

***ECHO 2: EXPLORING AND COLLECTING THE HISTORY OF SCIENCE,
TECHNOLOGY, AND INDUSTRY IN A DIGITAL ERA***

A Proposal to the Alfred P. Sloan Foundation

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Roy Rosenzweig, Dan Cohen, Tom Scheinfeldt
Center for History and New Media
MSN 3GI
George Mason University
Fairfax, VA 22030
roy@gmu.edu, dcohen@gmu.edu, jscheinf@gmu.edu
Phone: 703-993-4532 (office); 703-522-2334 (home);
<http://chnm.gmu.edu/>

INTRODUCTION AND OVERVIEW

The decade since the World Wide Web emerged in public consciousness has brought astonishing changes for historians. When we wrote an early guide to the Web for historians in 1995, we thought we would impress readers by telling them that a search on “FDR” brought up 49 “hits” in a search engine. Eight years later, the same search yields 627,000 hits. As early as 1996, the History Web had become a densely populated city that no one person could fully explore. Yahoo! counted 873 U.S. history websites in an incomplete reckoning that fall. But seven years later, an equally partial census returned almost ten times as many American history websites and 33,515 sites under the history rubric. Even that underestimates the pervasiveness of the past online. Nearly every scholarly journal duplicates its content online, and almost every history course has its syllabus posted on the Web. Nearly every historical archive, historical museum, historical society, historic house, and historic site—even the very smallest—has its own website.

This remarkable explosion of online history in quantitative terms has not always been matched qualitatively. Most historians have not been using the Web and other digital tools to their fullest potential. While the posting of course materials, essays, and exhibits makes excellent use of the distributive properties of the Internet, it fails to take into account the true nature this network of computer networks. It is, after all, the *Internet*, in its very name representing the way this network shuttles information *between* and *among* people, rather than just a publishing medium that goes from point A (historians) to point B (an interested audience). As we enter the second decade of this medium most historians continue to consider the Web an electronic bullhorn rather than a place where history can be created and exchanged. Only a tiny fraction of historians have discovered that the Internet can be a medium for collecting as well as presenting the past.

This narrow view of the Web has in turn meant that historians generally have failed to fully explore technologies and methods that could help them, their subjects, and their audiences find each other and in the process generate a more extensive and robust historical record. In their Web projects, few historians use sophisticated infrastructures like databases that permit sites to serve complex content efficiently. Few know how to take full advantage of the massive databases that have become available for historical research. Few successfully use Web search engines and other forms of publicity to bring visitors to their sites. Relatively few observe basic technical, archival, and coding standards – an unsurprising failure given that no history departments provide systematic training in the use of digital tools and resources. To observe that history is all over the Web is not, in short, to say that historians are making effective use of either the Web or other digital media and tools.

For the past decade, the Center for History & New Media (CHNM) at George Mason University (GMU), through *ECHO: Exploring and Collecting History Online—Science & Technology*, its progeny the *September 11 Digital Archive*, and other projects, has explored this more substantial potential of the Internet; we have done this by pursuing methods, tools, and technologies for transferring information, data, and documents not just from historians to an audience, but also in the other direction, from an audience or set of historical subjects to the scholars who wish to document their recollections and gather from them important historical materials. (See Appendix 1 on CHNM.) In particular, with the active encouragement and support of the Sloan Foundation, CHNM has taken a central role in fostering the use of the Internet to collect the history of science and technology—a response to the dilemma that the output of science and technology is growing at a much faster rate than the means of collecting and documenting that history. As testified by the Library of Congress’s accession of the *September 11 Digital Archive* and by the alliances of *ECHO* with major institutions such as NASA, NIH,

the Smithsonian Institution's National Museum of American History, the World Bank, and United Nations Development Programme, we believe that we have become important leaders in a online historical movement that is now moving into the mainstream. Just recently, for instance, the Ford Motor Company established a website to collect memories and other documents for their 100th anniversary celebration, and the National Park Foundation has an online presence gathering World War II recollections for its Rosie the Riveter Park.

But even as work in digital history is gaining legitimacy, the nature of that work is continuing to shift. The methodologies developed by the *ECHO* Project will need to continually change along with rapid developments in digital technology. The research firm Gartner Inc. projects that instant messaging will surpass email usage by 2005; the transmission of voice and audio over the Internet is booming, and Bob Metcalfe, one of the leading lights at Xerox PARC, foresees video traffic overtaking the data traffic of the Web in this decade. At the start of the twenty-first century, digital technologies and media thus promise to even more profoundly reshape the ways that historians (both professional and amateur, popular and scholarly) research, collect, preserve, analyze, discuss, and present the past.

This proposal responds to these circumstances (the growing use of digital technologies among historians, the enormous potential of those technologies, and the unevenness with which that potential has been tapped) and seeks to leverage the power of the digital medium to improve the research, writing, and presenting of the past within three major fields—the histories of science, technology, and industry. We will work with diverse practitioners in these fields to foster and facilitate their uses of digital media, particularly its utility as a mode of collecting as well as researching and presenting the past.

ECHO 2: Exploring and Collecting History Online—Science, Technology, and Industry will do that by offering outreach and training, developing easy-to-use tools, and experimenting

with new approaches to collecting history online. In so doing, it will build directly on the success of two previous projects funded by the Alfred P. Sloan Foundation—*ECHO 1* and *the September 11 Digital Archive*—taking the best elements of those projects and extending them to new domains and practitioners. In particular *ECHO 2* will:

- Expand, institutionalize, and improve the practice of digital history, especially the collecting of history online, through workshops, consultancies, and conference presentations.

(Project Plan, Sections I.A, B, & D)

- Enable that practice by providing cost-effective easy-to-use software tools and hands-on guides. (Sections I.C & E; Appendix 5 A)

- Broaden that practice by bringing the approaches that have been piloted among historians of science and technology to historians of business and industry. (Sections I & II)

- Experiment with new approaches to the online collecting of history both by considering new methodologies and technologies and by piloting these new approaches and tools in the development of the first comprehensive website on the history of Open Source software, which poses particular opportunities and challenges for this practice, in addition to being a crucial yet relatively unexplored topic in the recent history of science. (Section II.A; Appendix 6)

- Demonstrate the potential of this method by publishing scholarly articles on Open Source software. (Section II; Appendix 6)

- Pilot innovative approaches and tools for the researching, writing, and presenting of the history of science, technology, and industry in a digital era, while retaining our core focus on online collecting. (Section II B; Appendix 5 B)

At the broadest level, our goal is to fulfill the potential of digital media and networks to create a more democratic history that incorporates democratic content (open to multiple voices and diverse perspectives); democratic access (accessible to multiple audiences); and a

democratic practice (that that can be participated in by many different people, not just “certified” professionals). When *ECHO* was selected as a Yahoo! Pick in October 2003 (one of only four history of science sites ever selected), the editors highlighted this felicitous outcome of our work: “It's one thing to read a one-sided news article or textbook account of events that impact us, whether it's the Columbia tragedy, the Apollo lunar missions, or the advent of computers and the Internet. It's another thing entirely to share your own first-hand account of these pivotal moments. That's what this site is all about. Its mission is to pool our collective Memory Bank and create a multi-faceted, engaging record of science and technology history.”

Despite these populist goals, we retain a strong commitment to serious and scholarly history. We want to foster a democratic historical practice that draws upon the most exacting standards and approaches of professional historians and archivists. The Library of Congress's acquisition of the *September 11 Digital Archive* shows that our democratic approach is compatible with—indeed fosters—the creation of resources of enduring value to scholars.

And, finally, we believe that this democratic, but scholarly, historical practice is best achieved through methods that are pragmatic, experimental, and hard-headed—ones that draw more from the world of the entrepreneurial businessperson or the grass-roots organizer than from the faculty lounge or the musty archive. Thus, in our prior work, we have emphasized the importance of moving ahead quickly even if imperfectly. The success of the *September 11 Digital Archive*, for example, rested on launching our site within two weeks of being funded. And we have also stressed the importance of cost-effective strategies—for example, developing tools that had can be deployed quickly and easily by others and then re-used multiple times.

The work we have already done on *ECHO 1* and the *September 11 Digital Archive* has made significant strides in these directions of fostering a digital historical practice that is simultaneously popular and democratic, serious and scholarly, pragmatic and cost-effective. It is

our strong contention that the two-part plan for *ECHO 2* outlined below will allow us to leverage the potential of digital tools and media to more fully accomplish those goals. (See Appendix 2 for Project Team and Appendix 3 for detailed work plan.)

PROJECT PLAN

I. EXTENDING AND ENABLING DIGITAL HISTORIES OF SCIENCE, TECHNOLOGY, AND INDUSTRY

This first part of our work— extending, enabling, and enhancing the practice of digital history, particularly online collecting, by training and supporting practitioners in the history of science, technology, and industry—emerges directly from our experience with *ECHO 1*. In the winter of 2000, CHNM received a three-year grant from the Sloan Foundation for “Fostering the Recent History of Science and Technology in New Media.” That project responded to the Sloan Foundation’s earlier initiatives directed at developing a new practice—collecting, documenting, and disseminating the recent history of science and technology through electronic media. These innovative experiments produced promising (but uneven) results, and we argued that, like all experiments, these efforts needed refinement and expansion if they were to have a broad and lasting impact.

