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***Geographic Information Systems Technology and Digital Humanities:  
The Mark Twain's Mississippi Project***

The Mark Twain's Mississippi Project has emerged at the intersection of library science and new developments in the humanities. Its World Wide Web site (<http://dig.lib.niu.edu/twain>) presents users with a digital library featuring humanities materials shedding light upon the historical milieu in which Samuel Clemens grew to maturity, and which he remembered and imagined as Mark Twain in a series of celebrated works based in the Mississippi River Valley of the mid-nineteenth century. These materials include traditional digital library resources such as texts, images, and sound files. Project staff members have assembled over one hundred nineteenth century texts describing the Mississippi Valley, and used a Dublin Core markup scheme to identify individual passages from these works discussing or depicting individual locations on the river. The project's World Wide Web site also features images depicting and songs describing the region. Finally, the project World Wide Web site presents spatial data via Geographic Information Systems technology, including geographical features and data sets depicting the changing demographic, economic, and political contours of the region in this period. Using these online tools, project users may compare Mark Twain's accounts of the Mississippi Valley of the nineteenth century with those produced by other observers, thereby exploring and analyzing significant themes in American literature and history.

While many groups have reaped large benefits from the rise and integration of digital technology, databases, and the World Wide Web, the humanities have benefited as much as any. For decades, educators, students, and lifetime learners have often relied upon secondary sources' accounts in order to perceive the course of historical change. Likewise, those interested in literature usually found themselves confined to the examination of authors' final, published texts alone. Since the early 1990s librarians and scholars have taken advantage of rapid technological developments to make a wide variety of humanities materials available on the World Wide Web. The rise of online digital libraries has especially facilitated the wider dissemination of the often rare and delicate primary source materials that enable us to study history, as well as the drafts, letters, and papers, that shed new light upon the study of literature. Access to these materials enables users to take up the scholar's task for themselves while examining and analyzing primary source materials.<sup>1</sup>

Digitization technology and the systems supporting the World Wide Web have made large contributions to these developments. But neither is more important than the development of databases and the metadata that helps librarians to facilitate their use. When librarians and information science professionals discuss metadata, they refer to the language and terms they use to describe the data at hand. For example, a book's metadata would include the book's author, title, publisher, date and place of publication, and subject classification. Other metadata elements may include information about electronic materials' structures and format, and administrative information such as rights and permissions. Many elements of what we now call metadata reside in a library resource's catalog record. Digital library materials usually store metadata in an object header, or descriptive portion of the electronic file. Databases' ability to employ metadata, in combination with string searching, have provided digital library users with powerful new tools for

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<sup>1</sup> While major writers' papers and drafts continue to be published in scholarly editions, these projects' pace has been slow, and they reach an audience of specialists.

the exploration, manipulation, and analysis of primary source materials, and especially texts. While there is still no substitute for simply reading a work or corpus, database technologies provide their users with a quick and reliable alternative to the vagaries of human memory and note-taking.<sup>2</sup>

At the same time that librarians and humanities scholars developed online digital libraries filled with texts, images, sound files, and video files, geographers and their collaborators in the world of systems analysts and computer programmers developed Geographic Information Systems technology. Geographers and other map users once created and consulted familiar paper representations of landforms that often featured many types of information, such as the locations of cities and towns, highways, waterways, and railroads, all in one resource. More specialized maps also represented demographic, economic, and political data in various political jurisdictions and entities, such as precincts, wards, counties, states, and nations. Such demographic data sets are often housed in tabular databases that do not immediately allow viewing or management of the information in a spatial, or map, format. Users hoping to analyze relationships between any of the data types have usually confronted a cluttered map, at best. Users seeking more readily accessible maps have struggled with resources unable to reveal relationships between geographic and demographic features and phenomena.<sup>3</sup>

