

The Perseus Digital Library

A Case Study

Emily Preece and Christine Zepeda

12/3/2009

I. HISTORY AND EVOLUTION

Timeline of important events:

1985-1988: Planning Period

1987: Development of Ancient Greek Collection begins

1992: Perseus 1.0 released as CD-ROM (HyperCard-Perseus)

1995: Development of Perseus web site (Perl-Perseus)

1996: Perseus 2.0 released as CD-ROM for Mac only

1999: Perseus begins expanding collection focus from ancient civilization due to the Digital Library Initiative, Phase 2

2000: Perseus 2.0 platform independent CD-ROM released

2000 (again): Perseus 3.0, web site expanded & revised, new collections added

2005: Perseus 4.0 released online (Java-Perseus)

2006: Release of Perseus TEI XML collections in Greek, Latin, and English under a Creative Commons license

2007: Source code for Perseus 4.0 released

The Perseus Digital Library is a hypertext resource that allows its users to interact directly with primary and secondary resources in the humanities. Perseus has been in existence in various forms for over two decades; it truly is, as it claims on its webpage: an evolving digital library. Over the two-plus decades that Perseus has existed, it has changed from a single CD-ROM to a sprawling website on the Internet, growing and adding new tools as it developed.

The Perseus Project began at Harvard University in the 1980s. It was the brainchild of Gregory Crane, who remains the Editor and Chief of the project. Crane apparently got the idea for Perseus when he was a classics graduate student at Harvard, as his work in classics had “gotten him accustomed to making connections between documents, in the traditional sense of tracking down footnotes and running around the library.”¹ Crane, who has an interest in information retrieval, realized that it would be possible to put the texts and images traditionally in physical libraries into a digital library.

Led by Crane and a team of classicists, Perseus began with a three-year planning period from 1985-1988, and was funded in the beginning by small grants which allowed for planning and the purchase of equipment. Collection development began in earnest during 1987. In 1989 the project was given a 4-year grant (1989-1993). In 1991, the first version of Perseus came in the form of a CD-ROM published by

¹ Wilson, Sara. “Navigating Ancient Worlds.” *Humanities* 21, no. 5 (Sept.-Oct. 2000): 18-20.

Yale University Press for Macintosh computers, using the Apple HyperCard, which was a hypermedia system application designed by Apple.

According to Gregory Crane the primary goal of Perseus was to “bring a wide range of [Greek] source materials to as large an audience as possible.”² To accomplish this goal, the Perseus team set out to get as many Greek texts and English translations digitized as they possibly could. The team also compiled or created maps, images, and videos related to Greek locations and artifacts. To better use all of the materials Perseus put together, tools had to be created to search and manipulate the information.

In the beginning, Perseus was not a digital library; rather, Perseus version 1.0 was a CD-ROM that contained typical primary readings and resources for classics courses, mostly Greek texts and English translations, as well as commentary, lexicons, encyclopedias, atlases, and illustrations. This early version was criticized as being an “odd mix of elementary and specialized, and so full of gaps”³ that it was difficult for a user to fully be able to use the program. Perseus 1.0 was also criticized as merely using a new technology to improve the old way of doing things, instead of being truly innovative and creating new ways to do things.

In 1993, Perseus moved to Tufts University where the digital library has lived ever since.

The Perseus Digital Library first got on the Web in 1995, and has been steadily growing and evolving; the code for the web version of Perseus was written mostly in Perl. Perseus 2.0, which was another Macintosh-based CD-ROM, was released in 1996.

Around 1998-1999, Perseus decided to expand its horizons and explore other areas in the humanities outside of the Greco-Roman world. The Digital Library Initiative Phase 2, funded primarily by the National Endowment for the Humanities (NEH) and the National Science Foundation (NSF), gave additional funding in the form of a large grant to the Perseus project to expand the project and examine

² Marchionini, Gary. “Evaluating Digital Libraries: A Longitudinal and Multifaceted View.” *Library Trends* 49, no. 2 (Fall 2000): 306.

³ Eiteljorg, Harrison, Richard Hamilton, James O’Donnell, Lee T. Percy, and Sian Wiltshire. “Perseus Review.” *Bryn Mawr Classical Review* 3.5.4 (1992).

the “problems of creating a digital library for the humanities as a whole.”⁴ The money from this grant allowed Perseus to create collections about subjects such as the history of London and the American Civil War. The Digital Library Initiative grant given to Perseus to study the complexities and issues inherent in developing a digital library lasted from 1999 through 2006.⁵

A platform independent version of the Perseus 2.0 CD-ROM came out in 2000, while at the same time Perseus 3.0 was released on the web, with new and expanded collections.

The latest version of the digital library, Perseus 4.0, was released on the Internet in 2005; the move to Perseus 4.0 was gradual, with the older version of Perseus being slowly phased out over a period of about a year.⁶ Compared to previous versions, Perseus 4.0 is Java-based with a cleaner, more modern design and feel. The source code for the Perseus Hopper (which is another name for Perseus 4.0) was released two years ago.

Perseus is still growing and changing and the digital library is continuously being updated and expanded upon; additions have been made to the collections as recently as October 2009. Perseus already had a heavy focus on Greek and Latin languages; the digital library has now added Arabic to its focus as well. The Perseus team published a Latin Treebank in 2008 that includes over 50,000 words. Currently, the Perseus digital library is focused on projects in several areas: enabling undergraduate research; creating a large Greek Treebank; optimizing OCR and algorithms to create an automatically tagged, searchable collection of Greek and Latin; and on the “automated production of new knowledge” through text and data mining.⁷

Perseus has managed to exist for over twenty years by being flexible and experimental; the digital library’s ability to adapt and evolve is one of its greatest strengths that will help Perseus continue to be sustainable and useful in the years that come.

⁴ <http://www.perseus.tufts.edu/hopper/research/background>

⁵ <http://www.perseus.tufts.edu/hopper/about/who/gregoryCrane>

⁶ <http://old.perseus.tufts.edu/PR/perseus4.0.ann.full.html>

⁷ <http://www.perseus.tufts.edu/hopper/research/current>

Funding

Funding for the Perseus Digital Library has been provided over the years by a long list of agencies. According to the home page of the Perseus website, the list of financial supporters includes: the Alpheios Project, the Andrew W. Mellon Foundation, the U.S. Department of Education, the Institute of Museum and Library Services, the National Endowment for the Humanities, private donors, and Tufts University.

Additional support for the Perseus project has been provided over the years by the Annenberg/CPB Project, Apple Computer, the Berger Family Technology Transfer Endowment, Digital Libraries Initiative Phase 2, the Fund for the Improvement of Postsecondary Education part of the U.S. Department of Education, the Getty Grant program, the Modern Language Association, the National Endowment for the Arts, the National Science Foundation, the Packard Humanities Institute, Xerox Corporation, Boston University, and Harvard University.

