# Evaluation Report: 1997-98

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Developing and Evaluating a WWW Collection of Humanities Publications

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**Introduction**

The FIPSE funding for this project supports the development of new publication models in the humanities that integrate the Perseus corpus as well as other scholarly materials in electronic form. The new publication models created aim to broaden the audience for humanities scholarship, establish more timely and accessible links between research and practice, and support innovative teaching and learning in the humanities. This report summarizes efforts to assess progress specific to the goals of this project and to advance our general understanding of information technology applications in education. The overall evaluation is formative in that it aims to guide the continued development of publication models and instructional practice.

The original proposal targeted three evaluation threads:

- Creation of electronic publications;
- Impact on curricula and instruction;
- Usage strategies.

For the first year of this project, the evaluation team focused first on the Perseus corpus itself and secondly on the creation of a new publication model embodied in the Stoa Consortium. This report has two major parts, results for the 1997-98 project year and evaluation plan for the following two years.

**Executive Summary of 1997-98 Accomplishments**

- Perseus has become an electronic gateway to a suite of electronic resources well beyond the original ancient Greek culture corpus and tools. Many of the tools and techniques have been integrated into new projects at Tufts (e.g., Rome, ancient science) as well as in other projects.

- Perseus impacts a large and diverse community beyond university classics courses. It serves as a stable and authoritative resource for other publications (e.g., commercial online encyclopedias) as well as for distance education and other non-traditional education venues.

- The Stoa consortium was created to leverage the Perseus and other electronic publishing in the humanities efforts in order to broaden humanities audiences (both contributors as well as consumers).

- At workshops and through email discussions, a Stoa mission was defined. This mission is to:
  - foster a new style of refereed scholarly publications in the humanities not only of interest to specialists but also -- and just as importantly -- accessible by design and choice of medium to wide public audiences,
  - to develop and refine new models for scholarly collaboration via the Internet,
  - to help insure the long-term interoperability and archival availability of electronic materials, and
  - to support resolutions to copyright and other issues as they arise in the course of scholarly electronic publication.

- A Stoa web site was established, tested, and is ready for public use in September 1998. (www.stoa.org)

## PART I. 1997-98 RESULTS

Perseus has been under development for ten years. Over this time it has evolved to take advantage of new technologies (from HyperCard and CD-ROM to WWW), acquired substantial primary and secondary resources in multiple media, expanded its scope beyond the original focus on the ancient Greek world (Roman culture, history of science, Marlowe), developed a community of instructors and students who incorporate Perseus into their teaching and learning, and become an important source of primary material for individuals and institutions. Evaluations over the years (Marchionini & Crane, 1994; Marchionini, Neuman, & Morrell, 1995; Marchionini & Goodall (1995, 1996) documented several effects:

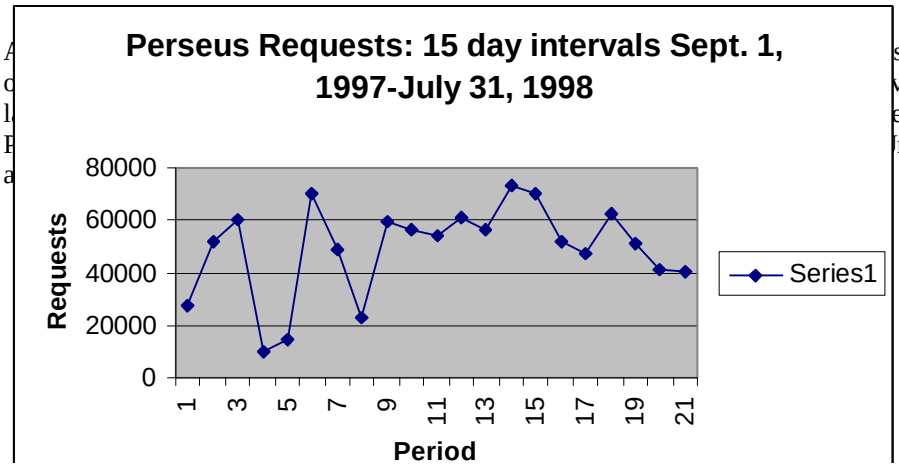
- mechanical advantages (e.g., faster, easier access to classical materials),
- new types of teaching and learning (e.g., laboratory investigations with primary data, integration of philological and visual evidence, multimedia presentations by instructors and students), and
- significant needs for physical and conceptual infrastructures (technical problems and discovering strategies for teaching and learning with technology).

The current FIPSE-supported project aims at publication models that broaden audiences and further investigate the conceptual infrastructure challenges identified in earlier work. Thus the new publication models that emerge will be assessed by their impact on instruction and by the strategies teachers and students develop for using these new models. The first year evaluation effort focused on the usability of the Perseus web site as one model of publication and the community interaction that led to the creation of the Stoa consortium. *Clearly, the establishment of Stoa was the major accomplishment of this first year.*

### Perseus: The materials and the community

Three types of data inform our understanding of how the Perseus corpus and community provide a model of publication that spawned the creation of the Stoa Consortium. First, the Perseus web site transaction logs illustrate the range of users and scope of impact of the Perseus corpus. Second, the Perseus List archive illustrates the topics of conversation and participants in the community. Third, the interface design for the web site illustrates some of the challenges of publishing different types of materials (primary, secondary, multimedia, pedagogical, administrative) in different topical areas (Greek, Roman) with different levels of coverage.

**Perseus materials**.
The sheer volume of access to the Perseus web cannot be solely attributed to growth and novelty in the World Wide Web (WWW). From September 1, 1997 to July 31, 1998, the Perseus web site served 1,029,921 requests. It is important to note that this number does not include GIF transfers and thus represent discrete visits to the site. Additionally, hit counts underestimate the true number of user requests since they do not take into account pages that have been cached on the client (In other work, we have found that caching underestimates home page access by as much as 90% for top-level pages; i.e. for each server log request record, users visit the home page almost 10 times; Fieber cited in Marchionini, 1998). With these caveats in mind, the server-side request data represents 2822 requests per day or 19806 per week, in spite of two periods of system down time in October-November 1997. Figure 1 plots usage for 15 day intervals and depicts consistently high usage during the academic year. The first large dip in the graph represents down time November 1 and 15 with a high-usage spike after recovery (there is no data for much of October due to system failures). The second dip is the value for January 1—significantly lower than other values but remarkable nonetheless that 22,567 requests were made on New Year's Day. Visible falloff occurs near the end of the academic year—point 16 on the graph represents May 1).




s provide a more interesting view
versity sites show up as the
er the past two years) come to
University of Victoria. It is

Pointer services such as the Berkeley Sunsite and the Internet Public Library, as well as commercial search services such as Askjeeves and Looksmart refer often to the Perseus site. Hundreds of requests are referred by each of the major search services (AltaVista, Lycos, Excite, Yahoo, MetaCrawler, HotBot, InfoSeek, and Netfind). Thus, not only are web sites related to courses or projects at universities using Perseus materials, but also many individuals are accessing Perseus materials through personal searches.

What is more interesting are heavy use (several dozens) by Commercial encyclopedias (Groliers, Encarta) to Perseus. This suggests that Perseus as an electronic publication has begun to play an authoritative and archival role in the commercial publishing arena.

Another interesting trend is the large number of referrals made by distance education courses and programs. The heaviest referrer is the Houston Community College Distance Education program. Thus, we see evidence of Perseus as a source of scholarly information moving beyond the traditional classics departments to personal use, as authoritative supplement for commercial sources, and as material for non-traditional tertiary education.