GIS provides an opportunity for its users to examine and analyze spatially-oriented materials in dynamic new ways. It manages and displays map information in a digital, computer environment that enables its users to submit queries, which in turn instruct the GIS software to create maps depicting only the types, or "layers," of information that the user has requested. For example, a GIS user may request a map of a region representing its railroad network, on a specific date, alone, without the clutter created by other types of information. As importantly, that user might ask GIS technology to render a map depicting the railroad network as well as results from the United States Census for a particular year. The ability to isolate, depict, and overlay these layers of information makes GIS a formidable tool for the integration and analysis of a wide variety of data, and provides individual GIS users with a flexibility that facilitates inquiry and research.<sup>4</sup>

In the years immediately following its introduction in the early 1990s, GIS users employed stand-alone computer workstations to tap databases and generate dynamic map resources. This state of affairs largely restricted usage of GIS's dynamic data layering and map generation capacities to professional geographers, university professors and their students, and employees of well-funded business concerns and government agencies. But by the late 1990s GIS developers and vendors had adapted their technology for ready use on the World Wide Web in the form of products such as Environmental Systems Research Institute (ESRI)'s ArcIMS. This development places Geographic Information Systems' considerable analytical power within the reach of a much larger audience, including, potentially, the users of online digital libraries. Much like digital libraries utilize metadata and full-text string searching to make text, image, sound, and video materials both accessible and subject to manipulation and analysis for a dramatically expanded audience, Geographic Information Systems unlock the potential of spatially-oriented data.<sup>5</sup>

While librarians have discussed Geographic Information Systems at some length, humanities scholars are only beginning to appreciate its usefulness in their work. Librarians' discussions of Geographic Information Systems have largely addressed the opportunities and challenges that this new technology presents for information professionals. Many articles outline the new skills that

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<sup>2</sup> See "Introduction to Metadata: Pathways to Digital Information" Murtha Baca, ed., at [http://www.getty.edu/research/conducting\\_research/standards/intrometadata/](http://www.getty.edu/research/conducting_research/standards/intrometadata/); Nair, Saju S. and V.K. J. Jeevan "A Brief Overview of Metadata Formats/Author(s)" *DESIDOC Bulletin of Information Technology*, v. 24 no4 (July 2004) p. 3-11; Haynes, David "The Five Purposes of Metadata" *Library and Information Update*, v. 3, no 7/8, pp. 30-1.

<sup>3</sup> See Julie Delaney *Geographic Information Systems: An Introduction* Oxford: Oxford University Press, 1999; Haywood, D. Ian, Sarah Cornelius and Steve Carver *An Introduction to Geographic Information Systems* New York: Addison Wesley Longman, 1998; Allan B. Cox and Fred Gifford "An Overview to Geographic Information Systems" *The Journal of Academic Librarianship*, November, 1997, pp. 449-461.

<sup>4</sup> Cox and Gifford "An Overview to Geographic Information Systems"

<sup>5</sup> Plewe, Brandon *GIS Online: Information Retrieval, Mapping, and the Internet* Santa Fe, N.M.: OnWord Press, 1997; Green, David and Terry Bossomaier *Online GIS and Spatial Metadata* London: Taylor and Francis, 2002; David A. Cobb and Arlene Olivero "Online GIS Service" *Journal of Academic Librarianship*, November, 1997, pp. 484-497.

librarians need to develop in order to provide their patrons with the ability to use geographic information in this form. Some describe the investments in computer technology that the development and use of GIS resources requires. Others analyze the technology's potential for helping librarians and their administrators to perceive and address their service areas. Humanities scholars have devoted much less energy and ink to the discussion of GIS technology, in part because their training and job descriptions orient them toward, and oblige them to take part in, discussions of history, literature, and culture themselves. In short, librarians have devoted their discourse to discussing techniques and procedures for providing access to information, including the primary sources that fuel the humanities. While a few humanities scholars have adopted GIS in their work, most of their projects continue to discuss and consider traditional humanities themes and questions.<sup>6</sup>