We began our work by assessing what had been done in this area (especially under Sloan’s aegis), and produced (with the help of leading outside advisers) a seventy-page white paper, “Fostering The Recent History Of Science And Technology In New Media: A Report On Past Practices And Future Directions,” which subsequently guided our own efforts and aided a number of other practitioners. Our work has focused primarily on providing outreach, training and other resources, including workshops, consultancies, online tools, a practical guide to doing history online, a series of memory bank pilot projects and a virtual center for the history of science to help establish a community of like-minded historians. In almost all these areas, we have gone significantly beyond the benchmarks that we set out in our original proposal (See Appendix 4 for *ECHO 1* deliverable, results, and website traffic.)

In *ECHO 2* we will continue working to extend and enable this emerging practice. Building on lessons learned in *ECHO 1*, we have determined that some historians will require more traditional, live interactions in a workshop setting (the most costly form of communication of knowledge from the *ECHO* team), while others will be able to engage in the new online practice virtually through our Web presence and automated tools (the least costly form). There will also be hybrid forms of consulting that will involve both personal interaction and automation, as we have done, for instance, in our collaboration with the National Institutes of Health, where several live meetings combined with the use of our Web-based tools led to a successful project on the history of the discovery of the compound hCG and the associated creation of the home pregnancy test. We expect that tiered, varying levels of support will enable us to reach the largest number of practitioners in the most cost-efficient manner. While the resources committed to this aspect of *ECHO 2* will therefore be roughly the same as in *ECHO 1*, we expect to at least double the number of people we directly work with, creating at least on hundred new sophisticated users of digital technologies and media for the history of science, technology, and industry. The numbers we will reach indirectly through our tools and guides (and, hence, less expensively) are more difficult to estimate, but we would hope that at least 2,000 historians make use of these resources. The following five modes of outreach are intended to meet the varying requirements of varying practitioners in depth and breadth, and at the lowest cost possible:

A. WORKSHOPS. In *ECHO 1* we used a mix of strategies to provide outreach and training for practitioners of online history. The most direct was through two in-person and two online workshops, which reached thirty-six historians of science and technology. Some workshop participants developed notably successful projects, such as Josh Greenberg's history of the video

industry, which collected almost 900 entries, and Shelly McKellar's Project Bionics, which later received separate Sloan funding.

In *ECHO 2* we will expand and enhance this program of workshops. Beginning in July 2005, during each summer for the rest of the funding term, we will offer week-long intensive workshops for fifteen participants who plan to create online projects in the history of science, technology, and industry. The addition of business and industrial history here is a crucial expansion of our previous work. To reflect this enlarged mandate we will change the subtitle of *ECHO* to "Exploring and Collecting History Online—Science, Technology, and Industry." The workshops will be one of the first and more obvious ways we will bring our work to a large and new constituency of historians. Moving into these new areas will, of course, pose new challenges for our work. In particular, the collecting of recent business and industrial history is much more likely to raise legal and privacy issues than work in science and technology; this expansion will require that we work with consultants familiar with issues of intellectual property and business archives.

A second element that will distinguish these workshops from those in *ECHO 1* is that while they will continue to emphasize the possibilities of the online collecting of history, they will have a wider focus on digital history in general. In that, they will mirror the orientation of our Practical Guide, which covers all the topics of interest to digital historians (e.g., Web design and infrastructure, digitization, copyright and legal issues, publicity, collecting, preservation) and which will serve as the text for these workshops. We have found that it is often difficult to discuss the facets of online historical collection without covering these other topics, and that workshop participants will be less likely to flounder in their projects if they have an understanding of the totality of what they need to know and do. Moreover, expanding the focus beyond collecting will allow us to attract the larger numbers of historians of science, technology,

and industry who work on earlier eras than the past seventy years. These historians have much to gain from making use of new media and digital tools even if they do not engage in gathering the past online. While we will be devoting significant resources to training a modest-sized cadre of forty-five historians, we believe our efforts will have a major and lasting impact on the quality of work in digital history, especially because we will focus especially on graduate students and younger historians who will be themselves training the next generation of historians.

We will give these workshops greater national visibility by co-sponsoring them with the American Historical Association and the new National History Center that is being planned for Washington, DC. (See Appendix 9 for letter of commitment.) That official imprimatur will serve to attract a wider constituency for the workshops and, in particular, help young historians to see digital history as an important part of their career training. The need and demand for such training has been a frequent topic in recent national reports (e.g., AHA's just-published, *The Education of Historians for the 21st Century*, which cites CHNM's work as a model) and conferences (e.g., the 2003 conference on "Transforming Disciplines: Computer Science and the Humanities.")

In addition to these summer workshops in Washington, we will offer four, shorter (and less costly) workshops for at least forty public historians at locations convenient to their workplaces. In Washington, we will hold one Smithsonian workshop for the combined staffs of the National Museum of American History, the Air and Space Museum, and the Smithsonian Archives, and another for staff from the National Park Service. In New York and Chicago, the workshops (held respectively at the New-York Historical Society and the Chicago Historical Society) will invite all area public historians concerned with the history of science, technology, and industry. (See Appendix 9 for letters of commitment.)

B. CONSULTANCIES. In *ECHO 1* some of our most effective work was as consultants to specific projects, offering conceptual, organizational, and technical assistance. Such assistance allowed those we worked with to move swiftly from the planning stages to an active online presence and to get past unnecessarily complicated technical and legal issues related to online collecting of personal materials. In our work with the *September 11 Digital Archive*, for instance, we were able to help major institutions such as the Library of Congress and the Smithsonian Institution's National Museum of American History set up online collection efforts, in addition to assisting individual historians who had already established similar projects. Likewise we have worked with dozens of historians and institutions beyond those who enrolled in our workshops. In some cases, our help was confined to a couple of long phone calls and emails; in others, it stretched over a period of months. Most recently, for example, we helped the National Institutes of Health launch what they expect will be the first of several websites documenting the history of innovation at NIH, in this case the history of the home pregnancy test. Without *ECHO*'s help, it is unlikely that the project could have moved beyond the drawing board, since the *ECHO* team provided help at all stages, including conceptualization, Web and database design, and outreach. We also allowed the NIH history office to cut through red tape and execute the project fairly rapidly by hosting some of the more sensitive aspects of the project (including the collection mechanism) on the *ECHO* server.

In *ECHO 2* we would like to continue the type of work we've done with NIH, NASA, and the Smithsonian by expanding our consulting services to twenty-five other individuals and institutions. We will solicit individuals for proposals, and those selected will receive at least one day of consulting advice and a \$500 start-up grant.

C. TOOLS AND RESOURCES. One of the most important conclusions of our white paper was that many early Sloan-funded projects had expended (and in some cases squandered) resources

by developing their own, unique, technical infrastructure. Worse still, these expensive setups often delayed the launch of their projects and then stopped working as the host institution changed computer platforms. We concluded that we needed to make it much less expensive, less complicated, and less time-consuming for historians of science and technology to get involved in the online collecting of history—a decision that led to the development of a tool that we came to call the Survey Builder. Survey Builder allows historians to set up online forms for collecting historical information quickly and with no programming background. More than 350 people have signed up to use the two iterations of Survey Builder. Another CHNM tool that has aided online history projects is our Web Scrapbook—a collaborative tool that organizes historical documents and facilitates the work of dispersed teams. We believe that the tools and resources (including the white paper itself) we have provided have expanded and improved the practice of online history.

Under *ECHO 2*, we will enhance and refine existing tools and develop new tools that will allow additional groups and institutions to organize themselves to collect and disseminate the past on line, including Survey Builder 3.0 (an improved version of our tool for collecting historical reminiscences online); Collection Builder 1.0 (a new tool that will allow online collecting of photos, art, email, and other resources); History Site Builder 1.0 (a new tool and set of templates to enable individuals to create history websites quickly); and Virtual Center 2.0 (a greatly expanded version of our current guide to websites—the leading portal for the history of science and technology—which will also include the history of industry). (See Appendix 5 A for more detailed discussions of these tools and resources.)

D. OUTREACH TO SCHOLARS AND PUBLIC HISTORIANS: One of the biggest fallacies of the digital world has been “build it and they will come.” That has not worked in the realm of online history collecting, as our white paper showed. It also will not work in the effort to bring new

historians into the practice of online history. Thus, any effort to spread this practice needs also to include a marketing effort to make scholars aware of the potentials of these new methods and approaches. In *ECHO 1*, we made historians aware of our work through twenty presentations at scholarly and public history meetings, articles or announcements in ten historical newsletters and journals, and tables and informal conversations at numerous historical meetings of groups like the American Historical Association, the Society for the History of Technology, and the National Council for Public History. In addition, we sent regular announcements about our work to the various H-Net lists and a list of 1,200 history departments that we developed ourselves. We also benefited from CHNM's alliance with *History News Network* (HNN), an online newsletter that reaches more than 11,000 historians (professional and popular) and that ran more than forty announcements about *ECHO*-related projects. In *ECHO 2*, we will continue this evangelizing work through similar mechanisms. Since we have not addressed them previously, we expect to focus half of this effort on people working on industrial and corporate history. We plan a total of ten newsletter articles, four conference presentations, and a thousand personal letters and emails in our outreach efforts in *ECHO 2*.