**Perseus Community**

Over the years, many people have invested time and effort in building and using the Perseus corpus or in studying its development. One tangible indicator of such a community is the Perseus List. The list represents one public forum where instructors and researchers may share their questions and ideas about Perseus. The list showed heavy traffic in the earlier days of Perseus development but traffic has fallen steadily over time as WWW services have increased and Internet users become more wary of list subscriptions adding to the electronic mail deluge. From Sept 1, 1993 to May 31, 1994 there were 427 postings, from September 1, 1995 to June 30, 1996 there were 271 postings, and over the September 1, 1997 to June 30, 1998 period there were a total of 100 postings. Although these numbers pale when compared to web site requests, they do represent significant interest since users must first subscribe to the list and will see all the list activity. Table 1 shows the volume of activity for the September 1997 through June 1998 period. Table 2 shows participation rates for the Perseus site. Not surprisingly, three individuals located at the Perseus home both initiate and respond to list messages.

**Table 1. Perseus List Volume by Month**

| Month | Number of Postings |
|---|---|
| September | 15 |
| October | 24 |
| November | 7 |
| December | 8 |
| January | 5 |
| February | 7 |
| March | 16 |
| April | 10 |
| May | 5 |
| June | 3 |
| Total Messages | 100 |

**Table 2. Perseus List Message participants**

| Person | No. Messages Initiated | No. In-reply | Total |
|---|---|---|---|
| Crane | 6 | 0 | 6 |
| Cerrato | 3 | 8 | 11 |
| Smith | 2 | 5 | 7 |
| Other | 60 | 16 | 76 |

List messages mainly come from the EDU domain but Table 3 illustrates the international scope of the Perseus community.

Table 3. Perseus List Messages by Internet Domain

| Domain | Number of messages |
|---|---|
| Edu | 52 |
| Com | 11 |
| Net | 7 |
| Org | 1 |
| Ca | 3 |
| Ch | 4 |
| Gr | 2 |
| Ma | 1 |
| Jp | 1 |
| Lu | 3 |
| Uk | 6 |
| Br | 4 |
| Au | 1 |
| De | 1 |
| Es | 1 |
| Us | 1 |
| Ie | 1 |

It is important to note that a large volume of mail has been sent to the Perseus webmaster. The numbers of replies to email messages to the webmaster (counting replies avoids counting non-substantive mail such as spams) are presented for the December 1997-August 1998 period in Table 4. These data demonstrate the significant amount of time needed to service a major publication site such as Perseus. Answering three to six inquiries seven days a week requires appropriate staffing.

Table 4. Number of Replies to email sent to Perseus Webmaster

| Month | Number of Replies |
|---|---|
| Dec. | 90 |
| Jan. | 113 |
| Feb. | 207 |
| March | 201 |
| April | 184 |
| May | 154 |
| June | 189 |
| July | 127 |
| Aug. | 126 |

A content analysis of the messages shows different trends than a content analysis for the 271 messages in the 1995-1996 period. In the earlier analyses, a large portion (one fourth) of the messages dealt with problems installing or using Perseus. In the current year, 54 messages (more than half) dealt with technical questions (strong threads were established for Windows 95 versions, Greek fonts under Internet Explorer, and web server crashes). Similarly, in the 95-96 period, 22% of the messages dealt with access and availability issues, whereas only 5 messages dealt with ordering or access issues in the 97-98 period. A large number of messages in the earlier period (14%) dealt with broader implications of Perseus but only a handful of messages (8) in the 97-98 period raised implications or pedagogical issues (some asked for advice on specific topics such as gender issues, others tried to initiate discussion or collaboration, some dealt with geography of Gaul). Many of the messages in the 97-98 year were announcements (20) or metalist issues such as subscription and dealing with spams (3). Three foreign language messages were also posted (Spanish, Portuguese, and French). Thus, it appears that the Perseus community continues to depend on the electronic list for technical questions (and the rapid responses provided). The community is less dependent on the list for substantive issues and discussion but uses the list increasingly for general announcements and responses to those announcements. Although the movement of Perseus from a stand-alone system that required installation on local networks or machines to a web-based system has strongly curtailed the number of installation and system operation requests (although there were more than a dozen messages about local installations and operations), server

problems and the specialized nature of fonts and images in Perseus continue to require list support. Whether the overall decrease in list activity represents a mature and stable community, the emergence of alternatives (web-page mail, FAQs, etc.), or other phenomena is unclear.

**Perseus Interface**.
The user interface to the Perseus system has always been complex due to the many types of material and rich set of search and analysis tools offered. A user interface critique was undertaken for the Perseus web site to assess the usability of the current site, make recommendations for improvements, and inform the evolution of the Stoa web site. This critique was conducted by Anita Komlodi, a PhD student at the University of Maryand specializing in human-computer interaction. The complete critique may be found as Appendix A. The main results demonstrate that Perseus as a publication vehicle for many types of material is distinct from the core Perseus corpus that focuses on the ancient Greek world. The core materials are consistent in their look and feel but the Perseus home page acts as a gateway to several types of publications—Perseus core being only one of them. The Perseus home page addresses the problem of linking a collection of projects that begin with some core material or obey the same design controls. In the print publishing world, a single publisher may offer many types of materials but use a common style manual and at least a common logo/imprint for each product. A more uniform model is the journal or yearbook series that provides a more controlled look and feel. Because the Perseus community can exercise substantial control over what is included and what guidelines all components must follow, it can offer users several types of consistency that root them in a context and minimize navigational disorientation or confusion.

**The Stoa Consortium: Broadening materials and community**

Based upon the experience of creating Perseus and publishing it and various related works, the Perseus community sought to create a new publication model that would build upon Perseus and other projects in the humanities. This publication model will emerge in the years ahead but the dual goals of broadening interest in and access to primary materials in the humanities and creating new venues for scholarly products motivated the first year's effort at formalizing community and creating a consortium. It is essential that the reader consult the Stoa web site to fully understand the summaries below (www.stoa.org).

The genesis of Stoa lies in the many discussions both face-to-face and online that took place over the past 10 years. Two significant events in 1997-98 made possible by FIPSE and NSF funding led to the definition and formal founding of Stoa. First, a workshop on Electronic Publishing in the History of Science was held at Tufts University on December 6-7, 1997 (see Appendix B for agenda and participant list). Second, a workshop on Electronic Publication in Classical Studies was held at Holy Cross College on February 5-7, 1998 (see Appendix C for agenda and participant list). Some of the roots of Stoa and the decisions made to develop the consortium are also found in the Stoa list and various email exchanges and telephone conversations that took place over the past year.

**Electronic Publishing in the History of Science Workshop**.
Crane introduced the potentials of electronic publishing as overcoming the limitations of space and time and stressed the importance of persistence in publication. He challenged the workshop participants to create publications that reach both the specialty audience we typically target with our publications and broader audiences (including scholars in allied fields). Different publishing models were discussed: Project Muse (digitize paper, added value is search and distribution); the Making of America Project (create page images, minimal OCR, individuals work on specific pieces, added value is volume); Institute for Advanced Technology in the Humanities (create many specific, in-depth digital products that leverage technology); and Perseus (large but integrated approach, transform what can be done with documents). Major problems to be addressed include: quality control, intellectual property.