II. LITERATURE REVIEW

Many articles have been written about the Perseus Digital Library. A great many of these articles were written by Gregory Crane, the editor-in-chief of the project, or by one of the other project members, a group of project members, or a project member or members in conjunction with Crane. Though inside insight into the developments of the Perseus project is not without use, it does not provide an adequate picture of the ways in which the community at large has evaluated the project, and also may tend toward a positive bias. Thus, this literature review will have two dimensions. One dimension will provide a general overview of the trends in the Perseus literature, including publications written by Gregory Crane and members of the Perseus team. The second dimension will concentrate on a select group of articles for closer analysis and an evaluation of the opinions of the larger community about the Perseus project. No articles by Gregory Crane, or members of the Perseus project team, will be included among the articles for close evaluation (although in one case an article by Crane was read because it was written in response to a review by project outsiders). Articles written by scholars from outside of the project in conjunction

with Crane were considered acceptably objective and were included among the selections for closer review, unless Crane was the lead author.

Numerous articles were surveyed in the process of exploring the literature on the Perseus Digital Library, and thirteen were selected for closer reading as representative examples of the kinds of articles being written about Perseus by people outside of the project. An attempt has been made to gain the broadest possible temporal outlook, and to this end effort was made to choose articles from throughout the years of the project's development. There is at least one article from every phase in the development of the Perseus Digital Library, as seen in the annotated list of references at the end of this review. Effort was also expended in searching for articles published in the journals and books of different disciplines, including information science, classics, humanities computing, librarianship, and education. Wherever possible articles from different disciplines were included in the selection in order to present the most comprehensive view of the community's interpretation of the Perseus project.

In the second dimension of the literature review, articles, book chapters, and other references to the Perseus project were divided into categories based on format and function. The first category, case study, encompasses articles that base a case study on Perseus. The second division includes works that review or evaluate the Perseus project. These articles are usually short and do not provide much detail, but supply the reader with a brief overview and an implicit or overt value judgment about the resource. The third section comprises those articles and books that mention Perseus in passing to illustrate a particular concept about classical studies or digital libraries. Such works have been deemed citations. Each of these categories will be discussed in more detail below.

First Dimension: Overview of Trends

An overall picture of the body of literature on Perseus will be outlined before continuing to the compartmentalized analysis of literature types. During the early phases in the development of the Perseus

project, the literature, much of which was written by Crane himself, focused on introducing the contents, functionalities, and capabilities of Perseus. A good deal of the articles produced during this period dealt with Perseus as a hypermedia system. There were also several reviews of the new software published, and a lively debate even sprung up between Crane and the authors of a review of Perseus 1.1 in the *Bryn Mawr Classical Review*. The reviews, though noting some shortcomings of the Perseus system, were generally positive.

It was also during this time that the first case studies of Perseus began to emerge, especially those dealing with the first round of evaluations of the Perseus system that were built into the original project plan (see the Crane and Marchionini article in the reference list below). As the development of the project progressed, more substantive publications began to emerge, like the case study by Shu Ching Yang and the longitudinal study by Marcionini noted below, though basic evaluations of the Perseus website, like that written by Jessica Ludwig (see reference list), also appeared. Much of the literature from this period, again, a great deal of it written by Crane and other project members, focused on Perseus as a case study for the creation of digital libraries for the humanities (see for example, Gregory Crane's "Building a digital library: the Perseus project as a case study in the humanities"⁸ and "Towards a cultural heritage digital library" by Gregory Crane and Clifford Wulfman⁹). Papers by Perseus project members continued to appear introducing and explicating new developments, such as the article by David A. Smith, Anne Mahoney, and Gregory Crane entitled "Integrating harvesting into digital library content."¹⁰

In more recent years, publications have focused on specific aspects of the Perseus project (now known as the Perseus Digital Library), such as text encoding, the use of geospatial data, 3D images, text and citation analysis, OCR, and the Greek and Latin dependency treebank. One example is the article

⁸ In *Proceedings of the First ACM Conference on Digital Libraries* (New York: Association for Computing Machinery, 1996), 3-10.

⁹ In *Proceedings of the 3rd ACM/IEEE-CS joint conference on Digital libraries* (Washington, D.C.: IEEE Computer Society, 2003), 75-86.

¹⁰ In *Proceedings of the 2nd ACM/IEEE-CS joint conference on Digital libraries* (New York: Association for Computing Machinery, 2002), 183-184.

“When printed hypertexts go digital: information extraction from the parsing of indices.”¹¹ Another example is “Improving OCR for Classical Critical Editions” by Federico Boschetti, Matteo Romanello, Alison Babeu, David Bamman, Gregory Crane.¹² Once again, the project members whose jobs at Perseus involve working on these particular problems write most of these publications. Perhaps as the corpus of the Perseus Digital Library grows and new tools and functionalities are incorporated, new case studies will emerge that evaluate these developments.

Second Dimension: Close Analysis

Case Study

Case studies, the most substantive type of article written about Perseus, began to appear early in the history of the project, as noted above. Gary Marchionini and Gregory Crane, as part of Perseus’s built-in evaluation program, produced the first case study of the project. The authors emphasized that the novelty of a resource like Perseus and the technology on which it was predicated would require users to adapt to a new way of learning, in the case of students, and of teaching, in the case of educators. The authors seem to suggest that as part of larger development in the use of hypermedia, integration of Perseus and other resources using hypermedia into the educational apparatus would be forthcoming and would eventually lead to these changes. As we now know, the focus of the Perseus project would move away from the idea of Perseus as a teaching tool and toward that of Perseus as a research tool, so the necessity of a change in learning and teaching was inevitably somewhat negated.

Marchionini’s 2000 case study employed a case study of Perseus not only as an end in itself but also to illustrate the need for longitudinal and multifaceted approaches to the appraisal of digital libraries.

¹¹ Romanello, Matteo, Monica Berti, Alison Babeu, and Gregory Crane. In *Proceedings of the 20th ACM Conferences on Hypertext and Hypermedia* (New York: Association of Computing Machinery, 2009), 357-358.

¹² In *Proceedings of the 13th European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2009)* (Berlin: Springer-Verlag, 2009), 156-167.

The article concluded with a set of recommendations for digital libraries in general based on the experience at Perseus that included three main points: 1. Evaluation efforts must explicate goals on a continuum from evaluation research to product/system testing; 2. Digital libraries are emergent complex systems, and evaluation of such systems should be flexible enough to adapt to changes; and 3. It is important to combine statistical data and narratives in the assessment of impact and performance and usage. By using the Perseus Digital Library as a case study, Marchionini was able to extrapolate basic principles to guide the evaluation and development of other digital libraries. This study is similar in to those done by Crane (mentioned above) that use Perseus as a case study for the development of digital libraries in the humanities. The evolution of this particular type of case study suggests that Perseus had come to be seen as an exemplar in the field of digital libraries, as a resource that had reached a level of quality that enabled it to act as an archetype for other similar systems.

Shu Ching Yang's interpretive and situated approach to a case study of Perseus produced some suggestions for improvement. The main weakness in the Perseus system that Yang identified was the use of implicit links. Crane and Marchionini describe and explain the reasons for the choice of implicit links in "Evaluating Hypermedia and Learning: Methods and Results from the Perseus Project." As it was put later by Clifford Wulfman, a Perseus team member, the developers of Perseus chose to rely on implicit links in order to allow the user to "do the work of the humanities: acquiring new information, synthesizing that information into new knowledge, and arriving at new understandings."¹³ Crane believed that the best way to accomplish this was to allow the user to work freely with the primary source material, and therefore chose not to employ explicit links. However, as Yang noted, this choice caused novice users to become lost in the material, and therefore he suggested that a more structured approach, a scaffolding he called it, be provided to make new users more comfortable using the system.