E. PRACTICAL GUIDE. In-person workshops and consultancies are effective, but they are also impractical for many people and expensive for us to staff. Our tools provide both an alternative and a supplement for many historians. Our free, online Practical Guide to doing digital history is another resource that reaches additional historians while also providing crucial background reading for those with whom we work directly. Although our original version served this purpose, we realized that a more substantial guide dealing in detail with a larger number of issues would have a much broader impact. In order to satisfy those who wanted to have a print version of such a guide and to leverage the distribution reach of a publisher, we secured a contract with University of Pennsylvania Press, which allowed us to retain the right to offer the

guide for free online. Naturally, the print publication has set a more demanding standard for the final product and has slowed our work on this aspect of *ECHO*. Still, we expect to finish the book in the summer of 2004 and we believe it will be a lasting legacy of our work.

In *ECHO 2* we will release the first version of our Practical Guide online in Fall 2004 and in print in Fall 2005. Such guides inevitably require revision, especially given the changing nature of digital media and new tools that historians and their subjects are already using, like video conferencing and instant messaging. We will produce a new version by Spring 2007, which will address these new elements of digital communication and formats for historical documents in the recent history of science, technology, and industry. In addition, the second version of the Practical Guide will include shortcuts to the construction of historical websites using the new and revised tools of this section. We will heavily publicize the first and second editions of the Practical Guide, and expect that at least 1,000 historical practitioners will read it, which will be assessed through server logs and book sale figures.

II. EXPERIMENTING WITH NEW MODELS FOR DOING AND WRITING ONLINE HISTORY

The approaches outlined above build most directly on what we have already done through *ECHO 1* and the *September 11 Digital Archive*; they seek to extend our successes with new tools and new audiences. But it would be a serious mistake to codify a practice that has just emerged. We need to experiment with new approaches and move in new directions so as to renew and revise the practical advice we are offering. Just as we believe that being a good researcher makes one a better teacher, we believe research into the practice of online history will make us better teachers of that practice. Below we propose two different kinds of experimental work under *ECHO 2*: (1) new approaches to gathering online historical communications and documents; (2) new methods for effectively searching, cataloging, and using digital materials to write the history of science, technology, and industry.

Sloan's work with digital history was first funded in 1997 when the Web had only recently emerged into public consciousness. At that time the notion of "using the World Wide Web for investigating and documenting contemporary events in the history of science and technology" was a bold, controversial, and unfamiliar approach to gathering the past. Only now is the use of the Web for this purpose starting to become an accepted idea. What are the new technologies that might further alter modes of collecting and preserving the recent past? The most obvious change since 1997 has been the development of relatively ubiquitous high-bandwidth networks that makes voice and video communication remarkably easy and cheap. For example, according to the Pew Internet & American Life Project, the use of broadband connections at home has increased by fifty percent.

Can these technologies be used to, in effect, create a richer historical record? We suspect the answer is yes. For example, it is probable that the expensive process of oral historians traveling around the country with their equipment will soon become obsolete; new technologies, such as high-bandwidth networks, will likely replace these traditional methods. Consequently, we see the need to develop techniques, protocols, and technologies for using voice-over-IP and Internet video conferencing (or A/V chat) to capture the reminiscences of people central to the history of science, technology, and industry. While piloting experiments with these audio-visual technologies, we also want to experiment with the much simpler and more ubiquitous technology of instant messaging, which has the considerable virtue of being like a conversation and being self-documenting, i.e., the results of conversation can be easily captured, archived, and searched (and do not require costly transcription).

In *ECHO 1* we determined that it makes the most sense to pilot these approaches through real-life case studies in the history of science and technology because the pressures of producing usable results push one to most effectively and critically evaluate the quality of the work being

produced. Although *ECHO* was not designed primarily as a collecting project, we decided that we needed to engage ourselves in the practice that we were promoting. Our own experiments with online collecting have been important in piloting new approaches and developing best practices that we can teach to others. Over the past few years, we have mounted ten different projects on a range of topics — from the information theorist Claude Shannon to the experience of female scientists to the Three Mile Island Accident in 1979 — and have thus far collected more than 800 responses to our online historical surveys (our goal for the entire *ECHO 1* project period was 500 responses).

The narrative above skips over a key event that significantly altered the course of our work in online history (and, of course, altered the lives of millions) — the September 11, 2001 attacks. In the aftermath of those devastating attacks, Jesse Ausubel invited us to submit a proposal to the Sloan Foundation to use digital means to collect and preserve their history. That project, the *September 11 Digital Archive*, which was developed in collaboration with the American Social History Project at the City University of New York, has quickly established itself as the most successful online history-collecting project developed so far. It has gathered more than 130,000 digital objects — emails, photos, reminiscences, digital art, etc. — on the September 11 attacks. Contributions have come in from every state in the union and dozens of nations, and the Archive has garnered publicity from major media outlets, including *The Wall Street Journal*, *The New York Times*, *The Washington Post*, CNN, and MSNBC. Perhaps the most important recognition of our success is that in 2003 the Library of Congress agreed to accession the archive, making it the Library's first major digital acquisition. Although the Archive was not officially part of *ECHO*, it has been our most successful case study — one that has offered myriad lessons for the practice of online history.

One lesson is that we need to develop more robust means of collecting a full range of

digital objects, not just personal narratives. Thus, our first project described below — a case study of the Open Source software — makes use of new techniques of collecting online historical communications (e.g., using instant messaging) and also gathers a much wider variety of digital documentation. Another lesson is that historians need to develop new techniques to mine the vast digital archives. Our second attempt to address what we have learned, also described below, comprises the development of new tools for research, collaboration, and writing in the history of science, technology, and industry.

A. ECHO 2 CASE STUDY IN COLLECTING HISTORY ONLINE. Our chosen case study for *ECHO 2* is a central one in the recent history of science, technology, and industry—the rise of the Open Source/Free Software movement. This movement and its technologies lie at the heart of some of the most important businesses to arise, or recreate themselves, in the last decade: Google (which uses free versions of UNIX to create a powerful network of tens of thousands of computers), Yahoo! (which uses the Open Source database MySQL to run its message boards), IBM’s resurgence as the world’s largest proponent of an operating system created by a teenager (Linux), and Apple Computer’s rebuilding of its operating system on an Open Source platform. Moreover, a remarkable two-thirds of all Web domains operate on the Open Source Apache Web server software. The success of Open Source has begun to garner interest from social scientists as well as, of course, computer scientists, but as yet it has not drawn attention from historians.

Our project will remedy that neglect, create a lasting historical resource, and develop new approaches to online collecting of history with a particular focus on the problem of documenting a historical subject that has no central archive or even any central direction. This decentralized structure of the Open Source movement poses particular challenges for the future of historical documentation. Traditionally, subjects in the history of science, technology, and industry have been documented largely through their institutional traces — the papers generated by labs,

universities, scientific and professional organizations, and corporations. The Open Source movement has resulted in some of these (e.g., companies such as Red Hat Linux or organizations such as Linux user groups), but they tend to be ephemeral and not representative of the movement as a whole. The key exception to the institutional nature of historical record is, of course, the importance of personal collections and papers. The Open Source movement has its own leading figures like Free Software advocate Richard Stallman and Linux developer Linus Torvalds, but the collective and collaborative nature of Open Source makes such figures less important than an Alexander Graham Bell or a Thomas Edison.

How then will the story of Open Source be documented and preserved? We propose both to make a start on documenting and telling that story, but also to do so, in part, as a way of developing new approaches to online collecting and new protocols and approaches for documenting the history of decentralized movements in general. This multifaceted approach will feature a new website under the *ECHO* banner that will include both a general historical record as well as project-specific records, including a consolidated archive (incorporating scattered documents on the history of Open Source); a comprehensive bibliography of writings; a multimedia online collection (with at least fifty instant message interviews and ten video conferences with primary movers behind key Open Source projects); a message board and online survey (to gather comments from participants in the Open Source community); a scholarship database (an open access collection of scholarship on Open Source, including at least two scholarly articles that we will write). (For more details on these features of the Open Source project, see Appendix 6.) Naturally, a full-fledged archive about and book-length history of Open Source and Free Software is more than we can accomplish as simply one component of a much larger project. As a result, we will also seek separate funding — probably from NSF — to develop the large-scale and full project that this topic deserves.

B. RESEARCHING AND WRITING THE HISTORY OF SCIENCE, TECHNOLOGY, AND INDUSTRY IN A DIGITAL AGE. Our previous work under *ECHO 1* and the other parts of this proposal focus particularly on the collecting of history—primarily efforts to use the Web to capture a history that is expanding exponentially and at a rate that exceeds our current ability to preserve it efficiently. But if we succeed in recording and preserving a past that might otherwise be lost, what will it be like to actually write history in a digital history? Will such a vast historical record overwhelm future historians? How will we sort through it, retrieve specific documents, find trends, prove and disprove hypotheses? How will materials in disparate collections be related to one another for a better historical understanding? It seems likely that historians will need new tools and approaches to researching and writing about the past in a digital era. Almost no work has been done on this problem, and we propose to make a start.

Our first step will be a small workshop of humanists, archivists, and computer scientists to discuss what has been done so far and what might be done. The participants will include some of the people who have begun to think about this problem, such as Michael Jensen, Director of Web Communications at the National Academies; John Unsworth, Dean of the Graduate School of Library and Information Science at the University of Illinois at Urbana-Champaign; Greg Crane, Editor-in-Chief of the Perseus Digital Library at Tufts University (and one of our advisers on *ECHO 1*); Orville Vernon Burton, Professor of History and at the University of Illinois and Senior Research Scientist at the National Center for Supercomputing Applications; and John Willinsky, Director of the Public Knowledge Project at the University of British Columbia. (We are awaiting funding to issue invitations to this workshop, but these are some of people we will invite.) We will produce a short report on digital tools for the historian that will be added to the Practical Guide.

