions, states, cities, towns, landmarks, natural features, or buildings. The temporal nature of places requires that additional dates and coordinates be defined each time the physical traits, jurisdictional boundaries, or name of a place changes. Capturing these adjustments puts into context the before, after, and present-day characteristics of a location.

Information Need: Relationships

Relations typically involve identifying an individual’s familial associations with a spouse or spouses, siblings, children, and parents. Secondary relations of interest include people with whom an individual socialized outside of their immediate family circle such as business partners, neighbors, and organizations. Knowledge of relationships is important not only in defining a family unit, but also as an aid in identifying subsequent ancestral connections, or for eliminating those not fitting the profile. After gathering sufficient information about a particular individual, the family historian’s information-seeking process begins again by researching the next individual of interest, which may have been identified as a relation to the last person searched or someone else along the family tree.

Multiple Resources: Online or Traditional

Multiple resources are consulted in the quest to document each ancestor and the events, dates, places, and relations that shaped their lives. Traditional and online resources include, but are not limited to, genealogical societies, archives, government records offices, libraries, family records, newspapers, cemeteries, and published biographies. Information concerning the same event may be recorded in multiple resources and each should be cited to substantiate the date and place, or point out discrepancies. It is especially important to consult several sources to establish undocumented events.

For this study, family archives provided the initial information needed to begin a search for ancestors along one branch of a family tree. Thereafter, the goal was to utilize primarily online resources, beginning with a search for matching surnames. Names that included matching characteristics to the family records, such as the correct state of birth or date of marriage, were compared for relevancy. Those not containing distinguishing details or matching facts were eliminated. From here it was possible to establish links to previous generations and fill in event details missing from the family archives. Traditional brick-and-mortar establishments, that were geographically accessible, were later consulted in an attempt to substantiate the online findings.

Spatial Database

Throughout the information-seeking process, a family historian needs to record details and document sources related to the persons and events being researched. Traditionally, genealogists have used standardized paper forms for collecting much of this data (see “Research Guidance-Family Group Record” link: LDS, 2003). In the online method, commercial software programs employ modified versions of these forms to aid in the process (Hirsch, 2002). While both traditional and online data collection tools are plentiful, none appear to be designed for recording
geographical coordinate (e.g., longitude and latitude) information needed for use within a GIS. Thus, facilitating GIS mapping requires the creation of a spatial database capable of linking event attributes to geographic coordinates for display in a digital map.

Any number of database software packages can be employed for building a spatial database, such as Microsoft’s Excel, Access, or MySQL. Another method worth considering is the use of extensible markup language (XML) as suggested by Lu and Scaramuzza (2003). While the building of a spatial database is not the subject of this study, it has been addressed here to highlight the additional barrier to successfully mapping ancestral haunts. Not only does the family historian need to find and carefully document location information required for mapping, they often need to transcribe their findings into a compatible format for use in a spatial database. This second step is a time-consuming duplication of efforts and could be avoided if electronic family group records were designed to record location data automatically into an underlying spatial database.

**Information Theory & Models of Information Behavior**

In the fields of Communication and Information Science, the term information may be defined as: “The decrease in uncertainty of a receiver…in going from the before state to the after state. It is usually measured in bits per second…” (Schneider, 1999). This definition is attributable to Shannon’s (1948) development of a mathematical formula known as Information Theory, which is aptly described in The Meaning of Information (Bell Labs, 2003):

Information Theory regards information as only those symbols that are uncertain to the receiver. For years, people have sent telegraph messages, leaving out non-essential words such as “a” and “the.” In the same vein, predictable symbols can be left out, like in the sentence, “only infrmatn esentil to understandn mst b tranmitd.” Shannon made clear that uncertainty is the very commodity of communication. The amount of information, or uncertainty, output by an information source is a measure of its entropy. In turn, a source’s entropy determines the amount of bits per symbol required to encode the source’s information.