Perseus experience demonstrates impact on behavior. For example, Homer and Caesar are best selling Loeb volumes, Thucydides and Pausanius are most heavily used on Perseus. The Liddell-Scott-Jones Greek Lexicon was not used by students in the past, however, after it was put up on Perseus site, lots of student now access it. This illustrates the win-win promise of electronic publishing: scholars get more audience, students get better quality. Example of a technical 'skill' the Perseus team has developed is to automatically create TEI-encoded documents from ASCII texts (David Smith noted in his remarks that the structured text is the Perseus added-value product). Of course, many decisions about markup must be done manually as they require understanding text. One side effect is the added complexity of identifying the canonical text after many electronic operations have been done. Finding ways to leverage these experiences and skills motivates the search for new publishing models and consortia. The

win-win, self-perpetuating vision was expressed in the wrap up session as: The more access to information you give people, the more they will want to get the primary information; the more you give people the primary information, the more they will appreciate the expertise behind it.

Melissa Smith-Levine, an attorney at the Library of Congress discussed the difficulties of copyright, including the extensive background work in obtaining and documenting permissions. Thorton and Bender described the Galileo Project at Rice that provides a textbook with added value (links to 600 biographies, search) using Galileo's vila as a spatial navigational metahpor. They raised the issues of handling user email and generally perpetuating sites after funding cycles complete. Porter described the Darwin Papers (Virginia Tech and Cambridge U) project that aims to publish the collected correspondence of Charles Darwin. The project has rights for many letters, including Darwin family, but need to have permission of owners of the physical letters as well as the families of those participating in the communication. Derivative works such as translations are also problematic from a copyright perspective. Presently, not publicly accessible but in ASCII form with some basic header markups. In addition to the acquisition and rights costs, the authentication, annotation, and indexing process are time-consuming yet essential. The workflow process established since 1974 may be useful to other projects. Neel Smith described Exploring Geography Project that aims to address quantitative information (e.g., geographic data) that has largely been ignored electronic publishing in the humanities. As a start, he has developed programs to strip out tables from TLG Ptolemy text. These data can then by used for visualizations of numeric data and trends—alternative views for the text. He raised the question of how these visualizations can be published and disseminated (especially given the dynamic nature of the visualization tools that take advantage of the underlying database). Taub described the Virtual Teaching Collection at the Whipple Museum in Cambridge. One goal is to encourage historians of science to use more material culture in their work. She noted some of the concerns curators have with making collection representations available electronically (e.g., show gaps, invite theft, invite claims) and noted the importance of collections that include accompanying materials and collection as well as item cataloging. Currently developing CD-ROM collections with student authoring tools included. A number of other projects were discussed but the key publishing issues boiled down to:

- quality control, authority of object and version control
- intellectual property
- sustainability (persistence of the object in next-generation forms as well as project over time)
- technical challenges (digitization of brittle or hard-to-acquire objects [e.g., reflective surface photos], automating markup
- supporting user feedback (e.g., email)
- providing dynamic objects (e.g., simulations, spreadsheets)
- incentives (e.g., changing the academic reward structure)

**Electronic Publication in Classical Studies Workshop**.
This workshop was significant because it directly addressed how the challenges above could be met in a new electronic publishing consortium.

Pedar Foss asked what it means to publish an archaeological survey in an electronic environment with geopositioning systems that allow higher resolutions and global networks that allow instant communications. He used a ten-year plan to map a site as an example to ask how the publication process unfolds. Rather than a final report and book 10 or more years hence, can a preliminary survey be provided and filled in over time as an increasingly detailed map? What is the publication?

Neel Smith raised several publication issues: review process, archiving, interoperability, intellectual property, and delivery modes/protocols [what does the publication look like?]. Crane noted that the web changes the traditional publication process since scholars no longer know exactly who the audience is. He reiterated the issues Smith raised with examples from other electronic publishing efforts in the humanities (e.g., Homer and Virgil projects at Chicago and Penn respectively continue to evolve and eventually should interoperate with Perseus). He noted opportunities to provide publications at multiple levels of detail (on the one hand including raw data and details beyond footnotes, on the other providing integrated instructional support). Key questions were: Who are the users and what do they want from these publications (Quality? Volume? Cheap access?). This user-centered perspective is different from the scholarly tradition that focuses on producing texts for a small set of highly-knowledgeable peers.

After small group discussion, a list of challenges was identified (data entry and archiving, backend and frontend changes over time, interoperable standards or translators, and editorial guidelines) and examples from various projects were given (Scaife used the collaborative Suda project as a model where many people do translations but work with a common template; David Smith noted that although philologists agreed on a few specific standards such as line numbering for Homer, ways to create self-documenting, self-describing documents should be invented).

Several potential projects were described to illustrate the kinds of new publication models now possible. These included a spin-off of Cahill's Olynthus work (analog and digital versions); Scaife and Bonefas' Diotime (digital collaboration); daily reports from an archaeological site (how to create an instructional manual linked to field work); dictionary of antiquity (OCD-like with hyperlinks). In all cases, reviewing, archiving, and integrating analog and digital media arose as challenges. Through these presentations and discussions, both the needs to create a new publication organ as well as tangible examples of what those publications might look like emerged.

By the end of the day's discussion, the group agreed on Stoa as a name for the consortium and to use www.stoa.org as the web-based site. It was agreed that the group must create a reference system (ways to link materials), a style guide for Stoa objects, and editorial board policies. Ownership was also discussed. Individuals were tasked to investigate legal status (Martin), intellectual property (Crane), and editorial board issues such as content (e.g., whether to include raw data or not), format, external sites (Scaife). Participants were invited to develop candidate projects (Diotime essays, Olynthus, artifact catalogs, critical texts and commentaries, essays).

The group agreed that the consortium should develop templates for submission, validate external site (to insure interoperability; develop standards for format, persistence, and maintenance; police the standard), and develop stylesheets and guides. More immediately, the consortium agreed to establish a web site, a mailing list, a FAQ service, descriptive information for publicity purposes, and initial policies for the above long-term work.

Martin encouraged the group not to distinguish research and pedagogy and to invite teachers and others to contribute. Several editorial policies were encouraged:

- if possible, translate everything!
- accept/encourage scalable publications (scalable here means different audiences)
- crossover principle--scholarly but broadest possible audience (authors will have to work harder since they may not be able to assume the reader has deep knowledge about the primary theme, i.e., have read the primary materials OR have access to the primary materials
- Stoa makes a commitment to maintain site and access in perpetuity

To encourage commitment, individuals were asked to say what specific actions they would take in the immediate months after the workshop. The following list summarizes various statements made by participants:

Tom: submitter of content, e.g., Athenian democracy; life of Plutarch
Joe: follow Stoa guidelines for Virgil, but need to know very soon (4.5 months); less ideal to convert later
Amy: work on the traditional editorial standards (as opposed to tagging standards)
Martin: Illiad book new edition in electronic form
Sebastian: archaeologists interim reports i.e., a Technical Report Series; should there be a TR editor? Do the TR series live at Stoa or do pointers and guidelines live there (e.g., NCSTRL).
An alternative model is a summary of archaeology in X (now done in a journal)..that brings together brief summaries of the various projects ongoing in a specific X region.
Kenny: plans to publish exclusively in the Stoa community; consider the icons, interface and PR area; this entire project needs to be documented and the process disseminated
Neel: rich site linkages with Stoa; ancient geography work;
Gary: some interoperability and information structuring support
David: create API for Stoa and relating to other site APIs
Martin: pursue further consortia backing possibilities; interest in distributed group projects, Stoa creates a data entry facility
Joe: will send to Ross a proposal for what a set of critical editions would look like
Greg: will assign Jason to mark up TEI compliant Virgil for Joe

Amy: enthusiasm for encyclopedia, relationship to Perseus?
Susan: will help with infrastructure (e.g., email list already), getting word out to community, e.g., panels at meetings.; develop tools for just-in-time classroom interface for content, could help with the Stoa interface
Sebastian: site in S. France, various content contributions, how to advertise good practices; working on interoperability and APIs, what the Masthead looks like
John: use this as leverage to get funding for an ancient theater web site
Maria: support for technical, front end, plus PR ala Perseus; museum connections like licensing
Nick: Olynthus; also interested in preliminary reports in general
Mark: pursue with Nick some archaeological summaries for ongoing work (AJA annual reports), either get those in Stoa or develop some alternative model
Petr: coordination with site dig (but do not want to charge for anything); contribution of piece of work on a specific site (house, bath, cemetery progression) case study

Through this workshop, Stoa was launched and in the following months, the editorial board was composed, a web site was designed and tested, a list was activated, and many of the promised contributions came to fruition.