The outcome of the workshop will shape our next step, but our tentative plan is to develop tools in three areas that seem particularly valuable: note taking and organizing; collaboration; searching and analyzing digital materials. Such tool building efforts will take advantage of three preliminary projects that we have already developed at CHNM — Scribe, the Web Scrapbook, and the Syllabus Finder. Our tentative plan is for three tools, but it may be modified based on feedback from the workshop: Scribe (an online historian’s note-taking program); Web Scrapbook (a scholarly collaboration tool that also allows the collecting and sharing of non-text documents); History of Science, Technology, and Industry Search Tool (a cross-site search of online resources in the history of science, technology, and industry, including those not accessible through standard search engines). (See Appendix 5 B for more detailed descriptions of these tools.)

In summary, our primary goal is to significantly increase the quantity and quality of practitioners of online history of science, technology, and industry. We will do that through direct training and workshops, outreach and consulting, and cost-effective and easy-to-use digital tools. At the same time, we want to experiment with new approaches to online collecting, especially through our own case study of Open Source software. And, finally, we seek to pioneer some new approaches and tools to researching and writing the history of science, technology, and industry in a digital era. While this is obviously an ambitious agenda, it is also one that is grounded in the realistic experiences and, we believe, significant successes of *ECHO I* and the *September 11 Digital Archive*. We are eager to build on those successes to foster a more sophisticated and democratic practice of digital history.

APPENDIX 1: THE CENTER FOR HISTORY AND NEW MEDIA

CHNM is a logical location for this project because of our long-term commitment to combining excellence in traditional historical scholarship with experimentation with new media. Over the past decade, we have established an international reputation for our innovative work at the intersection of new technology and the more venerable pursuit of the past. Our interest in making innovative use of new media grows directly out of our successful work in developing one of the first scholarly based CD-ROMs about U.S. history — *Who Built America? From the Centennial Celebration of 1876 to the Great War of 1914* (published by Voyager in 1993), which won the American Historical Association's James Harvey Robinson Prize for "outstanding contribution to teaching." (A sequel to that disk — *Who Built America? From the Great War of 1914 to the Dawn of the Atomic Age in 1946* — was published by Worth in 2000.)

In addition to the two projects funded by Sloan and discussed above, CHNM maintains a wide range of online history projects directed at diverse topics and audiences, making them available at no cost through its website (<http://chnm.gmu.edu/>). Among these are *World History Matters* (<http://chnm.gmu.edu/worldhistory>) and the forthcoming *Women in World History*, which help teachers and their students locate, analyze, and learn from online primary sources; and *History News Network* (<http://chnm.gmu.edu/hnn>), a Web-based magazine that places current events in historical perspective. CHNM and the American Social History Project/Center for Media and Learning at The Graduate Center of The City University of New York have collaborated on several projects also presented through the CHNM website, including *Liberty, Equality, Fraternity: Exploring the French Revolution* (<http://chnm.gmu.edu/revolution>), an online archive and teaching resource, and *History Matters* (<http://historymatters.gmu.edu>), a resource center and portal for teachers of U.S. history.

CHNM has also developed a number of online databases and other resources for historians and history teachers, including a listing of 1,200 history departments worldwide; a collection of essays on history and new media (<http://chnm.gmu.edu/assets/historyessays/essaystoc.html>); and a popular set of free digital tools for historians and teachers, including Poll Builder, Web Scrapbook, Scribe, Survey Builder, and Syllabus Finder (<http://chnm.gmu.edu/tools>). CHNM also provides online history consulting services and hosts several additional history-related websites, including the *Journal of Social History*, *Building the Washington Metro*, the *Business Plan Archive*, and *DoHistory*. Finally, CHNM has been actively engaged in professional development work for teachers for many years. It co-organized with ASHP the New Media Classroom, which has reached hundreds of high school and college teachers through national and regional workshops. And with support of the Department of Education, it is currently organizing three major projects on improving the teaching of American history in the schools. Since 1996, CHNM and its collaborators have received more than \$6 million in support for these projects from NEH, the Department of Education and the Rockefeller, Sloan, Gould, Kellogg, and Delmas foundations and Atlantic Philanthropies.

Although CHNM's projects are largely grant-funded, it has established a long-term institutional base for work in history and new media. With the help of an NEH challenge grant, it has raised a \$2 million endowment for support of its work. In addition, George Mason University has made a major commitment to supporting CHNM's work. The university has provided tens of thousands of dollars in equipment as well as 2500-square feet of office space. The Center is also slated to move into the university's new research building, where it will be the only unit from the

humanities to receive this sought-after space. The university also provides significant staff support to the Center, funding the positions of Webmaster and administrative assistant. In addition, five tenure or tenure-track faculty are closely affiliated with the Center, and GMU is unrivaled in the number of faculty who have backgrounds in history and new media. Of great relevance to this project is that the university agreed to move Dan Cohen to a tenure-track line in Spring 2003, a sign of its further commitment to CHNM and especially to digital work in the history of science and technology. Finally, CHNM benefits from its close association with GMU's doctoral program in history, which is the only doctoral program in the United States to feature work in new media and new technology. Four to five Graduate Research Assistants, funded by the university, are assigned to work at CHNM.

In 2003, CHNM's work in New Media was recognized by the Richard W. Lyman Award (awarded by the National Humanities Center and the Rockefeller Foundation), which was given to its founder and director, Roy Rosenzweig, for his "outstanding achievement in the use of information technology to advance scholarship and teaching in the humanities." This was only the second time that the Award has been given.

APPENDIX 2: PROJECT TEAM

Principal Investigator: Roy Rosenzweig is the Mark and Barbara Fried Professor of History & New Media at George Mason University, where he also heads the Center for History and New Media. He is the author, co-author, and co-editor of numerous books, including *A Companion to Post-1945 America*; *The Park and the People: A History of Central Park*; *The Presence of the Past: Popular Uses of History in American Life*; *Eight Hours for What We Will: Workers and Leisure in an Industrial City, 1870-1920*; *History Museums in the United States: A Critical Assessment* and *Presenting the Past: Essays on History and the Public*. He was co-creator of the prize-winning CD-ROM, *Who Built America?* and has been the director and executive producer of numerous Web-based projects at the Center for History and New Media. He currently serves as Vice-President of the American Historical Association.

Project Co-Director: Daniel Cohen is Assistant Professor of History at George Mason University. His research interests are in European and American intellectual history as well as the history of science. He received his bachelor's degree from Princeton University, his master's degree from Harvard University, and his doctorate from Yale University in 1999. His dissertation, winner of the George Washington Egelston Prize, examines the values and social motivations of the Victorian mathematicians who created the logical systems at the heart of modern computing. He is a co-author of the forthcoming *Making Online History: A Practical Guide to Presenting, Gathering, and Preserving the Past on the Web* (University of Pennsylvania Press). At the Center for History and New Media, he is the Managing Director of *ECHO: Exploring and Collecting History Online* and the Associate Director of the *September 11 Digital Archive*.

Project Co-Director: Tom Scheinfeldt is Research Assistant Professor and Managing Director of the *September 11 Digital Archive* at George Mason University. He received his bachelor's degree from Harvard and his master's and doctoral degrees from Oxford, where his doctoral thesis examined the public role of science history in the inter-war period. His research interests include the history of popular science, the history of museums, and the changing role of history in society, and he has worked extensively in the fields of public history and museum studies. Scheinfeldt is the author of several published articles, and he has presented the results of his research to numerous scholarly bodies, including the Royal Society of London, the International Union of the History and Philosophy of Science, the History of Science Society, and the British Society for the History of Science. He has lectured before audiences at the Smithsonian Institution and worked on exhibitions at the National Museum of American History, the Library of Congress, the Museum of the History of Science in Oxford, and throughout the State of Colorado.

Project Associate: Joan Fragazy works on the *September 11 Digital Archive* and the *ECHO* Project at the Center for History and New Media. She earned her bachelor's degree in History and Latin from Indiana University, where she also studied art history and music.

Project Associate: Marty Andolino works as a Web developer and system administrator at the Center for History and New Media. He earned his bachelor's degree in Information Management and Technology from Syracuse University.

Please find brief vitae in Appendix 8.