In 1997 Leta Hunt, a librarian, and Philip J. Ethington, a historian and librarian, noted "the utility of spatial and temporal organization in digital library construction." They noted that digital library developers have largely directed their efforts toward building "specific genre databases," rather than "multi-disciplinary, multi-format" resources, and argued that "What is needed is a way to browse and access multi-formatted, multi-disciplinary digital information in an integrated way." Ultimately they argued that "digital library development should focus on the integration necessary for including information in multiple formats, relevant to many disciplines, and targeting a wide range of audiences for purposes of teaching, research, and public access...." They went on to discuss "the utility of space/time referencing" in this capacity, and specifically Geographic Information Systems' utility in augmenting conventional item description by using materials' place and time of creation and, perhaps, the time and place they describe, to identify them and make them more accessible for use. "Ideally what is needed," they concluded, is a spatio-temporal infrastructure that would allow users to go back in time as well as to 'zoom' in and out of space. The challenge is to blend geographical information systems (GIS) technology, standard search and retrieval algorithms, and artistry to create an environment in which users can see the progress of time within the framework of the earth's surface in a compressed fashion, each layer bringing to life its physical and cultural space/time and enabling users to think differently about the questions they want to ask."<sup>7</sup>

The passage of time and new technological developments have enabled Mark Twain's Mississippi Project staff members at Northern Illinois University to attempt to implement Hunt and Ethington's vision of a geographically oriented, multi-media and interdisciplinary database accessible, both technically and intellectually, to a large public. The Mississippi Project will integrate Geographic Information Systems technology into a large, multimedia digital library exploring the Mississippi Valley of the mid-nineteenth century, a region that Mark Twain's celebrated works have made an integral part of American historical memory and mythology. The project represents a partnership between Northern Illinois University Libraries' (DeKalb, Illinois, USA), Tulane University Libraries (New Orleans, Louisiana, USA), the St. Louis Mercantile Library (St. Louis, Missouri, USA), and the Newberry Library (Chicago, Illinois, USA). The Institute for Museum and Library Services, a part of the United States' federal government, has supported this project with grant

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<sup>6</sup> Recent librarians' publications on the subject of GIS emphasize public service, professional development, and administrative issues. See Sweetkind-Singer, Julie and Meredith Williams "Supporting the Information Needs of Geographic Information Systems (GIS) Users in an Academic Library" *Science and Technology Libraries* 2001, v 21. no. 3/4; Spiegel, Shaun and Janae Kinkin "Promoting Geographic Information System Usage Across Campus" *Computers in Libraries*, May, 2004, v. 24, no. 5; Martindale, Jaime "Geographic Information Systems Librarianship: Suggestions for Entry-Level Academic Professionals" *Journal of Academic Librarianship*, January 2004, v. 30, no. 1; Dorman, David "GIS Provides a New Way of Seeing Service Areas" *American Libraries*, February, 2002, v. 33, no. 2. Humanities scholars have published considerably fewer articles discussing GIS technology. See Hillier, Amy E. "Redlining and the Home Owners' Loan Corporation" *Journal of Urban History*, v. 29, no. 4, pp. 394-420; Black, Fiona, Bertrum H. MacDonald, and Malcolm W. Black "Geographic Information Systems: A New Research Method for Book History" *Book History* 1998 1: 11-31. Archaeologists seem to have made the most use of GIS technology. See D'Andrea, Andrea, Rosalia Gallotti, and Marcello Piperno "Taphonomic Interpretation of the Developed Oldowan Site of Garba IV (Melka Kunture, Ethiopia) through a GIS Application" *Antiquity*, v. 76, December 2002, pp. 991-1001, for example.

<sup>7</sup> Leta Hunt and Philip J. Ethington "The Utility of Spatial and Temporal Organization in Digital Library Construction" *Journal of Academic Librarianship*, November, 1997, pp. 475-483.

funds, as have several private foundations. The Mark Twain's Mississippi Project will use its World Wide Web site (<http://dig.lib.niu.edu/twain>), currently under development, to present its users with two opportunities to place Mark Twain's celebrated recollections and imaginings of the United States' Mississippi Valley in the nineteenth century in historical context.