**Stoa Conversations**
The Stoa list received 24 messages in this formative March-June 1998 period. A content analysis of these messages yielded three main categories of postings: announcements (7 messages), operational questions (2 messages), and policy discussions (15 messages). Although some messages fall into more than one category (e.g., announcing a new feature/event and adding commentary, responding to a previous posting and adding an announcement) each message was assigned to one category based on its primary purpose.

Announcements (for purposes of sharing information as well as for seeding discussion)
- 2 messages on a related project (dictionary of philosophy)
- 1 message on a technical framework with request for comment
- 1 thanks for site design
- 1 message announcing a general product with no commentary
- 2 messages updating work on the project and adding an elaboration

Operational Questions
- 2 messages on a specific submission

Discussions
There were two multiple message discussions.
- 5 messages (4 participants) over two day period (April 12-14) discussing a policy issue: whether to use transliterations or rich encodings.

Out of this discussion also came advice to build a database of names/dates and then fill dates for individuals in automatically later. This is a sensible suggestion because it leverages the advantages of database management principles (data integrity, easy updates, and data entry simplification), but it is more interesting as an illustration of how humanities scholarship can evolve as scholars begin to take advantage of repeatable productions to augment the traditional piecework (creative, unique) culture.

- 10 messages (8 participants) over 3 week period (June 16-July 6) discussing what Stoa should become.

The discussion began with a question about mission, a response, and a reply to the response. One theme revolved around the term ‘consortium’ and how formal the Stoa community should become vis-à-vis other professional organizations. Other participants jumped into the discussion offering their understandings of primary mission. One point of view argued for Stoa as a standards body, developing and promoting electronic publishing standards for markup, access, and preservation. Another point of view argued for a publishing role that actively seeks scholarly work outside the existing publication paradigms (e.g., instructional materials, simulations, databases, essays and commentaries dependent on electronic tools or repositories). A related function was to identify core research materials for the field that were in danger of being physically lost over time, and then digitize and preserve these works. Another role that has already been started is to publish reprints of existing books and materials.

**Current Status of the Stoa Consortium**

As the workshop notes and Stoa list discussions show, there are a variety of views of how this scholarly community should best invest its time and effort. The rather ambitious goals coming form the workshop discussions laid the foundation for the creation of the Stoa web site that manifests these goals in specific products and services. The list discussions illustrate how the larger mission continued to emerge as well as how one specific policy issue was aired.

The main accomplishments after these workshops were as follows:

- Establish the Stoa Web site www.stoa.org
- Appoint Editorial Boards according to the different content areas and publishing issues
- Link to several ongoing projects
- Receive commitments from scholars for new projects/publications
- Appoint post-doc scholar

Over the summer, the web site was changed several times as new services became available. With the arrival of Robert Chavez on the project, a functional web site with several interactive features and a key set of exemplary projects, the Stoa consortium is ready to officially announce the web site and broaden its base beyond the few dozen central players who founded and defined it. The web site provides mission statement, many services such as FAQ and a threaded discussion facility, and a set of 17 linked or proposed Stoa compliant projects.

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## Appendix A: Perseus Project: An Interface Review (Anita Komlodi)

### Introduction

The goal of the site is to provide both primary and secondary source materials for the study of the ancient world. The site contains a very rich and diverse collection both in format and in topic. This complex collection poses a challenge for users in navigation and information seeking. Users have to learn about the scope of the collection, its organization and the use of the browsing and search tools to be able to find their way and locate information. The issue of disorientation in hypertext environments is well known, and it is especially important to support users in orientation in large and complex hypertext environments, such as the Perseus collections.

The designers of the site integrated various degrees of many features to help users' navigation. Consistent page design, a navigational index on most screens, and the easily available search box provide very useful tools to users. The complexity of the site, however, warrants more consistent and structured navigational tools. One of the strengths of the site is that it takes full advantage of the capabilities of hypertext. The site is highly interlinked, words are linked to many different indexes, and related areas of the site are cross-referenced. This is a very nice design feature, but makes orientation more complicated for users. The following comments focus on the navigation structure and tools of the site because of its immense importance to a large, multimedia, highly interlinked site like the Perseus digital library. Many other design issues could be explored in a more detailed quality assurance study. Some of these issues are covered in this report as examples of higher level design principles.

In the design of rich, diverse and complex web sites it is not only important to provide adequate navigation, but the interface has to inform and educate the user about the site. The user needs to know what to expect, what the site contains and how to find the necessary content. All this information has to be available without much user effort. In the case of complex websites, it is very important to enable the user to select the right 'neighborhood' to begin their search or navigation. This can greatly enhance their chances of locating the right information with minimum effort.

Although the designers of the site integrated many features that help navigation, an overall information organization structure in not clear and makes navigation for users harder. A site map can be provided to users to impose structure on the site, even if restricted the higher levels. A well defined information structure would help both designers and users of the Perseus site. The site design is very successful in providing multiple access points to data. This is very useful in navigation, as users may arrive at the same data through multiple entry points depending on their current goal. However, the interfaces have to make it clear what alternative access methods are available, how to use them and what to expect behind them. Design for good navigation of a site include features that inform the user about where he/she is, how he got there, how to get back, where he can go next and how to get back to the starting point. It can also include global navigation designs and additional help such as search or a site map.

Several high level design principles can be summarized as follows. The organization of the site content can include collapsed hierarchies and shorter user paths among different levels and areas of the site. Providing multiple levels of representation of objects can save user time and effort in the browsing and selection process, these could include thumbnails for images or summaries for text. Consistent page layout and design (including color coding, fonts, alignment) ensures better learnability and usability and higher user satisfaction. All these principles are covered in the specific section in the rest of the report. The organization of this report is based on the different functional and structural units of the site. The large number of pages, functional sections, and the considerable diversity of designs among these warrants this

### Specific areas

### Home page

The homepage of the site will be covered in more detail than the rest of the individual pages. Homepages are very important in introducing the site to the user and giving an overview of the site structure.

The homepage opens with an image, an example from the rich collections of the site. This image is not only visually appealing, but also represents the subject coverage of the site very well, thus giving the user an idea of what to expect at the site. As mentioned above, it is very important that the designers of a web site inform users about the content of the site with as little user effort as possible. This sample is very useful in giving users a feel for the types of materials found at the site.

The homepage of a web site needs not only to introduce the site content to the user but also to provide navigational tools to start out the information seeking process. The Perseus homepage has links in several different sections of the page: the opening image and right below the image; the "New" section, links to the Athens Olympics, sponsors and contributors and contact information. These different sections are visually separated and functionally different. The page starts out with a highly graphical design, structured and coordinated. The second part of the page is mostly text-based and less structured.