APPENDIX 3: WORK PLAN

July 2004 – December 2004:

- Place call for summer 2005 Washington workshop participants
- Arrange first on-site workshops with Smithsonian and Chicago Historical Society
- Place call for first twelve consultancies
- Plan and host tools conference
- Develop concepts and integrated architectures for tools including Survey Builder, Collection Builder, Site Builder, Scribe, and Web Scrapbook.
- Identify sites to add to Virtual Center
- Launch Virtual Center 2.0 *beta* including live feeds and new search functionality
- Publish first monthly website review
- Publish two newsletter articles
- Establish mass mailing list
- Launch online practical guide
- Build architecture for consolidated Open Source archive
- Complete research for Open Source bibliography and publish online
- Design online interview instruments and identify interview subjects
- Design and code Open Source message board and online survey forms
- Identify existing Open Source scholarship for inclusion in online database
- Begin establishing partnerships for Search Tool

January 2005 – June 2005:

- Design summer workshop format and materials
- Plan summer 2005 Washington workshop
- Hold first on-site workshops with Smithsonian and Chicago Historical Society
- Establish first twelve consultancies
- Begin Web-development for tools including Survey Builder, Collection Builder, Site Builder, Scribe, and Web Scrapbook.
- Index 500 new sites for Virtual Center
- Annotate 200 new sites for Virtual Center
- Publish two newsletter articles
- Distribute first mass email announcement
- Make first conference presentation
- Work with University of Pennsylvania Press on print version of Practical Guide
- Start outreach and collecting for consolidated Open Source archive
- Conduct first ten IM interviews and first two A/V interviews
- Start outreach and collecting with online message board and online survey forms
- Secure permissions and obtain existing scholarship for inclusion in online Open Source database
- Finish securing partnerships for Search Tool

July 2005 – December 2005:

- Hold summer 2005 Washington workshop
- Place call for summer 2006 Washington workshop participants

- Arrange on-site workshops with New-York Historical Society and National Parks Service
- Place call for second twelve consultancies
- Manage first twelve consultancies
- Index 500 additional sites for Virtual Venter
- Annotate 200 additional sites for Virtual Center
- Continue web-development for tools including Survey Builder, Collection Builder, Site Builder, Scribe, and Web Scrapbook
- Publish 2 newsletter articles
- Update mass mailing list
- Publish print version of Practical Guide
- Conduct second ten IM interviews and second two A/V interviews
- Launch online Open Source scholarship database
- Start research for first scholarly Open Source article
- Begin coding Search Tool
- Begin work on NSF book proposal

January 2006 – June 2006:

- Plan summer 2006 Washington workshop
- Hold on-site workshops with New-York Historical Society and National Parks Service
- Establish second twelve consultancies
- Manage first twelve consultancies
- Index 500 additional sites for Virtual Center
- Annotate 200 additional sites for Virtual Center
- Finish Web-development for tools including Survey Builder, Collection Builder, Site Builder, Scribe, and Web Scrapbook
- Publish two newsletter articles
- Distribute second mass email announcement
- Assess and report Practical Guide usage
- Begin updating Practical Guide
- Conduct ten IM interviews and two A/V interviews
- Complete and publish first scholarly Open Source article
- Finish and launch Search Tool with Scribe integration
- Complete and submit NSF book proposal

July 2006 – December 2006:

- Hold summer 2006 Washington workshop
- Place call for summer 2007 Washington workshop participants
- Manage consultancies
- Index 500 sites for Virtual Center
- Annotate 200 sites for Virtual Center
- Begin work on downloadable tools package including Survey Builder, Collection Builder, Site Builder, Scribe, and Web Scrapbook.
- Publish two newsletter articles
- Update mass mailing list
- Make second conference presentation
- Finish updating Practical Guide

- Conduct ten IM interviews and two A/V interviews
- Start research for second scholarly Open Source article

January 2007 – August 2007:

- Plan and host summer 2007 Washington workshop
- Index last 500 sites for Virtual Center
- Annotate last 200 sites for Virtual Center
- Manage consultancies
- Release downloadable tools package including Survey Builder, Collection Builder, Site Builder, Scribe, and Web Scrapbook.
- Distribute third mass email announcement
- Make third and fourth conference presentations
- Launch updated Practical Guide online
- Send updated Practical Guide to publisher for printing
- Conduct final ten IM interviews and final two A/V interviews
- Complete and publish second scholarly article
- Submit final report

APPENDIX 4: *ECHO 1* DELIVERABLES AND SITE TRAFFIC

Since this proposal builds directly the project that the Sloan Foundation funded three years ago (Grant # 2000-10-2.), we thought we should provide a brief review of how we have done in meeting the goals of that project and also the traffic on website. As a result of a no-cost extension provided so that we could focus our attentions temporarily on the *September 11 Digital Archive*, the original funding extends until June 30, 2004, and we will be actively working on the project for the next six months.

A. DELIVERABLES

The proposal included “five major deliverables.” They are quoted directly from the proposal below with a brief review of our progress so far.

(1) “A critical, on-going assessment of the practice of documenting the history of science and technology online, which will involve five leading practitioners from the worlds of the history of science and technology and digital history.”

The core of this work was accomplished in the first six months of the grant when we held a workshop with five leading practitioners (Greg Crane, Linda Shopes, Bill Leslie, Steve Brier, and David Kirsch) and three George Mason University faculty (John Cheng, Mike O’Malley, and Alison Landsberg) and produced a seventy-page white paper based on both the meeting and our own study of previously funded Sloan projects in this area. The report, “Fostering the Recent History of Science And Technology in New Media: A Report On Past Practices And Future Directions” was crucial to guiding our own work (and resulted in some changes in our work plan as noted below); it has also been consulted by a number of others (e.g., Taylor Walsh, LuAnne Johnson, Abby Smith) undertaking projects in this area.

Although the most important part of this work was completed early in the project, we have carried on this work in two areas. First, we have continued our own very active assessment of the practice of documenting the history of science and technology online, which has been reflected in numerous conference presentations (e.g., Dan Cohen’s presentation to the Dibner Conference on the History of Science on the Web), publications (e.g., Jim Sparrow’s article in a collection on public history edited by Jim Gardner), and especially in the relevant chapters of the expanded Practical Guide (see below). Second, we have consulted regularly with four of the five original advisers (Crane, Shopes, Brier, Kirsch), received the benefit of their feedback on current directions in online history, and have collaborated with them on work in this area. For example, Linda Shopes’ presentation on oral history and digital history at the Library of Congress on September 10, 2003, grew out of her collaboration with us. And we have worked very actively with David Kirsch on the *Business Plan Archive*, which is hosted on our server. We will be consulting further with these advisers in the final six months of the project in the areas where their help is most appropriate—for example, Brier, Kirsch, and Shopes will review relevant chapters of the practical guide and we will talk with Crane about the tools.

(2) “The Portal, an online center for those interested in the history of science and technology, which will offer (among other things) 300 detailed annotations of history of science and technology websites and ten major online dialogues with leading participants in the making of that history.”

We have greatly exceeded what we originally intended to do in the Portal, which was renamed the Virtual Center. It has become the leading portal for those seeking information on websites related to the history of science and technology—hence, if you enter “history of science and technology” in Google, the Virtual Center is the first “hit”—ahead of such better established entities as the Dibner Institute. It includes categorized information on 2,500 websites and more detailed annotations on 400, 300 of which are currently available publicly. Thus, it serves the dual function of calling attention to the best work being done online in the history of science and technology and bringing traffic to *ECHO* and its related projects and consultees. A thorough redesign of the Virtual Center is now underway.

At our initial workshop, our advisers were unanimous in arguing that the originally planned online dialogues would not be an effective use of our resources, and so we dropped them from our original plan—a decision reported to Sloan in our report from that meeting. The resources that were slated for that effort were shifted to expanding other parts of the project (e.g., the much enhanced Virtual Center and Practical Guide) or to additional initiatives not originally part of the project—in particular the creation of the *ECHO* tools, including Survey Builder and Web Scrapbook. As noted above, these have had substantial use (more than 350 registered users of Survey Builder, for example) and have greatly facilitated the work of those in our workshops participants and of our consultees. Finally, we also did some experimenting with one aspect of the on-line dialogues—enlisting insiders to help develop memory bank projects. For example, we worked successfully with Andrew McMichael, an early participant in Usenet, to develop our online project on that topic.

(3) “An active collecting effort of our own in our Memory Bank, which will produce at least 500 contributions.”

Thus far, we have collected more than 800 contributions in our Memory Bank, which has ten projects including ones on Women's Careers in Science and Engineering, the building of the DC Metro, the 2003 Blackout, the development of the Pregnancy Test, Information theorist Claude Shannon, the Moon walk, Three Mile Island, the Columbia Shuttle disaster, online day trading, and the history of Usenet. We will continue to collect over the next six months with the goal of reaching 1,000 contributions.

(4) “A comprehensive guide to collecting history online.”

As noted in the proposal, we early on developed a beta version of the Practical Guide, but then decided that a more substantial Guide was desirable and that some people would like to have a print version. Seeking a publisher, not surprisingly, led us to conceive of the Guide as a basic introduction to all aspects of online history, including design, infrastructure, digitizing, copyright, collecting, publicity, and preservation. Our decision to cover much more than just collecting grew out of our workshops, where it was evident that potential practitioners of online history needed a grounding in all dimensions of work in the digital media. We have now drafted six of the nine chapters of the guide that the University of Pennsylvania Press will publish under the title, *Making Online History: A Practical Guide to Presenting, Gathering, and Preserving the Past on the Web*, and we will publish online (and for free) through the *ECHO* website. Naturally, the print publication has set a more demanding standard for the final product and has slowed our work on this aspect of *ECHO*. Still, we expect to finish the book in the summer of 2004.

(5) “Aggressive outreach to hundreds of other possible practitioners through personal contact, workshops, and consultancies, which will result in fifty new practitioners who pursue the collecting and disseminating of the history of science and technology online.”

Our outreach has exceeded what we had originally planned. As noted above, we have reached thousands of potential practitioners through eighteen conference presentations, nine newsletter announcements or articles, tables at major conferences, more than a dozen announcements to H-Net lists, two announcements to our own list of 1,200 history departments, forty announcements to *History News Network*’s 11,000 subscribers, and articles in print and online media (including Yahoo!, Information Week, BBC, ABC, and *The Washington Post*. On a more intimate and sustained basis we have also worked with at least seventy different individuals—about half through our workshops and half through one-on-one or small group consulting. As the result of the workshops and our consulting, we have helped to launch a number of active projects such as Taylor Walsh’s *Before the Web*; David Kirsch’s *Business Plan Archive*; NIH’s *Thin Blue Line*; Josh Greenberg’s video store study; Wendy Kline’s *Our Bodies, Ourselves*; Ellen Herman’s *Adoption History Project*; and Shelly McKellar’s *Project Bionics*. (Still more partnerships and projects — including collaborations with the Red Cross and the Smithsonian — have come out of work on the *September 11 Digital Archive*.)