First, the project World Wide Web site will present Mark Twain's Mississippi novels (*The Adventures Tom Sawyer*, *The Adventures of Huckleberry Finn*, and *Life on the Mississippi*) online in a fully searchable digital format, along with other contemporary authors' descriptions, accounts, and definitions of that region. Project staff members have gathered and digitized over 100 primary source texts, including travel accounts, immigrants' guides, gazetteers, and reminiscences, from participating libraries, and are at work presenting them on the project web site. They have also gathered nearly one thousand images from these texts, as well as participating institutions' collections of visual materials, and are mounting these materials in a parallel database. Finally, project staff have identified and gathered mid-nineteenth century sheet music totaling some twenty songs describing and mythologizing the Mississippi River, its valley, and its culture. Project musicians have recorded versions of these songs, which will be featured in database of sound recordings. Integrating multiple media types and materials from several institutions in a single online resource will help to facilitate scholars' research and encourage interdisciplinary study. Instead of individual trips to northern Illinois, St. Louis, and New Orleans, researchers may simply visit the project World Wide Web site. This resource's ready availability on the World Wide Web will also make these materials accessible to a broader public audience including educators, students, and lifetime learners.<sup>8</sup>

Project users may explore these many accounts and depictions of society, culture, and politics in the Mississippi Valley of the mid-nineteenth century in several ways. Some may employ the project World Wide Web site's PhiloLogic software suite (provided by University of Chicago Libraries' Electronic Text Services division and that institution's American Research Treasury of the French Language (ARTFL) project) to search the texts (as well as musical scores' lyric, or text, components) for words or strings of characters, or by author, title, or date. Users may also employ databases constructed with MySQL and PHP scripting to search project image and sound resources. Project staff members have also used metadata to expand the Mark Twain's Mississippi Project's ability to present these materials to users in new ways shedding light upon the Mississippi Valley in the nineteenth century. They have devised a customized version of the Dublin Core header system to identify descriptions and accounts of specific cities, towns, and other locations in this region included within project texts. They will attach Dublin Core headers identifying the location(s) described in each text, its date of creation and, if necessary, the time period that it describes (in cases featuring texts published well after their composition). Staff members have extracted these passages from their original texts and fashioned them into a database of place descriptions and depictions in the nineteenth century Mississippi Valley. They have also identified and organized the project's image and sound materials in a similar manner. Users employing the project's text, image, and sound database search capacities may explore these selected passages, images, and sound resources by through the use an interface in which they may select location, as well as author, title, and date, to identify materials of interest. As the project will only index materials pertaining to a limited number of locations discussed in a significant number of project materials, web site visitors may wish to make use of a drop-down menu listing featured locations. Each heading in this list will provide project users with an opportunity to link directly to the featured text in its entirety. They may also employ the project's interactive map of the Mississippi Valley.

This interactive map resource will allow Mark Twain's Mississippi Project users to focus their attention upon featured towns, cities, and locations with a mouse-click. For example, a user might find Twain's description of St. Louis in 1882 interesting, and call up other accounts and depictions of that city by finding and selecting it on the interactive map. This selection will present the user with a list of authors' descriptions of the chosen location, and enable them to read and compare these accounts, thereby considering different authors' characterizations of individual locations. This

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<sup>8</sup> Mark Twain *The Adventures of Tom Sawyer* Hartford: American Publishing Co., 1876; *Life on the Mississippi* Boston: James R. Osgood, 1883; *The Adventures of Huckleberry Finn* New York: Charles L. Webster, 1885.

resource will also enable project users to consider how these locations changed over time. Featured accounts of towns, cities, or other locations, as well as relevant images, will appear in this list in chronological order of creation and publication. This request will also produce a list of all project images, drawn from illustrated texts and archival materials, representing this location, once again presented in chronological order. Ultimately, the project World Wide Web site will present an integrated set of materials in a spatial context facilitating users' imagination of nineteenth-century authors' descriptions and accounts of specific locations. They will also facilitate easy access to a broad range of material types. This combination of a customized Dublin-Core mark-up scheme and database scripts will bring the sensibility informing Geographic Information Systems technology, specifically the ability to generate representations of specific geographic locations, to a digital library in a dynamic fashion facilitating comparison and depicting change over time.