¹³ "The Perseus Garner: early modern resources in the digital age," *College Literature* 36, no. 1 (Winter 2009), 18-26.

Yang's article was published in 2001, and more recent case studies by non-project-members were not encountered among the literature. Since the developers of Perseus are constantly introducing new materials and new functionalities to the resource, perhaps we will see new case studies being done in the future.

Review

For the most part, the review articles chosen for inclusion in close analysis share the common characteristic of being high-level descriptions of the Perseus project that offer limited evaluative judgments. These descriptions are very general, and simply function to introduce the contents and capabilities of Perseus to the reader. These high-level reviews praise Perseus, and often do so in rather colorful language. For example, in her article "Navigating Ancient Worlds," Sara Wilson said that Perseus "provides its users with the winged sandals of technology to aid them in their pursuit of knowledge." Most of the reviews that we encountered in surveying the literature were of this type.

However, there we did encounter several more substantive reviews that looked at Perseus with a critical eye. Two that have been included in the selection are the review of Perseus 1.1 published in the *Bryn Mawr Classical Review*, and William Bateman's "Reflections on the Interface Design of the Perseus Project." The five authors of the Perseus review in the *Bryn Mawr Classical Review* all recognized the merits of the Perseus project, but also presented criticisms of the project. For example, Lee Percy, who seemed to have the most criticisms of the project, asserted that "Perseus exemplifies what might be called the horseless carriage phenomenon; that is, the tendency to use a new technology only to improve an old way of doing things." Indeed, the comments in the review were provocative enough that Gregory Crane published a response in that same issue of the *Bryn Mawr Classical Review* in order to "provide some additional background on what was done and thus advance criticism and analysis of the database as it

stands.”¹⁴ Crane defended Perseus 1.0, but took the critiques of the reviewers in the constructive spirit in which they were intended.

The Bateman article, written four years after the *Bryn Mawr Classical Review* piece, also presented some constructive criticisms, this time of the Perseus interface. The authors main point was that in order to solve some of the problems faced by Perseus 1.0 and to make the Perseus model one that works for other academic disciplines, the interface needs to be redesigned to facilitate use. Bateman provided ten suggestions for improved interface design, including using a consistent navigation interface for the various kinds of storage, using local and/or global browsers so that the user has a sense of location, and using color throughout the interface. A sample user interface designed by Bateman was also included. As the author stated in the conclusion, “rather than expecting learners to adapt to the eccentricities of Perseus design” as some of the writings of Crane seem to suggest is necessary, “the design of Perseus should [be] adapted to the needs of learners.”

In recent years reviews of the Perseus project like those described above are less common. We did not encounter any later than 2000 (apart from what we have termed a review by Cathy Stanton cited below, which is in fact an article that lies somewhere between a review and a citation, as it treated Perseus as an example in a larger context but also devoted time to describing the resource). This seems logical considering that by this time most people in the field of classics and even beyond were aware of, if not very familiar with, Perseus and its capabilities, and Perseus had already been generally recognized as one of the premier (if not *the* premier) digital resource for the humanities.

¹⁴ “What Is Perseus? What Is It Not? Comments on the BMCR Review of Perseus,” *Bryn Mawr Classical Review* 3.5.24 (1992).

Citation

Countless articles present Perseus as an exemplar of one kind or another, and we consider these resources to be using Perseus as a citation. Two types of citations have been identified. The first type presents Perseus as an ideal resource for the study of classics, as in the article by Mark Dubis (annotated in the reference list below), or as prime example of a digital library, as in *A Companion to Digital Humanities* when Carole L. Palmer stated that “in the humanities, the *Perseus* project is considered an exemplar digital library.”¹⁵ The other type mentions Perseus as a model of a particular method of accomplishing a goal in the digital library environment. For example, Martyn Jessop’s article “The Inhibition of Geographical Information in Digital Humanities Scholarship” cites Perseus as an example of a system the uses geographical information qualitatively.¹⁶ Another example is the reference to Perseus made by Øyvind Eide and Christian-Emil Ore in a project abstract as a resource that uses automatic event detection to find named entities in digital texts.¹⁷

Consistently, citations of Perseus present the project in a positive light. None of the citations encountered during the review of the literature present Perseus as an example of what not to do, or as an example of flawed methodology or implementation. In this context, Perseus is always portrayed as archetypal, suggesting that those using Perseus as a citation view the Perseus project as a successful enterprise. The mere fact that Perseus is employed in the capacity of a citation suggests a level of trust and authority akin to that enjoyed by the authoritative sources cited for supporting evidence in scholarly papers. Thus, one may conclude from an analysis of this portion of the literature that Perseus is viewed as a model instantiation of a digital library for the humanities.

¹⁵ “*Thematic Research Collection*,” Chapter 24 in *A Companion to Digital Humanities*, 348-365, Blackwell Companions to Literature and Culture (Malden, MA: Blackwell Publications, 2004), 360.

¹⁶ *Literary and Linguistic Computing* 23, no. 1 (2008): 40.

¹⁷ In “From TEI to a CIDOC-CRM Conforming Model: Towards a Better Integration Between Text Collections and Other Sources of Cultural Historical Documentation,” <http://www.digitalhumanities.org/dh2007/abstracts/xhtml.xq?id=156>.

Conclusion

We have presented a two-dimensional review of the body of literature dealing with the Perseus Digital Library. As there did not seem to be much discourse between scholars about the Perseus project, nor was there a central issue that arose and sparked an ongoing debate, we felt that this was the best way to review the literature. Below find a list of references containing annotated entries for each of the thirteen articles selected for close reading.

References

Initial Development and Version 1.0, 1987-1994:

Crane, Gregory and Gary Marchionini. "Evaluating Hypermedia and Learning: Methods and Results from the Perseus Project." *ACM Transactions on Information Systems* 12, no. 1 (January 1994): 5-34. [Case Study]

This article presented the results of a three-year study of the use of Perseus in various college settings, including classroom instruction, individual assignments, and group work. The results of the study indicate that the use of Perseus provided for the discovery of greater amounts of information and greater numbers of resources, but did not guarantee that users would be able to, or have the motivation to, successfully integrate these resources into coherent and insightful analyses. The study also revealed that the differences between the Perseus system and traditional resources will require that both students and teachers must develop new strategies for learning and teaching. Additionally, new technologies like Perseus require that institutions develop systems of support for their use in order to maximize the benefits afforded by such technology.

Eiteljorg, Harrison, Richard Hamilton, James O'Donnell, Lee T. Percy, and Sian Wiltshire.