Both directly and indirectly, then, we have made a very large number of people familiar with online history, especially the practice of digital collecting. Whether we have been successful, however, in making them active practitioners is a more difficult question. One problem is that a number of the people with whom we have worked are planning projects but have not launched them yet. We need to undertake a more comprehensive census this spring to see about the state of these projects as well as the projects undertaken by those who have used the tools. Our best current estimate is that about thirty people have launched projects already. We hope that the final number will be higher than that, although we suspect that we will fall short of our goal of fifty—a reflection of the difficulty of mobilizing people to action. But we also expect that out of those with whom we have worked, we will ultimately create fifty practitioners as projects currently on the drawing board become active.

One measure of our success in this area is that initially we had to work hard to find possible clients and partners. But now we find increasingly that people are seeking us out. For example, the United Nations Development Programme and the Smithsonian have approached us about a major initiative on collecting online the worldwide experience of AIDS/HIV; that partnership now also includes the World Bank and other major organizations. The project will require substantial funding to get launched, but it would be an exciting initiative with a major global impact.

B. *ECHO* WEBSITE TRAFFIC

The *ECHO* website was launched in March 2001. Not surprisingly, traffic was very modest during the initial stages of publicity and concept development, especially to the Virtual Center. Over the rest of that year, we only averaged about 5,700 hits per month. (“Hits” are an inaccurate measure of Web traffic, because one visit to a page can count as multiple hits. But we are using it here because CHNM shifted log analysis programs twice over the past three years and the way those programs measure “visits” or “page views” differs significantly. Hits, as a result, give a more telling picture of change over time).

One crucial factor in the growth of traffic to the *ECHO* website was the agreement we forged with the WWW Virtual Library for the History of Science, Technology and Medicine, a portal site created by Tim Sherratt in the mid-1990s. That site had become increasingly out of date, and Sherratt was having difficulty keeping it current. In May 2001, Sherratt closed down his site and began referring traffic to us. Another key factor was the mass publicity we began doing ourselves in the second half of 2001. As a result, by the second half of 2002, our traffic had grown dramatically, and we were averaging about 113,000 hits per month. We have continued to enjoy steady growth in 2003; we had about 2 million hits in the past year or about 165,000 hits per month. Even more notable, perhaps, is our Google ranking. If you enter “history of science and technology” in Google, *ECHO* is the first site ranked—above much more established institutions in the field. (Significantly, the most important search phrases that bring traffic to *ECHO*—after “*ECHO*” itself—are “science technology,” “science and technology,” “history of science,” and “history of science and technology,” and “history of technology.”)

These overall numbers do not, however, include another significant component of *ECHO*—the tools, including the Survey Builder, which, while linked from *ECHO*, are located under the general CHNM domain. We are still working out some complicated inconsistencies in our logs, but it appears that the tools are getting an additional 200,000 hits per months. The tools most directly relevant to the *ECHO* project are a key part of that number, with the Survey Builder getting at least 15,000 hits per month and the Web Scrapbook about 35,000 hits per month.

Within the *ECHO* domain, the most important destination for Web traffic is the Virtual Center, which gets about half of all *ECHO* hits. In terms of subprojects, the one with the most traffic is Josh Greenberg’s video store project, a website he created after participating in one of our workshops. The next most popular are our projects on the Shuttle, Free and Open Source Software, Claude Shannon, and USENET. All of these have distinct patterns that reflect their particular circumstances. For example, the Space Shuttle Archive that we set up immediately after the Columbia Space Shuttle Tragedy on February 1, 2003, had 33,000 hits that month but then quieted down to about 2,500 hits per month for the rest of the year.

Another project that shows how news events can drive traffic is the Blackout project. It has its own domain and is also not counted in this overall assessment of traffic. The Blackout site was averaging about 44,000 hits per month for the several months before August. That spiked to about one million (986,000) during August – an increase by a factor of twenty-two. Traffic dropped in September, but it still remained much higher than in the first half of 2003.

APPENDIX 5: RESOURCE AND TOOLS DEVELOPMENT

Our proposal calls for the development of two different kinds of resources and tools. The first set (A), which comes under Part I of our Project Plan, is directed at making it easier for groups and institutions to collect and disseminate the past online. The second set, which comes under Part II, is directed at facilitating the researching, writing, and presenting of the history of science, technology, and industry in a digital era.

A. TOOLS AND RESOURCES FOR COLLECTING AND DISSEMINATING THE PAST ONLINE TO BE ENHANCED OR DEVELOPED

- **Survey Builder 3.0:** Users of the current version of Survey Builder have given us a long wish list of new features (e.g., better access control for sensitive historical documents and communications, which will be critical as we add recent business history to our mandate) that we need to incorporate into a new release. What organically grew out of the needs of consultees and institutions during *ECHO 1* is also now in need of its own more substantial technical infrastructure to ensure smooth service and seamless integration with large, complex projects as well as long-term backup and maintenance. Since George Mason University is planning on implementing a digital preservation infrastructure during the proposed term of this grant, we will also explore connecting the new Survey Builder server with this implementation. We will add a minimum of one hundred new users of the Survey Builder in *ECHO 2*.

- **Collection Builder 1.0:** Our work on the *September 11 Digital Archive* made us aware of the potential of collecting more than online reminiscences through digital means. We were, for example, very successful in gathering digital photos, art, and email. The collecting tools we developed for this purpose need to be opened to a broader spectrum of users. We plan to create Collection Builder, a tool that will allow for broad-based online collecting projects. Collection Builder will be offered in two versions — an easy-to-use version that individuals or institutions can operate on our server and a more advanced and customizable version (developed in Open Source software) that can be downloaded and deployed on a local server.

- **History Site Builder 1.0:** In addition to making the creation of an archival site infrastructure easier and more efficient (getting rid of the need to deploy a database, for instance), we want to simplify the task of designing the website that goes on top of this infrastructure — often another stumbling block to the creation and execution of online historical projects. As with our other free tools, the Site Builder will reduce the amount of time historians spend on this frequently time-consuming (and sometimes counter-productive) endeavor through templates and automation, leaving them with more time to spend on more substantive matters such as the conception of the project and outreach to historical participants. Although commercial versions of such a tool exist, they are not geared toward historians and the collection of historical materials. History Site Builder will enable people to download our templates and create a site on their own server or — even more simply — to create a site on our server by filling out a form.

- **Virtual Center 2.0:** The current *ECHO* Virtual Center has been a resource for those wishing to undertake online projects, a means of attracting visitors to our site and projects, and a service to the wider history of science and technology community. It includes categorized information on 2,500 websites and has established itself as the leading portal for the history of

science and technology. The majority of traffic to the *ECHO* website starts at the Virtual Center, where a worldwide audience interested in the history of science and technology learns about an enormous variety of topics online through our guide to websites. New technologies that have proliferated recently on the Web allow us now to envision an even more useful portal for the history of science, technology, and industry. Using real-time live feeds from a broad range of science, technology, and industry websites, including *Nature*, *The New York Times*, BBC, Oxford University, and Slashdot, we plan to offer one-stop shopping for historical news on science, technology, and business to the already large audience of the Virtual Center. We will also expand our guide to websites to 5,000 sites from 2,500 sites, and annotate another 1,000 of these sites — in part a reflection of the expansion of the site to include the history of industry. Longer, monthly reviews of featured websites will begin, with a critical eye toward advancing the practice.

B. TOOLS FOR RESEARCHING, WRITING, AND PRESENTING THE HISTORY OF SCIENCE, TECHNOLOGY, AND INDUSTRY IN A DIGITAL ERA

- **Scribe:** This historian's note-taking program was developed by Elena Razlogova at CHNM and is available for free download. It has already attracted more than 7,000 users and is cited in a number of guides to the study of history. Although it is widely used, it has a number of limitations that reflect the fact that it was an unfunded project done in the spare time of one staff member. In particular, we want to set it up to allow use online, rather than on a local computer. This transformation will allow users to access their bibliographies and notes from any Internet-connected computer, and more importantly to create and share such research with colleagues. In addition, Scribe will implement a common database for references, as the tool begins to be used more and more it will become a ready reference for scholars. For instance, users of Scribe Online will be able to search the reference database for topics and to type the first few letters of a source and have the system auto-complete and store the reference. Other features will include the ability to connect to online bibliographic databases, the addition of multiple and custom citation styles, more fields and types of references, the ability to publish bibliographies and notes to the Web, foreign language support, and an improved manual and online discussion board for users.

- **Web Scrapbook:** For researchers working beyond written sources—that is, using the growing online archives, websites, and multimedia covering the history of science, technology, and industry—we will produce a new, more robust version of another Web-based CHNM tool, the Web Scrapbook. The Web Scrapbook allows researchers to save whole Web pages, images, and text passages found on the Internet (as well as one's own hard drive) and then to annotate these items and sort them into folders. In addition, the Web Scrapbook has been built from the ground up as a collaborative environment. Users can grant other Web Scrapbook users access to any folder they choose, and allow them to add new items as well as annotate, comment upon, copy, move, and delete existing items. Research groups with a common interest therefore can collaboratively build, sort, and annotate a list of relevant webpages, images, and passages. The new version of the Web Scrapbook will allow integration with Scribe and will have the capability to store audio, video, and other new Internet communications such as archives of instant messaging chats.