### *Recommendations:*

A well designed homepage is very important for a site, as it is the first page most users encounter. A brief textual introduction to the site presented on the homepage could help orient users to the site right on the first page without having to click once to get to the "About" page. This introduction may include information on the content, searching and navigational tools, as well as recommended starting points for first-time users. It is a very hard task to introduce a site of the size and richness of the Perseus site in a short paragraph. However, it can save user time, and encourage users to stay in the site by making it more accessible and understandable. The "Evolving Digital Library" link promises more information about the site, however it simply reloads the same homepage. Removing this link would reduce navigational clicking that does not lead anywhere.

The graphical design of the page is very nice in the upper part, however, the lower part seems disconnected with a different design. The page is very long and requires a lot of scrolling from the user. Most users try to avoid scrolling, smaller screen sizes can make the use of this page bothersome. The opening image and the Copyright/Policies/FAQ line below it suggests a full page, first time users may have the impression that the site ends there (this is reinforced by the horizontal line dividing the screen) and never scroll down. A more compact design integrating all links on the opening image or better integrating textual and graphical links would make this page more usable.

The homepage is also remarkably different from the rest of the pages in the site. It stands above the site, almost suggesting that users would never return to this page, however some of the information would be interesting and useful for expert users as well. The homepage could be integrated with the rest of the site by using the same left-frame design as on the other pages.

The design of the navigational links on the homepage is different from the rest of the site, this can be a major problem for users. An inconsistency in the navigational tool can slow down learning and use and confuse users about where to find what tools and content. The naming, grouping and sequencing of navigational links on the homepage are different from that of the left frame index displayed on the rest of the pages. While from the homepage the users can select from the following set of navigational links: About Perseus; Starting Points, Art and Archeology; Text; Secondary Sources; Searching Tools; Teaching; Help Pages; Order Perseus CDs. On the lower levels of the site hierarchy pages contain the following set of links: Search; English Index; Art & Archeology; Atlas, Texts and Translations, Text Tools and Lexica; Historical Overview; Encyclopedia; Essays and Catalogs; FAQ; Help Pages; Copyright. The same page of a list of secondary sources is named "Secondary Sources" on the homepage and "Essays and Catalogs" on the navigational frame, inconsistent, can confuse users By applying the same page design and sequencing and naming of navigational links on the homepage as on the rest of the pages. The link to the text-only version of the site is at the bottom of the page. This link could be moved to the top of the page so that users with slow connections can get to it faster.

### *Search*

Searching mechanisms are just as rich and complex as the site itself. They provide many different capabilities to users which makes locating and interpreting information (the lookup tool) much easier for users. The design of these complex tools is very important to save users learning time and make their use easier. Below are some suggestions to improve searching the site.

Some of the search boxes at the site have their labels as search buttons on the left. This may confuse users as they proceed from left to right in the search, which is the way users of this site proceed in reading or writing. In some

instances, e.g. on the homepage there would be space to place a search button on the left. In some cases search boxes are missing, and users are required to use the "Return/Enter" key.

When a user tries to search for something in the lookup tool that cannot be found, the display does not inform about zero hits but displays the word it searched on and the lower part of the screen is empty suggesting a system error or interrupted download. The system should give the user more information about the status of the search and the lack of results.

The search result displays are very informative at the site presenting multiple levels of postings information under user control.

**Navigation**

Navigation tools in the site should support users in many ways. Users should be able to tell where in the site they are, where they can go next, how to get back and forth and how to get back to the starting point. It is especially important for large sites to support users in navigating around the content. The Perseus site provides a navigational left frame (in HTML tables format) on most pages which is helpful to users in navigating. Suggestions on improving the design are offered below.

The site is highly interlinked, this enables the site to provide capabilities that would not be possible in any other environment, for example, convenient lookup tools and encyclopedia use. However, overlinking the site is a danger, linking every word to the lookup tool can be confusing in some cases. Linking is kept under user control (e.g. select link primary text) in some of the full text displays, however not always. Another solution to reducing the effect of overlinking could be the use of typed links. Different colors could be used for links to the lookup tool and for navigational links. This would tell users right away what to expect behind a link and can save unnecessary navigation.

The menu in the left frame of the pages and the menu on the homepage are not consistently designed. The grouping of the items and prominence of items are different in the two lists, which may disorient users, and make navigation through the site more difficult. Also, some useful navigation aids (such as the search tool collection mentioned above, the teaching section) are not available from the left frame menu, although it would be very useful. The table of contents could be either static or dynamic. A static version would include more subitems under the headings, creating a longer index requiring more scrolling. A dynamic table of contents could reflect which section of the website the user is in and shower the lower level heading in greater detail at that section. The manipulation of the hierarchy could be under user control.

The navigation frame table of contents could contain more links, including links to content on the lower levels of the hierarchy. This can collapse the hierarchy of the website, users can straight go to second or third levels of the hierarchy without having to go up and down between the levels. Most screen sizes and resolutions today would allow for more links on the frame. This would also make it possible to present important links that are only accessible from the homepage (e.g. teaching).

The color coding of the table of contents frame can be a very useful tool in informing users about where in the site they are. However, in its current form the meaning of the different colors is not obvious to users. In a future design the different colors can mean different areas (e.g. primary text, specific collections within that, arts and archeology, etc.) or different levels of the hierarchy (e.g. summaries vs. full text, searching versus results, etc.). The table of contents frame also shows inconsistency within itself. In some screens, the FAQ link is available in others it is not. It is very important that the overall navigational tool is consistent throughout the site.

**Text views**

### *Primary and secondary full texts*

The Perseus collection currently has several different primary and secondary text subcollections. The primary Greek and Latin texts and their English translations have very consistent browsing interfaces. The text is divided into segments for easier browsing. Each segment is about 2-4 paragraphs, fitting onto an average screen. Navigation among these segments is facilitated through previous/next section links and links to author information. A very nice feature is that users can select the type of text displayed right from this page.

Not all the text subcollections follow the same layout, some of them are inconsistent with the rest of the design. The present critique will not cover each design in detail, but concentrate more on general text browsing suggestions. The inconsistency mentioned above can be very confusing to users, slow down learning and make use harder. Using the same design all through the text collections would require users to learn the browsing mechanisms only once.

In browsing text on computer displays it is very important to enable users to go to the next/previous sections and back to the table of contents or some kind of index or pointer page. It is also important to provide direct access to different sections of the text and to let the user know where in the whole text he/she is. A thumbnail 'map' of a page or article with current position may be helpful in this regard.

Chunking the text, wherever it is available, is very useful for navigation, although an option to download or look at the whole text may be useful, copyright permitting. Scrolling should generally be avoided as users tend to not scroll down pages. Shorter sections that can fit on one screen make reading easier. It also facilitates direct access (if it's provided) to specific sections in the text. Direct access is provided in "Frazer's summary of Apollodoruses's *Library*". Here users can jump directly to a specific section, while in most other text collections users can only proceed linearly from one section to the next. However, from the full text itself there is no way of getting back to the homepage of the document that contains the summary.

"Frazer's summary of Apollodoruses's *Library*" provides another good text display design feature. It gives users a middle level of representation between the title and the full text; that of the summary. This saves a lot of user time in browsing the text and helps identify specific sections of interest. Several levels of representations in text collection can be very useful for users, e.g. providing abstracts, table of contents or other types of summaries. The texts are usually long and users have no feeling of where in the text they are. A more flexible navigation with more levels of representation (not only title and the whole text but also maybe page numbers, chapters, etc) would be helpful. The browsing interface in the "Papyrological Resources in Perseus" texts have solutions to the problems mentioned above by providing direct access to specific lines in specific documents and also a link to the document homepage.