"Perseus Review." *Bryn Mawr Classical Review* 3.5.4 (1992). [Review]

This critique of Perseus 1.1 was put together by asking several different scholars to evaluate different aspects of the project. Sian Wiltshire, whose attention was given to the setup process, found the process simple to follow, but noted that the installation procedure ought to include setup of settings found on the Gateway. Lee T. Percy, whose section seems to address the whole system, felt that Perseus in its present form only used new technologies to “improve on an old way of doing things.” However, he did say that “even in its present form, Perseus 1.1 is full of promise.” The next section, written by Richard Hamilton, expressed that he was impressed with the Perseus system, but that he thought that scholars would be better served by a limited but complete database rather than the relatively limitless but inherently incomplete Perseus system. Hamilton reported many positive comments from students, and even “criticisms were set in the general context of praise.” Harrison Eiteljorg wrote that the most distressing aspect of the Perseus system was the lack of bibliographic assistance, as well as the incompleteness of the materials. Despite criticisms, Eiteljorg found Perseus “fascinating in many ways,” and noted that it was difficult to come to any general conclusions about the system after so little experience with it. James J. O’Donnell also gave mixed reviews, saying that the “gravest defect” of the project was its ambitious and far-seeing nature, but that the fact that there is no predetermined path through the material creates the potential for giving the student initiative to explore.

Neuman, Delia. “Evaluating Evolution: Naturalistic Inquiry and the Perseus Project.”

Computers and the Humanities 25 (1991): 239-246. [Case Study]

In this article, Neuman described the contributions of naturalistic inquiry to the first year of a four-year evaluation of the Perseus Project, the results of which are described in the 1994 article by Gregory Crane and Gary Marchionini cited above. Neuman identified the following characteristics of naturalistic inquiry that the evaluation team believed would aid in the study of the Perseus Project: 1. NI is conducted in natural settings rather than in contrived experimental settings; 2. NI focuses on discovering issues particular to a given research site rather than attempting to find generalizable, “context-free” principles; 3. NI recognizes that the most critical issues are the ones brought to light by study participants rather than those formulated in advance by the researchers; 4. NI believes that the researcher, rather than any given research tool, is the primary data-collection agent in a study; 5. NI relies on primarily qualitative data.

Version 2.0, 1995-1999:

Anderson, Kristina L. “The Perseus Project: An Evolving Digital Library on Ancient Greece.”

College & Research Libraries News 57, no. 8 (September 1996), 520. [Review]

In this short review, the author evaluated the Perseus Project web site, which came online in 1995. Anderson briefly described the content of tools available on the Perseus website, and noted some of the forthcoming features. She praised the interface's usability, and the provision of detailed instructions, cited sources, related sources, and authorship and copyright statements for each entry, database, or tool. In conclusion, Anderson called the Perseus website "a web treasure for students and scholars of ancient Greek civilization."

Bateman, William E. "Reflections on the Interface Design of the Perseus Project." *Proceedings of Selected Research and Development Presentations at the 1996 National Convention of the Association for Educational Communications and Technology*, 61-70. Ames, IA: Iowa State University, 1996. **[Review]**

In this critique by William E. Bateman of the Department of Mathematics and Computer Science at Kutztown University, the author examined the Perseus project with regard to its importance, contents, funding, development, delivery systems, future releases, costs, user acceptance and reaction, mechanical advantage, and project evaluation. The authors main point was that in order to solve some of the problems faced by Perseus 1.0 and to make the Perseus model one that works for other academic disciplines, the interface needs to be redesigned to facilitate use. Bateman provided ten suggestions for improved interface design, including using a consistent navigation interface for the various kinds of storage, using local and/or global browsers so that the user has a sense of location, and using color throughout the interface. A sample user interface designed by Bateman was also included. As the author stated in the conclusion, "rather than expecting learners to adapt to the eccentricities of Perseus design" as some of the writings of Crane seem to suggest is necessary, "the design of Perseus should [be] adapted to the needs of learners."

Collins, Boyd R. "Webwatch." *Library Journal* 121, no. 4 (March 1, 1996): 31-32. **[Review]**

This brief article in the *Library Journal* evaluated a number of web resources for classical studies, including the Perseus Project. The author briefly described the contents of the Perseus web site and the associated tools. The author called the Perseus site "a particularly admirable example of how certain subjects can be enhanced using the web" and stated that "Perseus is one of the few sites that truly begins to hint at the promise of the digital library." The fact that the Perseus site was intellectually accessible to students and scholars at all levels was also noted.

Version 3.0, 2000-2004:

Marchionini, Gary. "Evaluating Digital Libraries: A Longitudinal and Multifaceted View."

Library Trends 49, no. 2 (Fall 2000): 304-333. [Case Study]

Gary Marchionini has been part of the evaluation program of the Perseus Digital Library since the first cycle of evaluation began in 1989. In this article, Marchionini discussed the importance of longitudinal and multifaceted evaluation for digital libraries, and used the Perseus Digital Library as an example of the benefits of such an approach. The article first related the origins of the Perseus Digital Library, then went on to discuss the Perseus evaluation plan and its results. The article concluded with a set of recommendations for digital libraries in general based on the experience at Perseus that included three main points: 1. Evaluation efforts must explicate goals on a continuum from evaluation research to product/system testing; 2. Digital libraries are emergent complex systems, and evaluation of such systems should be flexible enough to adapt to changes; and 3. It is important to combine statistical data and narratives in the assessment of impact and performance and usage. By using the Perseus Digital Library as a case study, Marchionini was able to extrapolate basic principles to guide the evaluation and development of other digital libraries.

Wilson, Sara. "Navigating Ancient Worlds." *Humanities* 21, no. 5 (Sept.-Oct. 2000): 18-20. [Review]

According to Wilson, the Perseus Project "provides its users with the winged sandals of technology to aid them in their pursuit of knowledge." In this short article, Wilson provided a brief overview of the Perseus Project and its tools and capabilities, with emphasis on the fact that use of Perseus allows for the traditional scholarly process to be appreciably accelerated. She also related a bit about the origins of the project with its creator and editor-in-chief Gregory Crane, and the reasons why the field of classics has been a leader in the adoption and exploitation of technology in the humanities.

Yang, Shu Ching. "An Interpretive and Situated Approach to an Evaluation of Perseus Digital

Libraries." *Journal of the American Society for Information Science and Technology* 52, no. 14 (October 2001): 1210-1223. [Case Study]

In this article, Shu Ching Yang assessed the task-user system functionality of the Perseus CD-ROM by observing users conducting discourse synthesis via Perseus. This was accomplished by observing five undergraduate subjects who are taking an introductory course in classical Greek studies

complete an assignment using the Perseus CD-ROM. The results of the study suggested to the author some improvements that could be made in the Perseus system in terms of both the learner's and researcher's perspective. The main problem that the author identified with the Perseus system is that its system of implicit hyperlinks does not provide enough scaffolding for novice users, who end up getting lost and "missing the forest for the trees." The author also discovered that the path tool, which the subjects in this study used to complete their assignments, did not encourage the kind of idea building and cognitive exercise that the Perseus designers envisioned. Rather, users rarely went beyond using the path tool for the purposes of extraction, collection, and organization, failing to make the jump to "using these connections in their construction of meaning." The author also felt that Perseus should situate the user more firmly within a community, which would provide for engagement of the novice user with other users in collaborative efforts, and with professors and scholars as mentors. Additionally, the author felt that Perseus should provide simple and powerful authoring tools for creating and structuring complex documents which would go beyond the path tool in the synthesis of ideas. Overall, the author seemed to emphasize that Perseus should do more to help the novice user use Perseus for the purpose for which it was intended, namely for exploiting primary source material to make intellectual links between various sources and various media in the pursuit of addressing a larger problem of hypothesis.