Basically “The theory addresses two aspects of communication: How can we define and measure information? and What is the maximum information that can be sent through a communications channel? (channel capacity)” (Schneider & Lewis, 2002).

Several theoretical models of a person’s information needs have been developed that include Shannon’s aspect of uncertainty, although from a humanistic viewpoint. Wilson (1999) compared these models and grouped them into three categories, information behavior, information-seeking behavior, and information searching (Dervin, 1983; Ellis, 1989; Kuhlthau, 1991). Wilson contends that these models are complimentary and can be “nested” within each other, as they address a different scale within the information need process, from the macro to micro level. Wilson further recognizes that “information behaviour is a part of human communication behaviour…” although in communication studies the “strong focus [is] on the communicator and the channels of communication…” unlike information behavior studies, which focus on the information seeker (Wilson, 2000, pp. 263–64).

This study intends to evaluate the quality of resources that aid in reducing uncertainty related to the information needs of the family historian intent on mapping ancestral haunts. Of particular interest are two intervening (or environmental) barriers that Wilson (1997, pp. 559–61; 1999) defines in his model as economic variables and source characteristics. Economic variables are described as direct costs and the value of time, while source characteristics include accessibility,
credibility, and the channel of communication.

**Research Approach and Rationale**

Using a descriptive approach, a case study served to identify and evaluate the relevant information found during a “first pass” attempt to build a spatial database for mapping ancestral habitats. The search terms employed were based on the information needs of the family historian as presented in Table 1 (e.g., persons, events, dates, places, relations). The reasoning behind this study was twofold: to assess the barriers (time and cost) encountered in locating suitable family history content for mapping and to rate the characteristics (accessibility, credibility, and channel of communication) of each source used. A limitation to this research is the inherent nature of a case study, which focuses attention on a few examples of a particular observable fact. In this case, the analysis was limited to the tracing of one individual’s lineage back to a known relative living in the American colony of Virginia (later generations migrated to Kentucky) around the late 1700s. The resources consulted were restricted to selected online content and geographically accessible traditional material.

**Research Questions**

This study sought to answer six questions, loosely based on those posed by Toms and Duff (2002) in similar research. They have been modified to capture the information behavior of family historians:

1. How many and what type of source(s) provided relevant information (e.g., online or traditional; individual contributor, archive material, government records office, library)?
2. How credible are the resources that contained relevant information?
3. How many ancestors were located and what amount of information was found relating to each individual?
4. How many of the sources included complete information suitable for mapping three events: a person’s birth, marriage, and death? (e.g., for dates—the month, day and year of the event; for places—the country, state, county, and town where the event occurred).
5. What barriers (cost and time) were encountered during the search?
6. What other kinds of tools or information would have been helpful to improve the credibility of the findings?

These questions were selected to investigate the impact of the two intervening (or environmental) barriers to information described by Wilson (1997, p. 559–61; 1999): economic variables and source characteristics. It was expected that certain barriers would impact the source selection; for example, as economic variables became excessive a less credible source would become acceptable. Ideally the barriers encountered would identify where gaps in information existed and point to opportunities for improvement in servicing the information needs of the family historian.

**Methodology**

This project was intended as a pilot study to determine if the method was viable for use in studying a larger population of family historians. The goal was to do a preliminary evaluation of the search process primarily using Internet sources, followed by an analysis of the relevant information retrieved (e.g., persons, events, places, dates, relations) in relation to the source characteristics (e.g., accessibility, credibility, and channel of communication).
Using a case study, the lineage of a living individual’s deceased parents was traced backward along at least one branch in each preceding generation. The objective was to uncover which branch of the family tree led to a particular ancestor known to have lived in the colony of Virginia in the 1700s. It was unclear which branch needed to be followed (e.g., paternal, maternal, or a combination) to make the connection back to the known relation presumed to be the first in this family line to have settled in America. The focus was based in the context of the user as *information seeker* and the use of any *formal information systems* as defined by Wilson (2000):

any device, product or system intended for information representation, storage, conservation, retrieval, or re-packaging. That is, for example, any library, information service, abstracting journal, primary journal, on-line bibliographic data base, organizational record file, etc., etc…