- **History of Science, Technology, and Industry Search Tool:** This will be a powerful, first-of-its-kind tool that conducts cross-site searches of history of science, technology, and

industry resources. Even the most powerful Internet search engines like Google are unable to locate most resources that either reside within databases (the “deep Web”) or are behind the gated walls of subscription-based services (the “private Web”). Thus, there is no easy way to locate the full range of resources for the study of the history of science, technology, and industry that are found in not just public websites but also the eight-million item Library of Congress American Memory Collection or the 12-million-page (gated) collection of scholarly journals held by JSTOR. Using what we have learned in the creation of CHNM’s Syllabus Finder (<http://chnm.gmu.edu/tools/syllabi>), we will implement a single search box on the Virtual Center home page that will simultaneously and instantaneously scan a variety of powerful online databases, including (we hope) the full text of history of science/technology/industry books through the Amazon.com and Google Web APIs, history of science/technology/industry journals at JSTOR, the Google and Yahoo! directories of history of science/technology/industry websites, the British Library, the Library of Congress and its American Memory collection, the History Cooperative, ProQuest Historical Newspapers, the Internet Archive, as well as our own internal databases, and present them in an easy-to-read format. Because this list includes proprietary databases, we will have to negotiate search access with some of the providers, but Michael Jensen of the National Academies and the History Cooperative has already agreed to work on interoperability between the *ECHO* Virtual Center and the databases he coordinates, and we are confident that we can work out agreements with most, if not all, of the other providers.

Researchers will also be able to save search results into the new online version of Scribe, or if the results involve multimedia, the Web Scrapbook, from which they can share these resources with colleagues, discuss them in a class with their students, or simply catalog them for future use. We believe this will be a major advance in digital historical research and a model for other historical topics outside of the history of science, technology, and industry.

APPENDIX 6: OPEN SOURCE CASE STUDY

Our case study of the history of Open Source and Free Software will have five main features:

1. Consolidated Archive. Many critical document caches relating to the history of the Free and Open Source movement are already dispersed in an unorganized fashion throughout the Internet. *ECHO 2* will centralize these materials and make them searchable and usable to historians and the Open Source community itself. These documents and databases include informal insider accounts of the history of specific software projects; programming archives in C, C++, Java, and other languages that include insightful historical commentary within the code by its creators; archives of Internet relay chat conversations about the creation and progress of Open Source projects; Usenet dialogues on many of these same projects; email records (listservs) of communications among worldwide developers; bug lists, new feature recommendations, and timelines that are often maintained by projects; and project websites (possibly in collaboration with the Internet Archive).

2. Bibliography. The *ECHO* project has already created a large bibliography of written sources (both online and off) on the history of the Free and Open Source movement. This bibliography will be expanded to be as comprehensive as possible, with new sources added throughout the life of the project, including (as currently occurs) new sources suggested by members of the community. Developers and users will annotate these sources collaboratively.

3. Multimedia Online Collection. We plan to conduct at least 50 instant message interviews and 10 videoconferences with the primary movers behind key Open Source projects. These interviews will be posted or streamed on the site. We will also invite those interviewed and other leading figures to add documents using an archiving system.

4. Message Board and Online Survey. The site will also include a discussion board and online survey (similar to that developed in other *ECHO* projects) for members of the Free and Open Source community to weigh in about the history of their movement.

5. Scholarship database. We will develop an open access database of scholarship on Free and Open Source software that will solicit already published scholarship and make it available for free online. We have already developed a template for this feature in CHNM's online "Essays on History and New Media." In addition, we will include at least two scholarly articles written by us on the history of the Free and Open Source movement based at least in part on our online work. One of the key tests posed for the practice of online historical collecting is whether it can create resources used in developing serious scholarship. We want to meet that test with this project.

APPENDIX 7 BUDGET

APPENDIX 8: VITAE

Curriculum Vitae

ROY ROSENZWEIG

Office: Department of History
George Mason University
Fairfax, VA 22030
(703) 993-1247; 993-1251 (fax); Internet: roy@gmu.edu; Web: <http://chnm.gmu.edu>

Home: 511 N. Jackson St.
Arlington, VA 22201
(703) 522-2334

EDUCATION

B.A., magna cum laude, Columbia College, N.Y., 1971.
Research student in history on Kellet Fellowship, St. John's College of Cambridge Univ. (England), 1971-73.
Ph.D., History, Harvard Univ., 1978.

ACADEMIC EMPLOYMENT

Mark and Barbara Fried Professor of History & New Media; College of Arts and Sciences Distinguished Professor of History; Director of Center for History and New Media, George Mason Univ., 1981 to present (Asst. Prof., 1981-85; Assoc. Prof., 1985-92; Prof. 1992-98).
Mellon Post-Doctoral Fellow, Center for the Humanities, Wesleyan Univ., 1980 to 1981.
Assistant Professor of History and Humanities, Worcester Polytechnic Institute, 1978 to 1980.

GRANTS AND AWARDS

Richard W. Lyman Award (presented by the National Humanities Center and the Rockefeller Foundation) for "outstanding achievement in the use of information technology to advance scholarship and teaching in the humanities," 2003.
Vice-President, Research Division, American Historical Association, 2003-5.
State of Virginia Outstanding Faculty Award, 1999.
Historic Preservation Book Prize for Best Book of 1998 from Center for Historic Preservation, Mary Washington College and Award of Merit from American Association for State and Local History for *The Presence of the Past*.
James Harvey Robinson Prize of American Historical Association for "outstanding contribution to the teaching and learning of history" and finalist, Interactive Media Festival Award for *Who Built America?* CD-ROM.
Urban History Association Prize for Best Book in North American Urban History; Abel Wolman Prize for Best Book in Public Works History; Abbott Cumming Lowell Prize for Best Book of 1992 from Vernacular Architecture Forum; Historic Preservation Book Prize for Best Book of 1992 from Center for Historic Preservation; New York Historical Association Award for Best Manuscript on New York History, 1991 (for *The Park and the People*).
Fulbright Commission, Senior Scholar, Australia, June-July, 1990.
John Simon Guggenheim Memorial Foundation Fellowship, 1989-90.
Forrest G. Pogue Award for Excellence in Oral History, November, 1987.

PUBLICATIONS

Books, CD-ROMs, Websites, Films

A Companion to Post-1945 America (Oxford: Blackwell, 2002), co-editor with J-C Agnew.
The Presence of the Past: Popular Uses of History in American Life (New York: Columbia Univ. Press, 1998), co-author with D. Thelen.
Co-producer of *History Matters: The U.S. Survey Course on the Web* (<http://historymatters.gmu.edu>); *September 11 Digital Archive*

(<http://911digitalarchive.org>); *ECHO: Exploring and Collecting History Online* (<http://echo.gmu.edu>); *World History Matters* (<http://chnm.gmu.edu/whm>), *Liberty, Equality, Fraternity: Exploring the French Revolution* (Penn State University Press, 2001), co-producer of interactive CD-ROM and website (<http://chnm.gmu.edu/revolution>).

Who Built America? Working People & the Nation's Economy, Politics, Culture & Society (New York: Worth Publishers, 2000), co-author of Volume Two of this two-volume text and supervising editor of both volumes.

Who Built America? From the Great War of 1914 to the Dawn of the Atomic Age in 1946, a multi-media CD-ROM (New York: Worth Publishers, 2000), lead author and co-producer.

Who Built America? From the Centennial of 1876 to the Great War of 1914, a multi-media CD-ROM (New York: Voyager, 1993), co-author with S. Brier and J. Brown (vis. ed.)

The Park and the People: A History of Central Park (Ithaca: Cornell Univ. Press, 1992), co-author with E. Blackmar.

History Museums in the United States: A Critical Assessment (Urbana: Univ. of Illinois Press, 1989), co-edited with W. Leon.

Presenting the Past: Essays on History and the Public (Philadelphia: Temple Univ. Press, 1986), co-edited with S.P. Benson and S. Brier.

Eight Hours for What We Will: Workers and Leisure in an Industrial City, 1870-1920 (Cambridge and New York: Cambridge Univ. Press, 1983).

Government and the Arts in Thirties America: A Guide to Oral Histories and Other Research Materials (Fairfax: George Mason Univ. Press, 1986), chief editor.

Mission Hill and the Miracle of Boston (Boston: Cine Research Associates, 1979), co-producer of this documentary film with R. Broadman, J. Grady, and J. Pennington.

Experiments in History Teaching (Cambridge, Massachusetts: Harvard-Danforth Center, 1977), co-edited with S. Botein, W. Leon, M. Novak, and G.B. Warden.

Selected Recent Articles

"Scarcity or Abundance: Preserving the Past in a Digital Era," *American Historical Review* (June 2003).

"The Road to Xanadu: Public And Private Pathways on The History Web," *Journal of American History* (September 2001).

"Rewiring the History and Social Studies Classroom: Needs, Frameworks, Dangers, and Proposals," (co-author with R. Bass), *Journal of Education* (1999).

"The Riches of Hypertext for Scholarly Journals," *Chronicle of Higher Education*, March 17, 2000.

"Crashing the System: Hypertext and American Studies Scholarship," *American Quarterly* (June 1999), author of introductory essay and guest editor of special section in journal and website: <http://chnm.gmu.edu/aq>

"Live Free or Die? Death, Life, Survival, and Sobriety on the Information Superhighway," *American Quarterly* 51(March 1999): 160-74.