A very useful design feature is the cross-linking between different versions of a document from the actual page. This high level user control over the text display makes access to the versions easier, and can greatly enhance comparisons.

The Marlowe collection has a significantly different opening interface, it loses the navigation column and shows very different graphics. When going deeper in the hierarchy the original Perseus design reappears, however the inconsistency in the early sections of the collection can be very confusing to users who may not know whether they're still in the Perseus site or have left it. Distinctive design can be use for each collection, but they should be presented in the original framework (navigation toolbar on the left, content on the right).

Texts in the "Sources for Thucydides Research" section have the simplest interface with long texts on scrollable pages. Problems with scrolling discourage the use of long text displays, as mentioned above. The "Text help" page is not available from the "Primary text index" page although it would be very helpful for users. Currently, it is only available from the "Text tools and lexica" and the "Help" pages.

### *Encyclopedia*

An encyclopedia is a very good application area for hypertext. Cross referencing between entries provides an efficient way of browsing among entries. However, it is especially important to avoid the danger of overlinking (e.g. on the Encyclopedia homepage the "table" word in the Table of contents label is linked to the lookup tool and suggests the existence of another table of contents, although it simply links the word 'table' to the lookup tool). In the case of the encyclopedia the multiple entry points (through a topical hierarchy and an alphabetical listing) is a useful feature, however navigation between these indexes and between the entries could be improved.

More meaningful navigational labels could help users in the encyclopedia topical table of contents hierarchy, e.g. "Next Section: Artists", "Previous Section: Architecture". There should be a way to go back to both navigational starting points. (If you start from Biographies, and look at the list, go to Euripides, and want to read about Herodotus, so you click on the next section, it takes you to the next entry in alphabetical order, not to Herodotus

who was the next entry on the biographies list.) The two navigational systems are mixed here, it would be useful to make a distinction to the user so that he/she will understand how he/she got to the entry on the screen. To implement such features, the system would have to maintain state for user interactions to determine the proper context-sensitive index.

### *Text tools and lexica*

All the search screens in this section can be enhanced by more careful screen design: color coding should be used to express functional units; search boxes, labels and buttons should be aligned and organized from left to right or top to bottom; all the screens should adhere to a consistent layout and design, bold and double spaced paragraphs should be applied more carefully, only if they have a role in the design. The "English Word and Phrase Search" display is the best organized screen, some of the features from this screen could be followed in other screens and thus ensure consistency. Consistency is important in labeling as well; try to use the same label on the opening "Text Tools and Lexica" page and the actual search screen, it's just one click away and differing terminology may confuse users (e.g. "English index to primary texts and art & archeology databases" versus "English word and phrase search" – the user may think the he/she got to the wrong place since it is not what the link had promised).
Providing sample searches from the search screen is very useful. The result displays are very informative, as in the rest of the site. They display the original searches as reminders to users of what they searched on and provide surrogates of the documents found with the keywords highlighted. This makes relevance judgments easier and saves considerable user time.

### *Image and short text views in Arts and Archeology*

The general design principles of collapsed hierarchies, consistent page designs, multiple levels of representation and multiple access points are valid for these areas as well. The coin collection is used here to provide examples. There are multiple entry points to the coin collection, which is very helpful to users. The access hierarchies could be collapsed by presenting multiple levels of the hierarchy on the same screen saving user time and effort and also giving users a better idea of postings information (e.g. how many coins can be found under which headings).

Users have considerable control over the results display as in most areas of the site. Moving these controls to the top of the page would save users scrolling when trying to change their settings. Users may also not realize the existence of these but start clicking on the individual links thus spending much more time than necessary.
Individual coin pages promise images, but when you click on the link the user has to scroll down to the end of the page to find (not the image but) links to the images. Thus, it would take four or more clicks to get to see the coin from first clicking on the coin collection link. Showing thumbnails of the coins on the individual coin page or on the result list page would enable users to browse visually and use more information in making relevance judgments.

The text on the individual coin pages can be more organized, labels and text should be aligned and less space used.
Browsing on the individual object level is less convenient than on the index level, links to higher levels of the navigation structure would be useful. The simple search tools are in fact browsing tools, the complex search tools are disconnected at the moment from this page. However, the complex search tools are available from the "Searching tools" page - the "Searching tools" link from the homepage.

**Conclusion**

The Perseus site is a fairly large and complex digital library collection with many services and tools for users. This complexity warrants a careful information architecture design that defines access routes to the data for users. The site successfully provides multiple access points to and views on the data. There are many browsing and searching tools available for users to navigate through the site. A more consistent overall navigation plan and tools are needed to help users find their way through the maze of multimedia materials. Consistent page design, consistent searching and browsing tools, more compact and better organized document displays, clear paths presented to users should all be included in new designs.

This critique gave high-level design suggestions for the Perseus site to make navigation easier. A more detailed quality assurance study can cover many specific design issues that could enhance the usability of the site.

**Appendix B. Agenda and Participants for Electronic Publishing in the History of Science Workshop.**

SATURDAY, DECEMBER 6TH--EATON HALL, TUFTS UNIVERSITY

Part I: General Issues of Electronic Publication

9-9:30 Coffee - Eaton Hall Room 102

9:30-9:45 General Introduction

9:45-11 Electronic Documents and Digital Libraries: Creating open-ended publications.
Discussion Leader: Gregory Crane

11:15-12 Existing Standards for documents: Strengths and Limits of Text Encoding Initiative Standards
Discussion Leader: David Smith

12-1 Intellectual Property Issues: What can you do with preexisting materials? What rights do you need to retain for your own work?
Discussion Leader: Melissa Smith-Levine

1-2: LUNCH - Eaton Hall Room 102

Part II: Discipline Specific Issues

2:00 Electronic Publication for Classes: Galileo Site at Rice University
Discussion Leader: Albert van Helden

2:40 Archival Electronic Publication: The Galileo Archive in Florence
Discussion Leader: Jurgen Renn

3:20 Developing a Corpus in the History of Biology: The Darwin Papers
Discussion Leader: Duncan Porter

3-3:20: BREAK

3:20 Exploring Geography: Visualizing Ptolemy
Discussion Leader: Neel Smith

4:00 Documenting objects and collections: the Virtual Teaching Collection
Discussion Leader: Liba Taub

4:40-5 BREAK

5-5:30: Discussion of Results So Far
Discussion Leader: Gregory Crane

8PM DINNER AND CONTINUED DISCUSSION--Sheraton Commander Hotel, 29 Garden Street, Cambridge

SUNDAY, DECEMBER 7TH--EATON HALL TUFTS UNIVERSITY

9-9:30 Breakfast--Eaton Hall Room 102

PART III: Planning for the Future (Preliminary Agenda*)

9:30-10:30: Dealing with "generic" standards

10:30-11:30: Issues specific to the History of Science

11:30-12:30: Summary of results, plans for future work

*The final agenda for this concluding session will depend in part upon the results of the first day.