To initiate the study, a surname search of “Ancestor-1” was performed using the FamilySearch.org Web site (LDS, 2003) maintained by the Church of Jesus Christ of Latter-day Saints (LDS). This site was selected based on its breadth of search filters, access to multiple databases, content quality, and perceived credibility. The holdings of the LDS Family History Library are considered the largest nondenominational collection of genealogical material in the world. The majority of the records contain information about people who lived before 1920, the preponderance of this study’s population.

The goal was to substantiate three key events in the lives of the branch followed within each generation: their birth, marriage, and death, along with the places and dates each of these events occurred. Additionally, family trees linking each generation to subsequent or prior generations were important for documenting provenance. FamilySearch.org maintains an archive of member-submitted charts to aid in establishing these potential relations. If sufficient information was uncovered concerning the place an event occurred (e.g., at the town level), geographic coordinates were later determined for future use in generating a GIS map.

Several events in the life of “Ancestor-1” were already known based on family archive records. These events include birth date, birthplace, parents’ names, spouse’s names, and date of death. It was anticipated that because of this knowledge the initial search would successfully uncover additional lineage information such as events related to the parents or grandparents. From here the process was unstructured and followed information clues as they presented themselves, regardless of the resource format (traditional or online).

While family archives provided many of the initial clues, the LDS FamilySearch tool was employed whenever an uncertainty existed regarding a current or newly-discovered person. Whenever nonsurname information was required, such as locating a cited reference, the UNC-CH online catalog or their electronic databases were consulted. Geographic coordinates were found using several different gazetteers (*GNIS*, 2003; 2003; *TGN*, 2003; *US Gazetteer*, 2003). When information was needed to clarify a historical place name, the online search engine Google was utilized.

The identification of siblings and their spouses, related to direct descendants in the branch, were not a requirement in this pilot study, although when found they were documented and used in additional surname searches to help evaluate the credibility of the study’s findings. Extended relations, such as cousins, business partners, or organization affiliations were also excluded, unless these affiliations appeared useful for uncovering missing information related to a direct descendant.
Diary

A diary was employed to record the information-seeking process undertaken and the relevant people and events discovered. This method was chosen because of the insight diaries provide, as evidenced by the study completed by Toms and Duff (2002) in their analysis of archival record usage by historians. For this study, log entries documented the beginning and ending time of each search, the search terms used, and the information found as a result. Entries also identified the communication channel (online or traditional) and type of information provider (individual, library, archive, government records office, etc.). For online resources, screen captures of the initial search results were saved as a supplement to the diary entries, with relevant findings highlighted during the analysis. Monetary costs associated with a search, if any, were noted.

The results of each search were analyzed for familial connections. Information deemed relevant to the lineage being studied was recorded onto family group worksheets created using Microsoft Word. These forms were based on those typically used by genealogists for capturing information related to family units (see “Research Guidance-Family Group Record” link: LDS, 2003). The source that was discovered for each item was documented using Thomson ISI EndNote 6 bibliographic software.

Once adequate information was discovered to connect the most current generation back to the first relative in this branch to have arrived in the American colonies, the study was considered complete, with the exception of deciphering geographic coordinates for those locations suitable for town level mapping.

Project Justification

Finding accessible, authoritative, and relevant historical digital data, such as locations in context to time-specific boundaries (e.g., state, county, city, or town), is nearly impossible. Genealogists are not the only researchers faced with the problem of unearthing chronologically accurate place information. Historians doing subject-based research, such as that related to a person or an organization, and historical geographers interested in the study of human migration, are repeatedly challenged when seeking a suitable level of geographic detail for use in a GIS.