Second, project staff members will gather a wide range of geographic and statistical information pertaining to the Mississippi Valley states, including the extent of the region's road, railway, and water transportation network, as well as census data, agricultural and demographic materials, and voting returns as they changed in the period 1830-1890. Historical statistics are available for free use or sale from a variety of university research projects. For decades, with few exceptions, only geographers and other social scientists have made use of them. Their large size, and the labor-intensive, sophisticated techniques required to handle and analyze them made these resources largely inaccessible to other users. Members of the general public, including educators, students, and lifetime learners, usually benefited from these valuable materials only through individual maps and/or tables published in newspapers, magazines, and textbooks. As static, one-dimensional texts and images, these resources enabled authors to use spatially oriented data to demonstrate a single point or concept, but defied attempts to explore these materials in depth. Today, Geographic Information Systems technology can enable a far broader audience, including educators, students, and members of the general public, to learn from these valuable materials.<sup>9</sup>

Presented in a web-based database utilizing Java script and server-side scripting in addition to proprietary code, ESRI, Inc.'s Arc IMS software suite will enable project users to explore these resources through an interface facilitating the dynamic generation of Mississippi Valley maps featuring layers of data from specific points in time. Using a viewer toolbar and a freely available browser plug-in, project users may choose to examine data, such as electoral returns, religious affiliation, or African-American population, in JPEG map representations of the Mississippi Valley and its constituent states, in the specific years in which these data were collected. Most importantly, users may ask the GIS technology employed in the project web site to display several of these layers of materials simultaneously, thereby allowing them to ascertain potential correlations, or lack of same, between the phenomena that these data represent. For example, a project user requesting a map of the Mississippi Valley's railroad network in 1840 or 1860 might also request a map showing population density in this region for census taken in each of these years. GIS technology's ability to display this spatial data in visual representations of a spatial context helps users to identify patterns in large sets of such data that long required lengthy and painstaking collation and analysis. In this case the GIS user might examine relationships between railroad development and population density, suggesting transportation networks' relationship to economic development.

GIS technology will provide project users with a powerful tool for comparison and evaluation. Together, these materials can help project users to examine and explore the social context in which Mark Twain and his contemporaries examined and explored the Mississippi Valley as well.

The web-ready images produced by ArcIMS software represent a large leap forward in bringing databases full of information to the public in map formats, but they cannot directly address historians and their students' interest in studying change over time. Thus the Mark Twain's Mississippi Project has adapted Geographic Information Systems technology to enable its users to

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<sup>9</sup> Historical United States County (HUSCO) boundary files are available from Louisiana State University's Department of Geoscience. The Newberry Library's United States County Boundary Project is working toward presenting a revised representation of these boundaries as well. Geographical data, including railroads, highways, cities and towns, as well as historical statistics, are available from the University of Virginia's Geospatial and Statistical Data Center at <<http://fisher.lib.virginia.edu/collections/stats/>>

depict and examine how these data change with the passage of time as well. Previous projects employing ArcIMS technology, including Northern Illinois University's Abraham Lincoln Historical Digitization Project (<http://lincoln.lib.niu.edu>) have depicted changing demographic and political patterns in series of static map images best compared side by side when rendered by a printer. In order to represent change over time, project staff members will employ Flash technology to present these JPEG images in an animated series. This technology can enable educators, students, and lifetime learners to examine patterns of social and political change and investigate underlying factors contributing to these developments.