LeLoup, Jean W. and Robert Ponterio. "A Starting Point for Classical Studies: The Perseus Project." *Language Learning & Technology* 4, no. 1 (May 2000): 2-5. **[Review]**

This article provides an overview and explanation of the resources offered on the Perseus website. Like the other reviews cited here, this one is relatively superficial with few value judgments presented. The authors do, however, conclude by saying that "the Perseus site is an excellent example of an evolving digital library" and that using Perseus was "a thoroughly enjoyable experience that we recommend to anyone with interest in the ancient world."

Ludwig, Jessica. "Site Offers a Rich Experience in Classics and Ancient History." *The Chronicle of Higher Education* 46, no. 49 (August 11, 2000): A50. **[Review]**

This short article from *The Chronicle of Higher Education* provides another positive review of the Perseus Project. The author described the main features of Perseus, and noted that the ease of traversing between resources is one of the most appealing qualities about the system. She then said a few words about recent developments with the project, including the expansion to non-Classical topics, and shared Gregory Crane's thoughts on this expansion. By focusing on topics outside of the classics, Crane said, the larger problems facing any digital library become apparent. The review closed with a mention of Perseus's funding sources, and the release of the most recent version of Perseus, Perseus 2.0, for Macintosh and Windows.

Stanton, Cathy. "Historians and the Web." *The Public Historian* 24, no. 1 (Winter 2002):

119-125. **[Review]**

In response to a recent meeting of the Massachusetts Historical Society that featured a panel called "Historians and the Web," Cathy Stanton wrote this article about the three websites represented by that panel (Perseus, DoHistory, and Common-place) and analyzed the effect of the web in bridging the gap between academic and popular history. After a brief overview of the aims and functionalities of the Perseus website, Stanton considered some of the broader issues raised by sites like Perseus, DoHistory, and Common-place. One of these was funding: while Common-place is approximately the same price as producing a quarterly printed journal, the annual budget of Perseus is larger than that of many public libraries. Stanton reported that Gregory Crane recognized the eventual need to "come up with a model where somebody pays us something." She suggested, however, that a shift in focus from scholarly publishing to web content may eventually cause universities to invest funds in sites like Perseus and Common-place. In response to the question of who is using this type of site, Stanton concludes based on log and anecdotal evidence that sites like Persues, Common-place, and DoHistory are at least partially filling the scholarly-popular gap since they attract a wide range of users from all age and experience levels. Stanton's opinion of these types of historical resources seems to be neither positive nor negative, though she recognized the potential of these resources to become, as Gregory Crane said, "the long-term media in scholarship."

Version 4.0, 2005-present:

Dubis, Mark. "Web Resources for the Study of New Testament Backgrounds." *Journal of*

Religious & Theological Information 6, no. 1 (2003): 3-9. **[Citation]**

This excerpt from the *Journal of Religious & Theological Information* consists of a list of web resources for the study of New Testament backgrounds. The Perseus Project is listed under "General Sites" and called by the author "one of the most important resources on the Web for the study of ancient Greece and Rome." Citation of the Perseus Project outside of the field of Classics shows that as a resource it has a wide appeal and applicability, and is easy enough to use that non-experts will not find themselves out of their depth.

III. CONTENT

The Collections

Current collection development policy and focus is unclear; I have not found the policy expressly stated either on the website or in any of the literature I have reviewed.

When Perseus was first developing, the early collection development plan “called for amassing a significant portion of the extant Greek text and a large number of images and maps.”¹⁸ Along with the Greek texts, other types of materials were sought, including commentaries and explanations of texts, annotations made to manuscripts, metrical analysis for Greek poetry, staging notes for plays, bibliographies, and English translations.

For the first ten years, Perseus concentrated on its Greco-Roman antiquity collections (1986-1996). After this first decade, several factors led to Perseus deciding to expand its focus. These factors included: the feeling that the Greco-Roman collection had been developed to a point of reasonable maturity; the belief that having a classics collection on its own was not enough to “sustain its own specialized digital library infrastructure”¹⁹; the grant money Perseus received was also a factor in expanding the collection.

In 1998, Perseus made the somewhat controversial decision to expand beyond classics. Funding in the form of a large grant from the Digital Library Initiative Phase 2 and the National Endowment for the Humanities and the National Science Foundation, encouraged the Perseus to branch out into areas such as the History and Topography of London, the U.S. Civil War, and early modern English.

The collections in the Perseus Digital Library are mostly those that were created by the Perseus team for experimental purposes, though there are also some third-party collections as well. The focus has

¹⁸ Marchionini, Gary. “Evaluating Digital Libraries: A Longitudinal and Multifaceted View.” *Library Trends* 49, no. 2 (Fall 2000): 308.

¹⁹ Gregory Crane, Clifford E. Wulfman, Lisa M. Cerrato, Anne Mahoney, Thomas L. Milbank, David Mimno, Jeffrey A. Rydberg-Cox, David A. Smith, Christopher York. *Towards a Cultural Heritage Digital Library*. In *Proceedings of the 3rd ACM/IEEE-CS Joint Conference on Digital Libraries*, pages 75-86, Houston, Texas, 2003-06.

been primarily on texts, though the collection does include color images (and the accompanying metadata) as well as GIS and 3-D materials, which are considered to be more experimental in nature.²⁰

As of 2001, Perseus had put together seven sizable collections. Two of these collections are third-party collections; the other five were developed by Perseus. These collections were:

- Greco-Roman Collection
- London Collection
- U.S. Civil War Collection
- Early Modern English Collection
- American Memory Collection (third party collection)
- Duke Databank Documentary Papyri (third party collection)
- History of Mechanics

Currently, there still seems to be seven collections at the Perseus Digital Library. The top two collections Perseus has are the flagship Greek and Roman Materials Collection and the 19th Century American Collection (of which the American Memory Collection is now a part). The Duke Databank of Documentary Papyri remains part of Perseus. The other collections in the library include Arabic Materials, Germanic Materials, and Renaissance Materials. The digital library has also branched out into newspapers, as it now includes issues of the Richmond Times Dispatch from November 1860 to December 1864.

Though these collections appear random at first glance, Perseus seems to have acquired these collections for various reasons. Materials from the early modern period were chosen in order for the Perseus team to explore the difficulties of automatically processing such materials (apparently this collection presented the greatest challenge to automatic processing). The 19th Century collection was among the easiest to analyze due to the formats used; this collection let Perseus explore the wealth of information these documents offered about people, places, and organizations. And the classics collection, which was years in the making, let Perseus explore the challenges of complex layouts and having to process materials which were in languages other than English.

²⁰ Ibid.

Along with text collections, there is also an art and artifacts collection. Users can use the Perseus Art and Artifact browser to look through a library of 1305 coins, 1909 vases, 2003 sculptures, 179 sites, 140 gems, and 424 buildings.

Collection Principles

There are nine collection principles that apply to good digital collections and the Perseus Digital Library seems to follow many of them.

1. Collection development policy: The Perseus Digital Library started out with a more focused collection development policy – their mission was to amass as much classic Greek primary material as possible and get the information digitized. Over the last two decades, the focus has shifted, first by adding Roman materials to the collection, to finally broadening the scope to include the history of London, 19th Century America, as well as Germanic, Arabic, and Renaissance materials. Now the collections policy is more amorphous. It is not explicit in terms of what they want; rather it is explicit for what they want to be able to do. The collections in the Perseus digital library have either been put together by the Perseus team or acquired by a third party; most of the collection is public domain material or material Perseus has permission to experiment with.