BIOGRAPHICAL INFORMATION ON WORKSHOP MEMBERS:

Krist Bender received his BA in Biology from Shippensburg University in 1977 and subsequently went to work in industry, first in research and development, then in technical services and sales.
His interest in the use of computer technology to gather, store, manipulate, and publish information developed in 1985 when, while working in the drilling fluids industry, he realized that he could use rudimentary BBS software, a modem, and a dual floppy IBM PC to link his lab with field engineers. Despite leaving the oil field for his own decidedly low-tech art service business the following year, this interest was reinforced when a friend introduced him to the hypertext theorist, Ted Nelson, in 1988.
Then in 1993 a half-time position in the Department of Art & Art History at Rice University gave him access to the rapidly growing Internet and to WWW initiatives like Albert Van Helden's then fledgling Galileo Project.
Since then, Krist has worked on a variety of Internet based projects ranging from real-time performance art pieces to the university catalog.
He has built and in some cases continues to manage web sites for the Rice Media Center, the Office of Research & Graduate Studies, Human Resources, the Rice University Art Gallery, the Dean of Social Sciences, and the President's Office. Last May he joined with Alan Thornhill, of Rice's Department of Ecology & Evolutionary Biology, to form the Data Applications Center (DAC), a laboratory that investigates new Internet technologies and applies them to
the development of active and interactive web sites. In addition to its R&D function, DAC supplies specialized services like on-line registration systems, database services, bulletin boards, and
mailing lists to instructors in chemistry, biology, anthropology, philosophy and art history. He is currently the Project Manager and Webmaster of DAC (URL:http://dacnet.rice.edu/).

Len Berggren is Professor of Mathematics at Simon Fraser University in Burnaby, British Columbia, where he is also Chair of the Department. He has worked for the last 25 years in the history of ancient Greek and medieval Islamic mathematics and astronomy, and has recently formed an international Steering Committee to organize and implement a web-based data base on the history of mathematical sciences in medieval Islam. His most recent publication is Pi: A Sourcebook published by Springer-Verlag.

Alan C. Bowen is a historian of ancient Greco-Latin science with research interests in astronomy, harmonic science, and mathematics. He also served as Editor of the series of publications, Sources and Studies in the History and Philosophy of Classical Science, and has produced camera ready copy for all the volumes printed to date. He believes that the challenge now is to increase the series'

accessibility by making it an electronic publication. Ideally, this publication should be part of a Web site devoted to research and publication in the history of science and medicine in the ancient world.

Richard Creath is a professor of philosophy at Arizona State University, where he publishes chiefly in philosophy of science and in the history of twentieth century philosophy of science. He is also the editor and sometime curator of the Rudolf Carnap Collection at the University of Pittsburgh. He is interested in electronic publishing as a means of making previously unpublished or currently out of print material available to scholars and students. Because of special features of this collection he is also interested in issues of copyright and royalties.

Beth Davis-Brown has worked professionally in academic, technical, and special libraries since receiving her MSLS from the University of Tennessee in 1984. Since late 1994, she has been working in the field of digital libraries at the Library of Congress. As assistant to Dr. Sarah Thomas, Head of Cataloging Directorate, Ms. Davis-Brown coordinated a three day conference on "Cataloging Digital Documents" held at the Library and the University of Virginia. Beth Davis-Brown and her colleague David Williamson subsequently published LC's first "online proceedings" from the seminar on the WWW, and co-authored an article that appeared in an issue of Cataloging and Classification Quarterly about cataloging digital documents at the Library of Congress. Since 1995, Ms. Davis-Brown has been the contact person for the LC National Digital Library Program specializing in issues of bibliographic control of digital materials, coordinating Library sponsorship of the Encoded Archival Description development effort, and assisting in implementation of SGML encoded finding aids. While continuing these responsibilities, in January of 1997 she took over as Digital Conversion Project Coordinator for the Law Library of Congress. In this position, she supervises a team in an effort to convert and make available via the WWW over 350,000 page images from early congressional materials and over 668,000 kilocharacters of encoded text. Ms. Davis-Brown co-chairs a Library-wide committee on implementation of the EAD and as a member of the LC SGML Working Group. She also participates on the LC Repository Implementation Working Group on a project affiliated with CNRI in Reston, Virginia, and has worked with the University of Maryland Human-Computer Interaction Laboratory on a contract they held to analyze LC WWW site design and navigation. Finally, she has recently been named as a participant in an NSF panel that will study digital libraries in Japan.

Clark A. Elliott became Librarian of the Burndy Library at the Dibner Insitute for the History of Science and Technology at MIT on 1 February 1997. Before that, he was for twenty-five years the Associate Curator of the Harvard University Archives. He has published on archival topics and historical research methodology, and on the history of science in the United States. Among his publications are: Biographical Dictionary of American Science: The Seventeenth through the Nineteenth Centuries (1979), and, most recently, History of Science in the United States: A Chronology and Research Guide (1996). He co-edited Science at Harvard University: Historical Perspectives with Margaret W. Rossiter (1992). Dr. Elliott founded and, between 1980-1987, was editor of History of Science in America: News and Views, which is now the newsletter of the Forum for the History of Science in America. He recently was elected as chair of the Forum. His research interests are in the history of science in nineteenth-century America, and especially in scientific biography, careers in science, and the relations of individual and community. He is co-editing a forthcoming Osiris volume on the

historiography of commemorations of scientific anniversaries. In the area of electronic publication, his interests are from the perspective of the historiography of the history of science and from that of a provider of research materials (archival resources and primary printed texts). Among salient concerns are the identification of appropriate materials for such distribution, the relation of electronic accessibility to the totality of research materials, the importance of format in evaluating historical evidence, preservation, and similar issues.

David Joyce, Associate Professor of Math and Computer Science at Clark University. After receiving his Ph.D. in 1979 in mathematics at the University of Pennsylvania in knot theory he boradened his interests to other branches of mathematics, and to computer science and the history of mathematics. Recently he has been working on Euclid's Elements with minor modifications in its translation, a commentary, and illustrations using a Java applet. Its current form is on the web at: http://aleph0.clarku.edu/~djoyce/java/elements/elements.html

Gary Marchionini was editor of hypertext publications for the Association for Computing Machinery (pre web days). He struggled with many issues related to hypertext publications in producing the ACM Hypertext Compendium, a collection of articles about hypertext marketed in KMS (Unix), HyperCard (Macintosh), and ASCII formats. Mr. Marchionini currently serves as co-editor for the new online journal, Journal of Digital Information, sponsored by the British Computer Society and Oxford University Press. This may be found at: http://jodi.ecs.soton.ac.uk

Ron Overmann became interested in electronic publications as a result of "talking points" he had to write for Dr. Mary Clutter, Assistant Director for Biological Sciences at the NSF. Dr. Clutter had to speak before an assembly of Academic Press Directors and wanted Ron to find out for her the progress of electronic publications. Through that experience, Mr. Overmann became involved with colleagues at NEH and the National Archives, held several workshops at NSF, and worked with advisory panels to establish a policy for electronic publications for the STS Program. The Einstein Papers Project was the particular focus of this effort and Mr. Overmann engaged in negotiations with Princeton U. Press, Hebrew University, various ministries in Italy and Germany and the Einstein Papers Project. This whole effort collapsed when the President of Hebrew was killed in an automobile accident. With his death, Hebrew University discontinued cooperation on an electronic project. In Washington Mr. Overmann helped establish an interagency "funding group" of NEH, NSF, & NHPRC to pursue similar projects. He recommended for support a number of projects including the Perseus Project. Mr. Overmann retired from NSF in 1996.

Alex Soojung-Kim Pang studied History and Sociology of Science at the University of Pennsylvania, and conducted postdoctoral research at Stanford and Berkeley. In 1996 he became Deputy Editor of the Encyclopaedia Britannica, where he directs content development for its print and online products. He has published articles on American science and technology, Victorian astronomy, and visual representation in science.