The intent of this study is to identify opportunities for streamlining the current information-seeking process of the family historian and to point to collaboration opportunities for incorporating online mapping technology. As traditional institutions expand further into the use of online content they should consider their strengths and look for partners in the development of an integrated set of tools, especially those that incorporate geography and its related temporal shifts. Also needed is a universal tool to facilitate the use and documentation of trustworthy sources, such as a reputable bibliographic program similar to EndNotes or ProCite.

Implementing an integrated method to document credible sources and pinpoint locations during the search process could substantially improve the quality of material published online by family historians and reduce the need for multiple versions of the same family tree. The result would be a growing library of credible historic data related to family history, fit for sharing with family members as well as scholars interested in the study of humanities and social science. What characteristics are missing from the digital library holdings to achieve this goal? What is missing from the genealogical sites?
Study Results

Comparison of Information Behavior Models

The process employed in this study was in keeping with Wilson’s (1999) evaluation of several information theory models that he described as subsets of each other: information behavior, information-seeking behavior, and information search behavior. Information behavior encompasses the general nature of information theory as a form of investigation. Its subset is information-seeking behavior geared towards understanding “the variety of methods people employ to discover, and gain access to information resources…” The final subset is information search behavior, “particularly concerned with the interactions between information user and computer-based information systems…”

Borrowing from Wilson’s (1999) 1996 general model of information behavior, the impact of two intervening variables he identified (environmental and source characteristics) were observed in relation to information-seeking behavior. As the environmental barriers increased (e.g., cost and time), alternate information sources were sought. The resource characteristics (e.g., accessibility, credibility, channel of communication) not only influenced the initial choice of sources to consult, but the selection of alternate material when faced with unacceptable environmental barriers.

The conceptual model of genealogical information needs, presented in Table 1, incorporates characteristics of several of the information-seeking models evaluated by Wilson (1999). These include Ellis’s (1993) nonlinear model that defines the information-seeking process in terms of starting, chaining, browsing, differentiating, monitoring, extracting, verifying, and ending. Kuhlthau’s model is comparable to that of Ellis, although more general in terms of the concepts defined. Dervin’s sense-making model, defines information-seeking behavior as a problem situation (or information uncertainty) that needs to be resolved, the gap in known information, and the outcome (or resolution of uncertainty).

Wilson (1999, p. 267) observed that not all of the models he evaluated included feedback as a facet of information-seeking, yet this feature should be inherently assumed. “For example, a person at any of Kuhlthau’s stages may have to revisit an earlier stage as a result of problems experienced or new information found and, in Ellis’s model, a person engaged in…extracting may…need to return to chaining or browsing to gather further information.” This was routinely the case in dealing with ancestral information uncovered throughout the research process of this case study. As unknown bits of information were discovered, the situation was frequently reevaluated and approached from a different angle based on this new feedback.