2. Collection description: The collections in Perseus 4.0 are not well described. Instead, on the collections contents page, a one-sentence description is given about each collection. Clicking on a collection gives the user a hyperlinked list of every text in the collection, but no additional information is provided. Older versions of Perseus did a better job of showing the user exactly what was in each collection; users were given background information about the collection, told how many texts were in the collection, and even guided to the tools that could be used with the collection. I am not sure why the Perseus team went away from this arrangement with the new version of the website.

3. Collection curation: Yes, the collections at the Perseus Digital library are curated.

4. Availability and access: The collections at Perseus are available freely on the internet, so any user with a computer and internet can access the collection. Some browsers seem to work better than

others; sites tend to load better using Safari as opposed to Firefox and IE. As far as accessibility issues are concerned, we ran a test on the Perseus website to see how the site stacked up in terms of 508 compliance. Of the ten pages that were tested, 90% of the pages have accessibility issues. The scan performed found that: all 10 pages had overall quality issues, 0 pages with broken links or other errors (this was much better than average), 9 pages had accessibility problems, 4 pages were found to have browser specific issues, 4 pages had compliance or legal issues, 4 pages had search engine issues, 9 pages had W3C standards issues, 7 pages had usability issues.²¹



5. Intellectual property: The Perseus Digital Library strives to respect intellectual copyright laws. The copyright disclaimer given at the website is: “The Trustees of Tufts College hold the overall copyright to the Perseus Digital Library; the materials therein (including all texts, translations, images, descriptions, drawings, etc.) are provided for the personal use of students, scholars, and the public. Any commercial use or publication without authorization is strictly prohibited. Materials within the Perseus DL have varying copyright statuses: please contact the project for more information about a specific

²¹ <http://try.powermapper.com/Reports/62c0159d-2d2c-42a7-9bf2-5d3469c90250/report/map.htm>

component or object. Copyright is protected by the copyright laws of the United States and the Universal Copyright Convention.”²²

6. Usage data/usefulness measures: I am not certain what mechanisms to supply usage data or what Perseus uses to gather information about standard measures of usefulness.

7. Interoperability: Perseus does fairly well as far as interoperability is concerned, though its collections could use better descriptions to expand its use and usefulness. Perseus has begun to expose its metadata to the Open Archives Initiative, as has started to integrate OAI services into its system, which shows its dedication to interoperability.

8. User workflow integration: Perseus allows users to get involved with the collections to the degree that it is practical to do so. For example, Perseus allows users to vote on the best definitions for disputed words, but users do not contribute their own content to the collections.

9. Sustainability: Perseus uses the standard standards in its collections. Images are jpegs, text is marked up using XML; no weird formats are employed. Plus, Perseus has been evolving and sustaining itself for over 20 years. I would have to say that the collections have been and will continue to be sustainable over time.

Object Principles:

There are five object principles that apply to good digital collections; Perseus appears to follow most of these principles with regards to the digital objects in its collection.

Objects in the Perseus collections consist in the form of XML hypertext and JPEG images; these formats are standard, broadly accessible, and work well for the intended use of the collections – for reading, linking, reference, and display.

As far as preservation is concerned, it is uncertain how easy to preserve the collection is, considering that both JPEGs and XML are used; these may be the standard formats and encodings today,

²² <http://www.perseus.tufts.edu/hopper/help/copyright>

but there is no telling what the future might bring. However, Perseus did manage to migrate from SGML to XML, so I imagine they will do so again when the need arises.

Perseus employs standard metadata schemas, which help make the objects meaningful outside its local context. The texts in Perseus, being coded with XML, are also completely downloadable for users, which makes the objects portable.

All objects in Perseus are named with a ten-digit identifier. The identification numbers Perseus assigns seem to be scalable, as there does not seem to be any danger of numbers running out or being duplicated. The identifiers have been assigned consistently – all numbers are ten digits, always beginning with a year. And the numbers are persistent because the object identifier does not change.

As far as object authentication goes, Perseus does not explicitly provide ways for the user to determine the authenticity of the digital object itself. Users do not know who marked up the text, when a document was modified, etc.

Content Management

The content management system Perseus uses appears to be mostly a home-brewed system. From the earliest stages, when Perseus was transitioning from CD-ROM form to the internet, the Perseus team realized that the nature of the Perseus project and the scope of what they wanted the digital library to do would require a management system that was flexible, extensible and powerful. The early version of the Perseus management system was written mostly using Perl, and it evolved and grew as the library did. The Perl-based code was developed through experimentation and organic growth. However, the original code as it grew became difficult and unwieldy to share and modify.

By 2000, due in part to the cumbersome nature of the Perl-based system, the Perseus team decided to build a new digital library management system designed “from the start to be interoperable, modular, and open-source.”²³ In 2002, Perseus moved its collection of digital objects to the Tufts FEDORA repository and began designing a digital library system that could incorporate FEDORA. Thus,

²³ <http://www.perseus.tufts.edu/hopper/opensource>

the Java-based, faster, and more interoperable Perseus Hopper was born. The source code for Perseus 4.0 can be found online; it was released in 2007.

Metadata

From early on in the project, Perseus used SGML to mark up documents as they were made digital, even though this was an expensive decision to make at first because the Apple HyperCard that Perseus was using at the time could not handle SGML markup, and thus was not usable. However, this decision paid off years later due to advances in machine readable systems.

The Perseus team also basically began using a specialized metadata schema for their objects, long before the term metadata even existed. The team used an “object-oriented approach to managing the multimedia data”²⁴ Even if an object, such as a vase, had multiple thumbnails related to it, there would only be one main catalog entry created for the object with information about things like the collection, summary, ware, shape, context, region, date, period, condition, description, keywords, sources, etc.

These two early decisions were crucial in the growth and development of Perseus.

As part of being OAI compliant, the Perseus Digital Library currently uses Dublin Core as its metadata schema.

According to Anne Mahoney, a former programmer for Perseus, most of the markup the digital library uses is either SGML or XML that conforms to the Text Encoding Initiative (TEI) DTD. The markup follows Stoa conventions that specify which features to mark, what values to use for certain attributes, and what metadata should be included in the document header.