Kimberly Parker just became the Electronic Publishing and Collections Librarian for the Yale University Library at the beginning of November 1997. Before that, she was the Chemistry Librarian and Science Bibliographer at the Sterling Chemistry and Kline Science Libraries of Yale

University. Among her many past projects have been efforts to create a virtual desktop environment for chemists, and electronic seminar options for the discussion of articles. She is currently wrapping up a small project that experiments with digitizing classic science articles. Kimberly began her career as a National Library of Medicine Associate and her current position is returning her to her roots with responsibilities that include ensuring appropriate coordination of effort in the electronic arena between the Yale Medical Library and the Yale Library System.

Duncan M. Porter (AB, Stanford, 1959; AM, Stanford, 1961; PhD, Harvard, 1967; (all in Biological Sciences). Professor of Botany, Virginia Tech (at VT since 1975), and Director, Darwin Correspondence Project, Cambridge University Library(1997). Also taught at the University of San Francisco (1967-68) and Washington University (1968-72); Curator of the Flora of Panama, Missouri Botanical Garden, St. Louis (1968-72); Editor-in-Chief, Flora North America, Smithsonian Institution (1972-73); Associate Program Director for Systematic Biology, National Science Foundation (1973-75); Senior Editor, Darwin Correspondence Project (1991-97). Electronic publication of THE CORRESPONDENCE OF CHARLES DARWIN, the tenth volume of which was published in June 1997.

Melissa Smith Levine is the Legal Advisor to the National Digital Library Project at the Library of Congress. Ms. Levine provides legal review of Library materials for matters such as copyright, publicity and privacy concerns before NDL collections are released online. She also serves as liaison between the NDL staff, Library collections staff, the Copyright Office, and the Office of General Counsel for legal and contractual matters. Formerly, Ms. Levine worked at the Smithsonian Institution where she was responsible for negotiating and drafting contracts for business activities including publishing (in print and electronic media), licensing, and traveling exhibitions. She has a longstanding interest in public policy, law, and business relationships as they affect museums, libraries, and other cultural institutions.

Michael M. Sokal is Professor of History at Worcester Polytechnic Institute. As Executive Secretary of the History of Science Society (1988-1992) he followed developments in electronic publication closely. As a Visiting Program Officer at the National Endowment for the Humanities (1995), he participated in the definition of NEH's "Teaching with Technology" initiative. As Editor of HISTORY OF PSYCHOLOGY, a new quarterly about to be launched by the American Psychological Association, he is now especially interested in the potential impact of electronic publication on otherwise traditional scholarly journals.

Charlene Key Sokal As Head of Reference and Readers' Services in History at Worcester Public Library, Charlene Key Sokal is interested in the potential of digitizing overused collections. As Head of Periodicals, she follows developments in electronic serial publication.

Liba Taub has been Curator of the Whipple Museum of the History of Science and lecturer in the Department of History and Philosophy of Science at the University of Cambridge since 1995. Prior to this, she was Curator and Head of History of Astronomy Department, Adler Planetarium and Astronomical Museum (Chicago) and Instructor, Department of History, Loyola University and Northwestern University. Author of Ptolemy's Universe: The Natural Philosophical and Ethical Foundations of Ptolemy's Astronomy and various

articles, mainly on history of astronomy. Exhibitions include: The Universe in Your Hands: Early Tools of Astronomy (Adler Planetarium, permanent exhibition); A Heavenly Library: Treasures from the Royal Observatory's Crawford Collection (National Museums of Scotland; published catalogue); An University within Ourselves: Sciences in Cambridge in the Eighteenth Century (Whipple Museum). Interest in electronic publishing includes work on the Virtual Teaching Collection, in conjunction with the University of Cambridge Museum of Archaeology and Anthropology, to develop software and a database of digital images relating to archaeology and history of science.

Adam Thornton is a fourth-year graduate student at Princeton, studying the history of computing. His involvement with electronic publishing in the history of science goes back to his work at Rice with Al Van Helden on the Galileo Project. He was much of the enthusiam and the first implementor of the Galileo Project. He began in the spring of1993 (seehttp://es.rice.edu/ES/humsoc/Galileo/Reports/thornton.html) working on
the initial stages of the Galileo Project through a fairly complete prototype, and stopped active work on its development in May of 1994 upon graduation from Rice. Since that time he has, in some wonderment, watched the Web become a major component of pedagogy.

Albert Van Helden teaches history of science and technology at Rice University. The "Galileo Project" was begun as an effort to move the transfer of routine information out of the class room, in order to leave more time for discussion. The project has been used since 1995 in his course on the life and works of Galileo. The site was made generally available in September 1995 and has been used extensively by others for various purposes, including primary and secondary education. It has been incorporated in the National Endowment for the Humanities' EDSITEment Web site, where it is ranked in the top twenty educational web sites in the country.

**Appendix C. Agenda and Participants for the Electronic Publishing in the Humanities Workshop**

# Thursday, Feb. 5

Out-of-town participants in the archaeological publication meeting arrive Thursday evening.

# Friday, Feb. 6

8:45: pick up at Clarion Suites Hotel
9:00-9:30: Hogan 408-409, coffee and light breakfast

## Friday sessions in Hogan 408-409

Because archaeological publication raises special problems of representing spatial and temporal information, participants with special interest and expertise in archaeological publication will meet a day early to focus specifically on these issues. Interesting Web sites dealing with similar issues outside of archaeology include:

- Virtual geography department: provides peer review, templates for different types of publications and access to distributed material from a single Web site
- Open GIS consortium (OGIS): defines standards for GIS interoperability; includes definitions of both data and operations

**A.M. session: electronic publication and analysis of previously published field work**

9:30: Welcome to meeting. Neel Smith
9:45: Nick Cahill introduces his work on Olynthus: a post-excavation analysis of an extensively documented site.
10:45: Sebastian Heath introduces a Registry of Mediterranean Pottery. (See the currently available version of this at http://antaeus.holycross.edu/rmp.) A synthetic database of material from many field projects.
12:00 - 1:00 lunch at Crossroads (on campus)

**P.M. session: recording and publication of ongoing field work**

Haci Musalar: planning for all-digital recording and publication of a current field project.
1:00-2:00 Mark Garrison introduces the recording system used in the excavation.
2:00-3:00 Pedar Foss introduces current work on the regional survey.
Coffee break
3:30-4:30 Summary discussion: identifying areas of overlap and planning for support of archaeological publication
6:00 Dinner at Brew City

# Saturday, Feb. 7

8:45: pick up at Clarion Suites Hotel
9:00-9:30: Hogan 408-409, coffee and light breakfast

## A.M. session1: wrap-up of discussion of archaeological publications

9:30-10:30 Archaeological publication group summarizes plans
10:30-11:00 Coffee break

## A.M. session 2: opening of plenary meeting

11:00-12:00 Tom Martin and Neel Smith: introduction, including presentation of results of archaeological publications group
12:00-1:00 Lunch at Crossroads (on campus)

## P.M. session: rethinking publication in an electronic environment

1:00-2:00 Rethinking collaboration: Ross Scaife introduces an example of authors working together on a common publication.
2:00-3:00 Rethinking interaction: David Smith introduces an example of publications that work together in a common library.
3:00-3:30 Coffee break

3:30-4:30 Rethinking the institutional context: Greg Crane introduces some current initiatives to support electronic publication.

# Sunday, Feb. 8

8:45: pick up at Clarion Suites Hotel
9:00-9:30: Hogan 408-409, coffee and light breakfast

## A.M. session: planning to support electronic publication

9:30-10:30: assessing effects of electronic publication: Gary Marchionini initiates discussion with reactions to the previous day's discussion
10:30-11:30: a consortium to support electronic publication?
Informal discussion can continue over lunch as departures for airport get begin.

**Participants**

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