Genealogical Case Study Results

Question 1 Findings

A total of eleven sources provided concurring lineage information and event details related to at least one individual within the eight generations uncovered. Six sources provided content online; five consisted of traditional research material. Source types were categorized and given a credibility rating based on the author’s interpretation of the source’s value, and are presented in Table 2. Citations to sources that provided relevant information are included. Unfortunately, primary material of interest, such as birth, marriage, and death certificates, were not readily available online or geographically accessible.
<table>
<thead>
<tr>
<th>Relevant Sources (**Online)</th>
<th>Source Type</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>none found</td>
<td>Government vital records—official copy or facsimile</td>
<td>8</td>
</tr>
<tr>
<td>(1880 Census, 2002) **</td>
<td>Government records—index</td>
<td>7</td>
</tr>
<tr>
<td>(Death Index-NY, 2000) **</td>
<td>Government records—index</td>
<td>7</td>
</tr>
<tr>
<td>none found</td>
<td>Archives—institutional manuscript collections</td>
<td>6</td>
</tr>
<tr>
<td>(“News Article,” btwn. 1899-1921)</td>
<td>Family Archives—news clipping</td>
<td>6</td>
</tr>
<tr>
<td>(“Obituary,” 1940)</td>
<td>Family Archives—news clipping</td>
<td>6</td>
</tr>
<tr>
<td>(“unknown,” 1907)</td>
<td>Family Archives—news clipping</td>
<td>5</td>
</tr>
<tr>
<td>(Stewart, 2003)</td>
<td>Family Archives—undocumented</td>
<td>5</td>
</tr>
<tr>
<td>(Baskett, n.d.) **</td>
<td>Biographic material—documented</td>
<td>4</td>
</tr>
<tr>
<td>(Burke, 1939)</td>
<td>Biographic material—documented</td>
<td>4</td>
</tr>
<tr>
<td>none found</td>
<td>Biographic material—undocumented</td>
<td>3</td>
</tr>
<tr>
<td>none found</td>
<td>Online family tree file—partially documented</td>
<td>2</td>
</tr>
<tr>
<td>(Hopkins et al., 2003) **</td>
<td>Online family tree file—undocumented</td>
<td>1</td>
</tr>
<tr>
<td>(Hurley) **</td>
<td>Online family tree file—undocumented</td>
<td>1</td>
</tr>
<tr>
<td>(Ruvane, 2003) **</td>
<td>Prior Research—undocumented</td>
<td>1</td>
</tr>
</tbody>
</table>

**Question 2 Findings**

The credibility ratings were determined based on each source’s perceived authenticity, taking into account the quality of references cited and channel of communication (e.g., source type). The highest information credibility rating of eight was reserved for government vital records, either original or a facsimile, with lower ratings given to sources that lacked cited references. Four source types that were not encountered (e.g., government vital records, archives—institutional, biographical material—undocumented, and family tree file—partially documented) are included in Table 2 to place into context the credibility rating they would have been assigned. It is expected that relevant material will be found within each of these four source types in future research.

**Question 3 Findings**

From the eleven sources that did provide relevant information, thirty-two unique individuals were uncovered in this branch of the family. Family archive material provided corroborating facts regarding the known ‘Ancestor-1’ (in Table 3; Generation #1-H) and provided sufficient information to link each successive generation back to the first ancestor to have settled in America; a male (in Table 3; Generation #8-H) who apparently immigrated to the colony of Virginia in 1705
with his brother.

The ancestors found corresponded to eight generations, including sixteen parents, a partial list of offspring, and some of the siblings’ spouses. Several sources provided concurring information that established the links between each generation. Two sources were in agreement regarding the lineage of generations one through four (“Obituary,” 1940; Stewart, 2003), two tied together generations four through eight (Baskett, n.d.; Hopkins et al., 2003), and two connected five or more generations (Burke, 1939; Hurley, 2003). The findings in this preliminary study were not exhaustive, especially for siblings’ spouses and offspring not directly responsible for the next generation. The primary focus was on the search process and the environmental barriers (cost and time) and source characteristics (accessibility, credibility, and source type) encountered in the process of locating relevant information for mapping ancestral habitats.

In Table 3, a cumulative source rating was determined to characterize the overall information credibility rating for each unique item of information uncovered (e.g., first name, last name, birthday, birth month, birth year, etc.). The more information items recorded, and the greater the number of times each was cited, the higher the overall rating. Although the rating is a contrived value, it is useful in illustrating the volume of concurring or relevant information that was collected regarding each individual. The findings indicate that the first three generations relied heavily on information found in traditional material, while online sources provided the bulk of material related to later generations.