Ultimately, the Mark Twain's Mississippi Project World Wide Web site's use of GIS maps enables its users to compare Twain's descriptions of the Mississippi Valley in the mid-nineteenth century (as well as those of other authors) with tangible data and statistical materials representing these developments in space and over time. These materials can illuminate more than statistical trends. They can illustrate major themes that emerge in the works of Mark Twain and other authors included in the project database. For example, a reader studying Mark Twain's *Life on the Mississippi* may notice the author's detailed discussion of economic and social changes in the Mississippi Valley of the nineteenth century. As a young man in Missouri, Samuel Clemens noticed the steamboats plying the river and idolized their pilots. When he became a river pilot himself, it marked his life's greatest accomplishment. But the Civil War soon intervened, and decimated the steamboat traffic on the Mississippi, much of which facilitated trading between northern and southern cities. When, after a considerable sojourn in the West, Clemens emerged as a celebrated author writing under the pen name of "Mark Twain," he noticed that railroads had largely supplanted steamboats as Americans' principal form of transportation. In *Life on the Mississippi* Twain provides elegiac anecdotes and accounts of the fall of an economic and social order built around steamboats and the vivid river culture that grew up around them. Twain himself populated this milieu, and his stories provide one man's account of a massive social and economic transition in American history. Reference to geographical and demographic data including railroad networks, steamboat routes, population density, wealth accrued, and electoral returns can enable project users to place Twain's (and other authors') descriptions of historical change side by side with important aspects of the historical record as it exists today. Many users will find that these data underscore and amplify authors' textual accounts of this place and time; some will find reason to re-evaluate and challenge aspects of these analyses.

The Mark Twain's Mississippi Project World Wide Web site's spatial, or geographic, orientation will allow it to realize many of the goals that Hunt and Ethington articulated at the dawn of online GIS technology in 1997. It will integrate information in multiple formats, specifically a digital library of humanities texts, images, and sound files drawn from several institutions, as well as a GIS database of spatially oriented data, in an integrated, complementary setting. While a number of digital library projects have integrated text, image, and sound materials in one online resource, very few have added Geographic Information Systems resources to this mix. Project staff believe that at the time of this paper's publication, no online digital library projects had enabled their users to compare spatial data representations and more traditional humanities accounts of specific locations or regions.

This project will also employ spatial and temporal location as metadata for materials not usually identified in spatial terms, such as texts, images, and sound materials. As Hunt and Ethington suggest, these properties, which all informational objects share, have been largely underused in the identification of these objects. The Mark Twain's Mississippi Project's thematic and geographic foci make it an excellent test for this technique. In an effort to identify and mark up project texts' descriptions of towns, cities, and other locations in the nineteenth-century Mississippi Valley, project staff members have identified specific passages within texts in this manner. Conventional metadata schemes often fail to identify specific passages within larger texts in this genre. For example, library catalogers or markup teams have identified works containing detailed descriptions of cities such as St. Louis, Missouri; Cairo, Illinois; Memphis, Tennessee; and New Orleans, Louisiana as pertaining to the Mississippi Valley, but not any of these particular locations. Hence

researchers and other potential readers seeking additional information about these places are left to wonder if these authors' works can in fact provide helpful material. In these cases only individuals examining the actual book or resource itself can accurately gauge its contents. In the case of rare books and manuscripts, users who can only find access to such a catalog record or online citation are often faced with the prospect an expensive research trip to a distant collection.<sup>10</sup>

Powerful database technology facilitating text search enables digital library users to avoid this inconvenience by conducting individual searches for each location, but the identification and assessment of a significant number of search "hits" on a single word or character string, as in the case of "St. Louis" or another Mississippi Valley location, may still prove time-consuming. By placing geographic location among its most significant metadata components, the Mark Twain's Mississippi Project has provided users with a significant new opportunity to explore humanities and spatially oriented materials at once. Likewise, the project's identification and markup of humanities materials' temporal components facilitates the project's goals, especially the comparison of humanities materials with spatial data identified by their time of creation. Together, these metadata elements facilitate project users' detailed examination of change over time in specific locations.