As of 2006 Perseus began making what it calls “fourth generation” texts available. These texts “integrate not only carefully transcribed text and the original page images but also other forms of annotation (e.g., morphological and syntactic analysis, indices of people and places, markup for the

²⁴ Marchionini, Gary. “Evaluating Digital Libraries: A Longitudinal and Multifaceted View.” *Library Trends* 49, no. 2 (Fall 2000): 307

particular sense of particular words in context).” The fourth generation collection that Perseus is putting together for 2008-2009 includes:

- Expanded TEI-compliant XML transcriptions of Greek and Latin primary sources within Perseus.
- Cataloging data in XML MODS and MADS format that is modeled after the Functional Requirements for Bibliographic Records (FRBR) to represent multiple editions, translations, commentaries, indices and other scholarly data.
- Metadata to support access by book/chapter/section/verse or other conventional scholarly citations under the Canonical Text Services (CTS) Protocol. This metadata would make it possible to generate from a textual citation a dynamic link into electronic page images and/or XML-transcriptions.²⁵

IV. CONTEXT OF USE

Perseus features collections that target scholars in multiple fields. Naturally, the collections in Perseus will be of greatest use to scholars and students in fields related to the material covered by those collections. So, for example, the Greek and Roman collection would be most valuable for classicists. However, one could easily conceive of the Greek and Roman collection being useful for students and scholars in the fields of Greek and Latin philology and language studies, philosophy, history, material culture, or religious studies. As a master’s student in medieval studies, I often consulted Perseus to use the dictionary look up tool, and the collection contains texts that would be of direct interest to my studies, like *Boethius’ Consolatio Philosophiae* and Bede’s *Historiam ecclesiasticam gentis anglorum*. Because Perseus offers primary source texts in English or in the original language with an English translation, all of their collections can be used by anyone with a reading knowledge of English, regardless of whether they are familiar with the source’s original language.

²⁵ <http://www.perseus.tufts.edu/hopper/research/current>

Indeed, need for primary source material is a major reason why a scholar might consult Perseus. For example, Barbara Burrell in her article “Iphigeneia in Philadelphia” used Perseus to gain access to Servius’ *Commentary on Vergil’s Aeneid*.²⁶ And Thomas J. Kraus cited in his article “P.vindob.G 35935 (vormals 26132a): Notizen über das Endgericht?” using Perseus to search the Duke Databank of Documentary Papyrus.²⁷ Gaining access to primary source material is not the only context in which Perseus is used, however. Trevor V. Evans, in an article entitled “A Note on βονλή in ‘P. Col. Zen.’ I 10,” published his findings based on a study using the Perseus’ Greek morphological analyzer to study the morphology of the Greek word βονλή.²⁸ And, Linda Jones Roccas used the Perseus Project Encyclopedia to find resources on uses of the term *apoptygma*, as reported in her article “Back-Mantle and Peplos: The Special Costume of Greek Maidens in 4th-Century Funerary and Votive Reliefs.”²⁹ The evidence of these articles shows that Perseus is an important resource not only for the materials that it encompasses, but also for the tools that the Perseus creators have made available with which to study the material.

These tools are of great interest to students as well as professional scholars. As mentioned above, I myself have used the Perseus dictionary tool on many occasions. Students of Greek and Latin might also use this resource for help in completing translation exercises. Or, a student of archeology might use the art and archeology artifact browser to locate an image of given archeological site, or to perform a comparative study of two pieces of ancient art for a research paper. Or, a student might consult Perseus to find introductory secondary sources on Renaissance or Greek and Roman materials. Perseus is not just a tool for scholars, but one equally useful for students as well.

²⁶ In *Classical Antiquity* 24, no. 2 (October 2005): 223-256.

²⁷ In *Zeitschrift für Papyrologie und Epigraphik* 141 (2002): 149-154.

²⁸ In *Zeitschrift für Papyrologie und Epigraphik* 145 (2003): 246-248.

²⁹ In *Hesperia* 69, no. 2 (April-June 2000): 235-265.

It is also easy to conceive of Perseus being used by primary and secondary school teachers, as well as college professors, to gather materials for use in lectures and classes. After all, Perseus was originally developed as an educational tool, and in the early days Perseus was used for creating lectures and assignments.³⁰ It is not inconceivable that teachers would still find Perseus useful for gathering primary and secondary sources for reading assignments, or as a source of images of Greek art for a powerpoint to accompany a lecture.

One can even imagine Perseus being used by members of the population at large whose needs are not scholarly in nature. It is entirely possible that an individual could consult Perseus for information on Greek archeological sites when planning a vacation to Greece, or consulting the secondary resources on the Renaissance to learn more after viewing a program on the History Channel. The materials in Perseus could also be used by amateur genealogists searching for information about ancestors in the Richmond Times Dispatch. Or Perseus could even be used by a parent who wants to brush up on her 19th-century American history so she can help her 6th grader with homework.

It is also worth noting that the Perseus system itself can be considered a resource. As one of the earliest and most successful digital libraries, Perseus has been used as the subject of case studies by scholars in the fields of information studies. And being a leader in the field of digital library development, scholars look to Perseus to see how new technologies, like GIS, are being integrated into and exploited by the Perseus system. Thus, the Perseus Digital Library is a resource not only because of its collections and its tools, but also because it represents the best of what digital libraries have to offer.

³⁰ See Gregory Crane and Gary Marchionini, "Evaluating Hypermedia and Learning: Methods and Results from the Perseus Project," *ACM Transactions on Information Systems* 12, no. 1 (January 1994): 5-34.

The resources provided by Perseus can be used in a variety of contexts. The collections and tools are exploited by scholars to perform research that supports their efforts in writing and publishing. These same tools and materials can be used with equal benefit by students for the completion of class work, assignments, and papers. Teachers and professors might also find these materials useful in the preparation of lectures, course packets, and assignments. And, members of the general public could look to Perseus as a resource with a variety of non-scholarly uses. And that's not to mention information scientist who might use Perseus as a case study topic, or as a benchmark for judging other digital libraries. The richness of the collections in Perseus and the functionality provided by the tools renders the Perseus Digital Library a functional resource for almost any type of user.

V. ACCESS AND TOOL DEVELOPMENT

Access

When Perseus was still in CD-ROM form, at first only users (or libraries) with Macs who purchased the program could use it because the early versions were Mac-specific. In 2000, a platform-independent version of the CD-ROM was released, which widened the range of access.

The internet has furthered who may have access to the Perseus Digital Library. Now that Perseus has moved from CD-ROM to the Internet, anyone with a computer and internet access can use Perseus. The materials are freely available, not only for viewing, but also for manipulating since the source code is open and many of the documents in Perseus are public domain texts.

There does seem to be a bit of a problem with access for those with disabilities, as the Perseus website appears to have some issues with 508 compliance. Running the main pages of the site through an online compliance tester revealed several problems that I mentioned earlier.

Tools

Because of the complexities of the Greek language, tools were needed to make the texts in the Perseus collection truly useful to users. One of the early tools developed was called the Morpheus tool, which was used to create word indexes and became an important component of the text analyzing tools used by Perseus.³¹ Older versions of Perseus had tools such as the Perseus Atlas, which was a database that helped link the places mentioned in the texts. The latest version of Perseus has done away with its old atlas tool, replacing it instead with a Google maps interface.

Currently, the main tools in Perseus 4.0 tend to be language tools, search tools, or browsing tools. The language tools include the Word Study tool, the Vocabulary tool, the lookup tools, and the dictionary tool. The Word Study Tool helps users analyze the forms of Greek and Latin. While reading the text, users can click on a hyperlinked word and the Word Study Tool will pop up in a separate window, showing the word form. If a word form is disputed, users can vote on which they think is correct. In the non-English texts, Perseus includes a Vocabulary Tool, which defines each of the words in the passage on that page, and lists the word frequency. The English to Arabic, English to Greek, and English to Latin look up tools and the dictionary look up tool are also language-related tools.