Table 3. Information Items Found, Channel of Communication, & Quality Rating

<table>
<thead>
<tr>
<th>Generation</th>
<th>Online</th>
<th>Traditional</th>
<th>Source</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>10</td>
<td>17</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>H</td>
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<td>34</td>
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<td>319</td>
</tr>
<tr>
<td>W</td>
<td>3</td>
<td>24</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>17</td>
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<td>198</td>
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<tr>
<td>W</td>
<td>20</td>
<td>20</td>
<td>115</td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
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</tr>
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<td>H</td>
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<td>-</td>
<td>34</td>
<td>72</td>
</tr>
<tr>
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<td>30</td>
<td>1</td>
<td>40</td>
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<tr>
<td>5</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>H</td>
<td>34</td>
<td>-</td>
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<td>H</td>
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<td>51</td>
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<td></td>
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</tr>
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<td>H</td>
<td>19</td>
<td>-</td>
<td>31</td>
<td>51</td>
</tr>
<tr>
<td>W</td>
<td>15</td>
<td>-</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>8</td>
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<td></td>
</tr>
<tr>
<td>H</td>
<td>15</td>
<td>-</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td>W</td>
<td>9</td>
<td>-</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>
Question 4 Findings

While a good deal of information was found relating to each individual, as indicated in Table 3, to effectively map an event using a GIS requires that a complete date (e.g., the month, date, and year) in combination with a specific location (e.g., state, county, and town) be identified for each event. Here the results indicate a shortcoming in the information collected, as illustrated in Table 4. Only five out of sixteen births, one marriage (out of eight), and two deaths were uncovered that united both dates and town-level information related to place. Therefore, out of the possible forty-two events that could have been mapped (e.g., sixteen births, eight marriages, sixteen deaths) only eight included the preferred level of detail. Just two individuals, from generation three, have sufficient information for mapping more than one event—the date and location of their birth and marriage.

Table 4. Event Information Suitable for Mapping: Combined Dates and Places of Births, Marriages, and Deaths
(Including number of matching sources and overall source credibility ratings)

<table>
<thead>
<tr>
<th>Generation</th>
<th>BIRTH</th>
<th>MARRIAGE</th>
<th>DEATH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DATE</td>
<td>PLACE</td>
<td>DATE</td>
</tr>
<tr>
<td>H/Wife</td>
<td>Sources</td>
<td>Rating</td>
<td>Sources</td>
</tr>
<tr>
<td>1</td>
<td>H</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>H</td>
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<td>1</td>
<td>1</td>
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<td>8</td>
<td>H</td>
<td>-</td>
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<tr>
<td></td>
<td>W</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Question 5 Findings

Regarding the time and cost associated with each search instance, the online search tool (LDS, 2003) repeatedly retrieved unqualified results or linked to commercial sites where the information was accessible only for a fee, often in excess of one hundred dollars for a quarterly membership. The dubious nature and limited coverage in these membership-only databases did not appear to warrant the expense and therefore were avoided.
The information available online for free was not easily found because of several limitations discovered in the search tool. For instance, while results could be filtered by including an individual’s first name, last name, parents’ names, birth date, and birth state, no relevant results were retrieved when combining these filters in search for Ancestor-1. In a subsequent search using fewer filters, a record of this same individual was found to contain corroborating information used in the failed filter. Another limitation to the search tool was the restricted application of the exact spelling filter, which only functioned in selected combinations and never when it was really needed. For example, exact spelling could be used only when searching for one individual (first and last name) and optionally limited to a particular state, but could not be used to filter the search further based on parents’ names, the county, a particular event (e.g., birth), or time period. These limitations resulted in the retrieval of a great deal of irrelevant information, requiring an unnecessary amount of time to sift through.

The geographically accessible traditional material was relatively easy to analyze, and the information took little time to extract, having the advantage of being provided mostly by records in one family archive. The only traditional source (Burke, 1939) found in a nearby library involved the cost of parking fees and gas estimated to be less than five dollars. In light of the characteristics and limited number of sources consulted, it is probably unfair to compare the economic barriers of time and cost related to using either online or traditional material. In the author’s judgment, however, traditional sources appear to remain the only viable method for authenticating family history information at this time, which reflects poorly on online endeavors.