The Mark Twain's Mississippi Project's seemingly narrow scope has helped project staff members to assemble a list of featured materials small enough to allow detailed markup practices and the use of Geographic Information Systems materials, yet rich enough to provide an attractive resource. Most importantly, this approach will enable project users to explore and analyze Twain's celebrated Mississippi works in the detailed context in which he remembered and imagined them. It will also prove very useful for students of this context itself, specifically American history and culture in the nineteenth-century Mississippi Valley. This may sound like a very narrow potential audience base. But project developers believe that this approach will in fact produce the opposite result. By providing rich, well-defined contexts in which to understand its detailed historical materials, the Mark Twain's Mississippi Project World Wide Web site will attract a larger, more public, audience than traditional digital library projects.

Most digital library projects feature a wide array of materials shedding light upon a vast number of subjects in a broad historical time period. This orientation makes these online resources extremely valuable to trained scholars or lifetime learners particularly well-versed in a particular subject or period and able to identify materials of interest to their research. But it does not facilitate their use by a more general audience. Many non-specialist users of digital libraries find themselves lost when they confront lists of materials and an array of search options. "What should I search for?" they ask. If these projects were to frame their featured materials with several layers of historical context, larger numbers of users, including those lacking detailed knowledge of this context, would more readily conceive of search strategies and queries pertaining to their own interests, and make use of these materials.

Texts prepared by Mark Twain's literary contemporaries represent one layer of such context. Many discuss the same phenomena that Twain describes in his work. As importantly, many also notice and discuss phenomena that Twain overlooked or set aside. These accounts provide readers with a richer, more detailed aggregate picture of society and culture in the Mississippi Valley than Twain's works alone. The historical record as represented by GIS resources, including the transportation networks that Twain discussed so often, makes up another layer of context helpful in exploring and analyzing this milieu. These materials also include demographic, economic, and political statistics shedding light upon the larger themes that Twain confronted in his works, including the rise of a new, industrial America built around the railroad instead of the steamboat. Equipped with these resources, project users may dig deep into the milieu that Mark Twain shared with fellow denizens of the Valley, and made a staple of historical memory for millions of additional readers in America and abroad.

Finally, Mark Twain's familiar Mississippi works themselves represent a layer of context framing this project's primary source materials as well. While the project's assembled texts, images, sound

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<sup>10</sup> See, for example Emerson Gould *Fifty Years on the Mississippi; or, Gould's History of River Navigation* St. Louis: 1889; Uriah Pierson James *James' River Guide* Cincinnati: 1858; John M. Peck *Explorations of the Mississippi Valley* St. Louis: 1853.

files, and spatial data comprise a rich record of the context surrounding Twain's works, his well-known texts themselves help in turn to introduce a general audience to the lesser-known materials found in the project databases. Many educated Americans, and a significant percentage of international World Wide Web users, profess familiarity with Mark Twain and his work. Together, *The Adventures of Tom Sawyer* (1876), *Life on the Mississippi* (1883), and *The Adventures of Huckleberry Finn* (1885) have provided generations of readers with a mental map of the Mississippi Valley. Mark Twain first remembered and imagined this landscape in his essay "Old Times on the Mississippi" in 1875. He then revisited it through the youthful exploits of Tom Sawyer, Huckleberry Finn, and their young accomplices. With *Life on the Mississippi*, which built upon his "Old Times..." essay, Twain reintegrated the Mississippi Valley of memory and imagination with the pervasive dynamics that transformed it in his adulthood. Finally, in Huck and Jim's raft voyage down the river Twain elaborated his vision of this milieu and addressed one of his era's central social and political problems: the pervasive taint of slavery and racism in America. For over one hundred years readers in the United States and around the world have relied upon their own imaginations, and perhaps a road map, to envision Mark Twain's Mississippi. The Mark Twain's Mississippi Project does not seek to replace individuals' imagination with technology. Rather, it will employ digital library and Geographic Information Systems technology to enable readers to compare and contrast Twain's memory and imagination with important elements of the historical record as it now exists.<sup>11</sup>

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<sup>11</sup> For a discussion of historical memory and imagination in forging regional identities, see Edward L. Ayers, et. al., *All Over the Map: Rethinking American Regions* Baltimore: The Johns Hopkins University Press, 1996.