There are also two kinds of search tools – general, using keywords and phrases; or specific – word frequency or Greek/Latin words in context. There are also the Named Entity Search tools, which use automatically extracted people, places, and dates. When a user searches for a place, Athens for example, the search tool will then provide a list of the frequency and documents in which the search term appears.

The Art & Artifacts Browser is the tool that lets users search through the image gallery. Users can browse the art and artifacts by type; as the user goes through the different browser menus, each selection the user makes narrows the search scope. For example, if a user selects ‘building’ the next menu gives

³¹Marchionini, Gary. “Evaluating Digital Libraries: A Longitudinal and Multifaceted View.” *Library Trends* 49, no. 2 (Fall 2000): 308.

the options of ‘architect, type, period, or region.’ Users can also search through all of the art and artifacts images using the search page.

There are also browsing tools to orient the reader within each document. For example, every document has a horizontal navigation bar at the top of the screen that indicates where the user is located within the document. The specialized side-bar menu at the left of the document pages contain links relevant to each particular document.

Though the Perseus code is open source, it seems that tool creation is done in-house. Users can use the Perseus code to make their own tools or translate their own texts using Perseus tools, but they do not seem to be able to create tools for Perseus.

VI. STRENGTHS AND WEAKNESSES

The Perseus Digital Library is widely recognized as a forerunner in the field of digital libraries. This does not mean, however, that the creators of Perseus are infallible, or that there are not aspects of the system that could be improved. While we found that Perseus has many strengths, we also judged the system to be weak in several areas.

Weaknesses:

1. Interface and navigation: Upon entering the Perseus Digital Library website, it is not automatically clear where to go next to find what one is looking for. In the global navigation bar one sees the following links: “Home,” “Collections/Texts,” “Research,” “Grants,” “Open Source,” “About,” and “Help.” Should one click on “Collections/Texts” to locate individual resources? What does research mean? Does one click there to do research or is that a link to other people’s research, or is it a link to research about Perseus itself? And what about “About”? Will clicking on that link tell me about the resources in Perseus, or does it take me to a page about the system itself? Some of these might seem like inane sentiments that no one with sense would have, but in point of fact people are easily confused by labels, especially when they are not explicit. Good information architecture calls for navigation to have

labels that give no doubt (or as little doubt as possible) as to the content they represent, and the global navigation labels on Perseus' main page do not meet this criterion. The bulk of the main page is taken up by announcements, when the space could much more profitably be devoted to links to the content and tools for which Perseus is famous. It almost seems as though the Perseus creators are more interested in representing Perseus as a project than in making Perseus a useful resource.

Additionally, it is not always easy to find the things one is looking for. For example, if a person comes to the sight to use the dictionary look up tool, he or she will be unable to find it unless he or she think to click on the link labeled "All Search Options" below the search box at the top right corner of the page. Since the look up tool, which does a search for the dictionary entry of a word, is probably one of the most popular tools (especially for students who use Perseus to complete translation assignments), one would expect it to be featured more prominently. Indeed, one would expect all of the tools to be featured more prominently rather than hidden under a link that users looking for tools might not even think to click on. A link in the main navigation bar labeled "Tools" would seem to be a more appropriate way to provide access to Perseus tools. Again, the website communicates that impression that the Perseus creators are more interested in portraying the project aspect of Perseus than presenting it as a resource. If the Perseus team wants people to continue using the Perseus website, they needs to spend some time developing a more user-centered design for their navigation and home page.

2. Infrastructure: A chronic problem encountered by both Emily and I was the speed with which pages in the Perseus website loaded. It was often painfully slow, especially when attempting to access the Art and Archeology artifact browser. Sometimes pages would not load at all. When using the art and archeology browser, thumbnails sometimes do not load, and some full sized images do not load properly. And when one clicks on a hyperlinked word in a text the corresponding pop up window does not always load, leaving the user to wonder if an error has occurred or if there is no entry for this particular word. The fact that glitches such as these and slow loading speeds were a recurring problem seems to indicate an underlying infrastructure issue. When pages in a website do not load quickly enough, or do not load at

all, or items images are inexplicably absent, users will simply choose not to continue using that website, especially if the need to do so is not pressing. Though the Perseus Digital Library offers many useful tools and texts, it does not really offer much that cannot be accessed through other means. If the Perseus creators want to continue to attract users to their site, they might consider addressing these particular issues.

3. Accessibility: One of the greatest advantages of Perseus is that is easily accessible. One can access the resource from any computer with Internet connectivity. However, different users have different needs, and it is important that a website take in to account users with special needs. When attempting to answer the question of whether or not the Perseus creators have accommodated these types of users, we ran a Section 508 accessibility testing tool and found that 9 out of 10 pages had accessibility issues. Lack of Section 508 compliance is definitely something to which the Perseus team should devote attention.

Strengths:

1. Collection Development: Adding new resources to the Perseus Digital Library has been one of the driving forces behind the project from its inception. Perseus is very strong in the main collections of Greek and Roman resources. Recently, they began expanding to include collections outside of the Greek and Roman focus. The principles behind the acquisition of new resources are not entirely clear but seem to be driven by the desire to extend what Perseus has done for the field of classics to other areas within the humanities. Thus, the Perseus team has taken to gathering third-part collections that have to potential to be exploited in the same way as the Greek and Roman collection, and creating their own small collections as well. The idea is to incorporate collections on which they can experiment with the technologies and tool developed for the Greek and Roman collection to see what principles they can

extend from the classics to other humanities fields. Though the new collection development policy is not well enumerated, collection development can still be considered a strength of the Perseus Digital Library.

2. **Consistent Leadership:** The Perseus Digital Library has had the benefit of being led by the same man since its creation, editor-in-chief Gregory Crane. Consistent leadership leads to a sense of stability within a project, as well as providing it with a concerted sense of direction. By all accounts, Crane is a very dynamic and driven individual, and no doubt his personality has also played a role in helping Perseus to advance over the past twenty years.

3. **Adaptability:** When the Perseus Digital Library was first being developed it was on the forefront of developments in the field of hypertext technology. As time has passed, the Perseus project has evolved and adapted to new technologies and worked to incorporate them into the project. As a result, the Perseus Digital Library incorporates current field standards, such as the use of XML and TEI, and works to include new technologies in like GIS and data mining. Being adaptable is one of the aspects of the Perseus project team that has helped Perseus remain relevant for more than twenty years.

4. **Willingness to share:** Since the release of version 4.0, Perseus has been open source. This willingness to share is a great strength of the Perseus creators. It would be easy to envision a leading resource like Perseus having creators who jealously guard their code. Instead, the Perseus team has made the code underlying Perseus Hopper freely available so that anyone can use Perseus tools to interact with their own textual collections.

VII. CONCLUSION

The Perseus Digital Library has been a resource in the classics for scholars, students, and the general public for over twenty years. Now that they have begun to expand their collections to other areas of the humanities, one can easily envision Perseus becoming a useful resource for other humanities fields. However, for this to occur the Perseus team will need to devote attention to make Perseus more accessible by improving their infrastructure, and the interface and navigation of their website, as well as adhering to Section 508 guidelines. If they do so and stick to the main goal of giving users the ability to interact

directly with primary source texts, the Perseus Digital Library will remain a valuable resource and a forerunner in the field of digital libraries for another twenty years.