**Question 6 Findings**

Access to facsimiles of primary information facilitates family history research done online or from geographically remote locations. Improvements to search tools would also be beneficial. For example, online search filters could be upgraded to reduce the unnecessary amount of irrelevant material retrieved. Traditional institutions should expand their holdings to aid in the identification of relations born out of state. At present these collections are typically restricted to material related to the state in which they reside. This makes it difficult for a researcher who lives in North Carolina to find information regarding a person born in Kentucky. One promising tool traditional providers may want to consider is HeritageQuest by ProQuest (Oka & LaGuardia, 2002), a growing online database collection of genealogy and local history resources with links to original document images and interlibrary loan information. At present this database is extremely limited, but it may prove invaluable as its content expands.

**Discussion**

The goal of this study was to connect one branch in the family tree back to its first ancestor to have arrived in America, an aspiration that was successful but not soundly supported. For family history research to be credible, vital records must be located, as substantiated by experts in the field (Greenwood, 2000; Helmbold, 1976; Null, 1985). This study sought to locate birth, marriage, and death certificates or an equivalent level of corroborating primary material; this objective was not achieved. Unfortunately, American births and marriages were not included in the LDS FamilySearch database. LDS does provide a Social Security Death Index, and although it is not certified by the Social Security Administration, it was compiled from their Death Master File (SS FAQ, 2003) and provides the place and date of an individual’s death and Social Security number. Two caveats to the availability of this information should be noted: the issuance of Social Security numbers began in 1936, and not everyone living applied for one. Therefore a death record
is available only for those who were issued a Social Security number and whose deaths were reported to the Social Security Administration (SS FAQ, 2003).

To acquire official death records or copies of an original Social Security application, a Freedom of Information Act Form (SS-5) must be completed and sent with a payment of up to twenty-nine dollars for each individual document requested. Payments are not refundable if no record is found. Regrettably, searches to verify the existence of a record can be performed only by Social Security Administration staff, which seems a bit archaic in light of today’s technology. The fee required also seems to be a form of double taxation since we pay annually for the salaries, services, and maintenance associated with these vital records. At minimum, vital records searches should be accessible to the general public for free, and the purchase price for official copies substantially reduced.

One online source appears to have taken a lead in streamlining the process of obtaining authorized birth, marriage, divorce, and death certificates (VitalChek, 2003). This site was discovered after completing this study while using Google to conduct a search for Kentucky government records offices. VitalChek links you not only to the Kentucky records office, but also to vital records offices in all fifty states. Each state office has its own specific fee structure and method for requesting particular documents, all of which can be processed via VitalChek’s secure ordering system.

This study demonstrates that relying totally on Internet sources to authenticate one’s lineage is not yet possible, as evidenced by the missing information and lack of readily accessible vital record evidence. The same can be said for relying on traditional resources when the research is restricted to a limited geographic location outside of the realm of ancestral activities. In both cases the information gathered was insufficient to map the entire branch of this family effectively. The one advantage, or perhaps disadvantage, to the Internet was the wealth of material provided by individual member contributors (Hopkins et al.; Hurley, 2003). Although the majority lack credible source citations, they do provide an opportunity for those armed with at least some familial background information to locate a few missing details, especially locale particulars and full dates. The drawback is that they may also send you down an unrelated branch of someone else’s family tree if you lack authoritative records for comparison.

For the Internet to become a credible source for researching family history, facsimiles of official records must be made available online, or an integrated, affordable method of acquiring them must be provided. These records are essential for verifying legal names, dates, relationships, and the exact places each event occurred. Currently only selected government documents are accessible online that partially satisfy this requirement, such as the 1880 U.S. Census data available from the FamilySearch site (LDS, 2003). This information is useful in identifying family units living together, but it lacks important information found in vital records, such as complete legal names, and the names of parents and offspring not sharing a residence.