Wizards, Bureaucrats, Warriors, and Hackers: Writing the History of the Internet," *American Historical Review* 103 (December 1998): 1530-52.

"Brave New World or Blind Alley? American History on the World Wide Web," *Journal of American History* (June 1997), 132-155, co-author with M. O'Malley.

"So, What's Next for Clio?" CD-ROM and Historians," *Journal of American History* (March 1995), 1621-1640.

Daniel J. Cohen

Education

1992-1999 Yale University, New Haven, CT

Graduate School of Arts and Sciences, Department of History

- » Ph.D. awarded May 1999, winner of the George Washington Egelston Prize
- » Dissertation Topic: "Symbols of Heaven, Symbols of Man: Pure Mathematics and Victorian Religion"
- » M.Phil. awarded 1995
- » Passed Oral Examinations with Distinction, 1994

1990-1992 Harvard University, Cambridge, MA

Harvard Divinity School

- » M.T.S. awarded 1992
- » Concentration in the History of Religion in the Modern West

1986-1990 Princeton University, Princeton, NJ

Princeton College

- » B.A. awarded 1990
- » Major in Religion
- » Certificate in the History of Science

Academic Experience

2003-Present George Mason University, Fairfax, VA

Assistant Professor, Department of History and Art History, and Fellow at the Center for History and New Media

2001-2003 George Mason University, Fairfax, VA

Visiting Assistant Professor and Fellow at the Center for History and New Media

- » Graduate Courses: Science and Modern Life from Frankenstein to the Atomic Bomb; Europe, 1800 to the Present; Readings in the History of Science
- » At the Center for History and New Media: Co-Director of the September 11 Digital Archive (www.911digitalarchive.org) and the *ECHO* project (echo.gmu.edu), which present and collect history online

1997-2001 Yale University, New Haven, CT

Lecturer, Department of History

- » Taught Directed Studies, Yale's Western Civilization/great books survey, for three years
- » Seminars: Science in Culture, 1800-1914; Religion in Modern Europe, 1900 to the Present; Liberal and Radical Thought in Modern Britain; The Conservative Tradition in Modern Britain; Victorian Britain; Faith and Reason in the Nineteenth Century
- » Mellon Forum (senior thesis discussion program) director for Branford College
- » Senior thesis advisor; freshman and sophomore advisor
- » Elected as Fellow of Branford College

1993-1996 Yale University, New Haven, CT

Teaching Fellow

» Led sections in American Intellectual Life in the Twentieth Century; European Thought and Culture from Rousseau to Nietzsche; Europe, 1648 to the Present; The Holocaust in Historical Perspective

Publications

- » *Making Online History: A Practical Guide to Presenting, Gathering, and Preserving the Past on the Web*. Philadelphia: University of Pennsylvania Press, forthcoming. Co-authored with Roy Rosenzweig and Tom Scheinfeldt.
- » "Reasoning and Belief in Victorian Mathematics," in Martin Daunton, ed., *The Organisation of Knowledge in Victorian Britain*. Oxford: Oxford University Press, forthcoming.
- » "Making the Macintosh," website review, *Journal of American History*, December 2002.

Awards and Fellowships

- » George Washington Egelston Prize, awarded for "Symbols of Heaven, Symbols of Man: Pure Mathematics and Victorian Religion," 1999
- » Charlotte W. Newcombe Doctoral Dissertation Fellowship, awarded by the Woodrow Wilson Foundation, 1996-1997
- » Whiting Dissertation Fellowship winner, 1996
- » Pew Charitable Trusts Fellowship, 1996
- » Mellon Dissertation Research Fellowship, 1996
- » John F. Enders Grant, 1995-1996
- » Yale University Fellowship, 1992-1997
- » Harvard University Fellowship, 1990-1992

Selected Presentations and Papers Given

- » "Making Digital Collections Available Online," New Media Pioneers panel, National University Telecommunications Network Annual Conference, Washington, DC, June 2002.
- » "Victorian Mathematics," The Organisation of Knowledge in Victorian Britain Conference, sponsored by the British Academy and the Centre for Research in the Arts, Social Sciences, and Humanities, Cambridge University, May 2002.
- » "The Historian's Toolkit," Coalition for Networked Information Meeting, Washington, DC, April 2002.
- » "Exploring and Collecting History Online: Science and Technology," Society for the History of Technology Annual Meeting, San Jose, CA, September 2001.
- » "God and Mathematics in Nineteenth-Century Academia," American Society of Church History Annual Meeting, Washington, DC, January 1999.
- » "Unitarianism and the 'Ideality' of Mathematics in the Nineteenth Century," Pew American Religious History Conference, New Haven, CT, May 1997.

Tom Scheinfeldt

Center for History & New Media, George Mason University
4400 University Drive, Fairfax VA 22030
703-993-4213 (w) | 240-481-7228 (m) | jscheinf@gmu.edu

EDUCATION

University of Oxford

D.Phil. in Modern History. Doctoral thesis explored inter-war interest in science and its history in diverse cultural contexts, including museums, universities, World's Fairs and the mass media. Teaching responsibilities included lectures, tutorials and discussion seminars. 1999-2003.

University of Oxford

M.Sc. in History of Science: Instruments, Museums, Science, and Technology. Dissertation examined the implications of constructivism for museum education and received marks of distinction. 1998-1999.

Harvard University

A.B. *cum laude* in History and Science. Senior honors thesis explored the history of geology. Related courses in philosophy and religion. 1992-1996.

EMPLOYMENT

George Mason University

Research Assistant Professor, Fellow of the Center for History & New Media, and Managing Director of the September 11 Digital Archive. Directed nationally recognized effort to collect, preserve and present digital materials relating to the attacks of September 11, 2001. Researched and developed methods for digital and online outreach, collection, exhibition and education, including the design and maintenance of a widely popular website. Coordinated fundraising and media relations. Initiated and maintained partnerships with local and national organizations. Managed budgets. Supervised graduate students and staff. 2002-present.

Colorado Historical Society

Assistant Coordinator, Colorado State Roadside Interpretation Program. Coordinated all aspects of State of Colorado roadside history project. Wrote grant proposals and secured federal funding. Consulted with community organizations, historical societies, scholars and government officials. Researched, designed and produced more than thirty full-color, photo-illustrated roadside exhibits throughout Colorado. 1997-1998.

University of Northern Colorado

Research Coordinator for the Hewit Institute's Doing History, Keeping the Past project. Managed initial research activities for project aimed at providing teachers and students with greater access to history museum resources through information technologies. Drafted grant proposal and secured funding. 1996-1997.

PUBLICATIONS

Making Online History: A Practical Guide to Presenting, Gathering, and Preserving the Past on the Web. Philadelphia: University of Pennsylvania Press, forthcoming. Co-authored with Roy Rosenzweig and Dan Cohen.

"Documenting a Digital Event," *Organization of American Historians Newsletter*, February 2003.

"Memories: September 11 Digital Archive," *History News Network*, 9 September 2002 [Available from <http://hnn.us/articles/959.html>].

"Cosmographia: A Close Encounter," *Sphaera*, Spring 1999.

EXHIBITIONS & COLLABORATIVE PROJECTS

Managing Director, *September 11 Digital Archive*, Center for History and New Media, George Mason University.

Project Partner, *September 11: Bearing Witness to History*, Smithsonian Institution's National Museum of American History.

Project Partner, *Witness and Response: September 11 Acquisitions at the Library of Congress*.

Project Partner, *The Sonic Memorial Project*, National Public Radio's Lost & Found Sound.

Co-Director, *ECHO: Exploring and Collecting History Online*, Center for History and New Media, George Mason University.

Curator, *Cosmographia: A Close Encounter*, Museum of the History of Science, Oxford.

Coordinator, multiple roadside historical exhibits, including those at Colorado Welcome Centers in Burlington and Dinosaur.

Research Coordinator, *Doing History, Keeping the Past*, University of Northern Colorado.

Production Assistant, *There Was a Time*, Rocky Mountain Public Television.

PUBLIC PRESENTATIONS & LECTURES

"September 11: Collection, Exhibition and Education" (Panel Chair), American Historical Association Annual Meeting, Washington, January 2004.

"History in the Making at the September 11 Digital Archive," National Council for Public History Annual Meeting, Houston, April 2003.

"How Has Life Changed Since September 11?" National Museum of American History Panel, Washington, March 2003.

"Science, History, Hope and the Smithsonian," Smithsonian Institution Archives Research in Progress Lecture Series, Washington, March 2003.

"Archives & Terrorism," University of Pittsburgh School of Information Sciences Panel, Pittsburgh, September 2002.

"Science and History in the British Empire Exhibition, 1924-5," University of Oxford Problems in the History of Science Seminar Series, Oxford, January 2002.

"Robert T. Gunther, Historian of Science," British Society for the History of Science Graduate Conference, Oxford, December 2001.

"Science History and Attitudes Toward Material Culture Between the Wars," XIXth Symposium of the Scientific Instrument Commission of the International Union of the History and Philosophy of Science, Oxford, September 2000.

"Constructivist Historiography: Some Implications for Museums," Fourth British/North American Joint Meeting of the British Society for the History of Science, the Canadian Society for the History and Philosophy of Science and the History of Science Society, St. Louis, August 2000.

"Why Don't Historians of Science Care About Science Museums?" Science Communication, Education and the History of Science Conference, Royal Society of London, July 2000.

APPENDIX 9: LETTERS OF COMMITMENT