Are the online providers currently looking to partner with traditional institutions to incorporate access to primary material? If not, vital records may remain geographically inaccessible and available only to those with the financial means and time to travel in search of these documents. Additional collaborations between genealogical information providers appears warranted too, for instance, developing partnerships and providing links to regionally specific source material, such as guides to local data (e.g., city maps, postal directories, newspaper archives, and telephone and city directories). The more inclusive each site becomes, the less streams researchers will need to forge in an attempt to build a picture of their ancestors’ past.

If genealogical Internet sources are not prepared to provide access to facsimiles of vital records,
it may be beneficial to upgrade the method and software their members currently use for publishing online family trees. While the software they recommend, and in many cases produce, have some excellent features, there still is considerable room for improvement (Hirsch, 2002). If the tools facilitated the capturing of properly formatted source citations, and a method for members to share images of vital records in their possession, the problem may in time be solved. Ideally software enhancements should incorporate bibliographic citation features (such as those found in EndNotes or ProCite) be linked to a geographic place names gazetteer that recognizes temporal accuracy, and be capable of connecting to GIS software for visual display or printing of the mapped results.

Study Limitations
This preliminary research left more questions unresolved than answered, in part because the case study was probably too large for the time frame allotted. It may have been more insightful to focus on one generation, two at the maximum, to allow adequate time for acquiring vital records for authentication and identifying missing date and location details. Unless these records or equivalent credible evidence is found, the results reported here remain incomplete for use within a GIS.

Another limiting factor to this study was the restricted use of Internet search tools. Surname searches were performed entirely on one Web site (LDS, 2003) and only immediate links contained in the results were explored. Google was used on rare occasions to uncover the provenance of long-vanished places, and in one instance to uncover biographical material on an ancestor in Generation 5. There are many other search engines equipped for the task of family history research that may have resulted in greater success.

Future Research
Aside from repeating this study on a smaller scale, the following additional avenues appear worthy of exploration in future research:

1. Evaluating online tools, or projects, focused on facilitating the use of GIS for mapping historical events (Block & Thomas, 2003; Fitch & Ruggles, 2003; Gregory, 2002; Holdsworth, 2003; Johnson & Fletcher, 1995; Mohr & Nicols, 1997; Humphrey Southall, Gregory, & Ell, 2000; Zerneke, 2003). It would be particularly interesting to evaluate each project in relation to its potential usefulness as a tool for mapping events in family history. Do these projects provide historical GIS digital mapping data? Or are any developing a spatial database product to facilitate data entry of past events linked to the geographic places where they occurred? What benefits will they offer to genealogical researchers?

2. Comparing online search tools provided for family history research (Kemp, 1998, 1999a; LaGuardia, 2002). What filters are employed by their search tools? What databases do they offer? How much do they cost? What sources do they draw their content from? How current is the information? How many unique surnames do they maintain? Do they provide information related to old maps and geographic locations?

3. Evaluating software available for recording family history (Kemp, 1998, 1999a; LaGuardia, 2002). There are many existing software tools on the market aimed at simplifying the recording of research material used as evidence in documenting an ancestral lineage. What event attributes do they capture, and at what level of detail? What features do they provide? Do they all offer the same? Is there anything missing that would be an added benefit to the historian interested in GIS mapping?

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4. Developing a statistically grounded method for calculating source credibility and overall credibility ratings. The contrived source credibility rating used in this study was elementary. It may be valuable to consider adopting a statistical method in future studies. The quantity of unique information items uncovered (e.g., last name, first name, middle name, name variants, birth month, birth year, state, county, city, etc.) and the numerous sources containing concurring information regarding each unique item warrant evaluation by an expert to identify an appropriate method. The goal would be to select a statistical theory suited for analyzing these large unequal sample sizes—one that presents the results in a standardized format for better comparison.

Cited References


(Louis Stewart, Sr.; follow links backward for other relations)


[Obituary] Louis Stewart, Former Retail Executive, Dies. Ex-President of McCreery, Lord & Taylor and Associated Dry Goods was 85. (1940, 11/31/1940).


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