Guide to the SRI ARC/NIC records

Creator: Stanford Research Institute. Augmentation Research Center and Network Information Center
Dates: circa 1959-2006, bulk 1968-1990
Extent: 351 linear feet, 281 boxes
Collection number: X3578.2006
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Abstract

The SRI ARC/NIC records contain material from Stanford Research Institute's Augmentation Research Center (ARC) and Stanford Research Institute's Network Information Center (NIC) project. The bulk of the collection is from 1968 through 1991. The collection documents the development of Dr. Douglas Engelbart's NLS/Augment system, which pioneered hypertext concepts and first embodied many features that later became central to personal computing as well as the World Wide Web. Materials of note include the work of Engelbart and various members of his lab, the original patent for the computer "mouse," NLS source code, the ARC journal, and materials related to the pioneering work done by Dr. Jonathan Postel and other ARC members on developing networking protocols for the Arpanaet. The bulk of the collection covers the role and work of the Arpanet/DDN NIC (Network Information Center), which was the information hub of the early Arpanet and later Internet. Included are a wide variety of documents pertaining to their development, including design, administration, information flow, research projects, programs, protocol development including the pivotal work of Dr. Jonathan Postel and other ARC members, working groups, naming and addressing development, and lists of early participants. Types of material include technical notes, proposals, reports, reprints, correspondence, videos, dump tapes, photographs, seminar presentations, protocols, working group papers, and bibliographies.

Administrative Information

Access Restrictions

The collection is open for research.

Publication Rights

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Preferred Citation

> [Identification of Item], [Date], SRI ARC/NIC records, Lot X3578-2006, Box [#], Folder [#], Computer History Museum

Provenance

> CHM obtained the ARC and NIC records from Elizabeth Feinler in 2001. Feinler was a member of ARC, director of SRI's Network Information Systems Center (NISC), and principal investigator for the NIC project from 1974 to 1989.

Repository

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Administrative History

The Advanced Research Projects agency (ARPA), now known as DARPA, was established in 1958 by President Dwight Eisenhower as part of the Department of Defense (DoD). Initially DARPA dealt with the space race, but over time evolved into several basic research activities, one of which was command, control, and communications (CCC). In 1962, DARPA created the Information Processing Techniques Office (IPTO), which became a major driving force in the evolution of information technology in the United States. IPTO, as part of the CCC effort at DARPA, was instrumental in establishing and funding innovations in computers and networking that led to the Arpanet and then the Internet. DARPA became very interested in funding research in "packet switching" technologies because packet switching seemed to have the potential to be faster and more reliable than existing network technologies. DARPA selected several universities and research establishments to use packet switching principles to build a packet-switched research network called the Arpanet, forerunner of the Internet. The first four sites on the Arpanet were the University of California at Los Angeles (UCLA), Stanford Research Institute (SRI)[1] in Menlo Park, CA, the

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[1] Stanford Research Institute (SRI) is not affiliated with Stanford University. SRI was founded in 1946 by the trustees of Stanford University. SRI became independent of the university in 1970, and changed its name to SRI International in 1977.

University of California at Santa Barbara (UCSB), and the University of Utah (Utah). Originally, each center was to share its particular resources with other members of the network, i.e., the Arpanet was to be a "resource sharing" network.

Dr. Douglas Engelbart joined Stanford Research Institute (SRI) as a research engineer in 1957. In 1963, he began to receive funds for his own research laboratory at SRI which was called the Augmented Human Intellect Research Center (AHIRC), later shortened to Augmentation Research Center (ARC). SRI ARC built and demonstrated a unique computer system that Engelbart called NLS (for oN-Line System), which was the forerunner of today's office automation and personal computing environments. Using NLS, the user sat in front of a video monitor and could interact directly with a computer to send e-mail, do text editing, programming, debugging, and hypertext journaling to name a few of its features. During Engelbart's tenure at SRI, he and his group developed many of the programs, techniques, and devices that are still in use today, including the mouse, hypermedia, multiple windows, document version control, distributed client-server architecture, protocols for virtual terminals, shared-screen teleconferencing, formatting directives, uniform command syntax, and many others.

In May of 1967, SRI ARC began organizing and cataloging documents from various future Arpanet sites and added them to their own extensive document collection in preparation for a proposal to DARPA about providing a network information center (NIC) for the Arpanet via NLS. In November a charter for a NIC was outlined by DARPA and Arpanet contractors, and in late 1969 the NIC concept was specified. The Arpanet Network Information Center, located at SRI in Menlo Park, CA, was the first NIC (1970) on the Arpanet, which later gave rise to the Internet. The NIC served as a search service and repository for early network information and provided a master catalog as a subsystem of NLS. Initially, the NIC was a part of Engelbart's overall DARPA contract, and it focused on providing information services to Arpanet users; whereas the focus of most of SRI ARC was the design of the NLS/Augment system, and the development and implementation of Arpanet and later Internet protocols. In 1973, the NIC was spun off as a separate project with Elizabeth Feinler as Principal Investigator.

Originally, the NIC project provided users with network access to NLS, and the NIC used NLS to provide its services to users. However, computers then had little capacity and users had to log in to the SRI-ARC computer to use NLS. In addition, users needed NLS training. As the network expanded, the ARC/NIC host computer was overwhelmed by users trying to access it; consequently, the NIC services evolved into services provided by network servers, wherein the user did not have to have much computer experience or an account on the NIC machine to use the services. Features like the file transfer protocol (FTP) and e-mail, made it easier to provide information services by other means – usually via dedicated information servers such as WHOIS.

In 1973 operation of the Arpanet was turned over to the Defense Communications Agency (DCA). DARPA still maintained administrative control over the research projects being carried out on the Arpanet by its many contractors; however, it was no longer responsible for operational control. After 1974, funding for the SRI NIC came from Defense Communications Agency (DCA) contracts.

SRI sold the NLS system to Tymshare Corp. in 1977. Engelbart and many of his staff working on the NLS system left SRI to join Tymshare. At that time the name of the system was changed from NLS to Augment. The NIC (by this time a separate project funded by DCA) stayed at SRI to continue offering information services to the Arpanet and later the DDN Internet.

By the early 1970s there were a number of computer networks in existence including Arpanet, but they were mutually incompatible, had proprietary protocols, and were not connected to each other. Research on protocols to connect different networks together into networks of networks, a process called "internetting", was being done in several places; England, France, Xerox PARC, and DARPA. The first DARPA internet protocol, known as the Transmission Control Protocol (TCP), was designed to tie together its own, dissimilar networks, the Arpanet, the Packet Radio Network, and the Satellite Network along with others into a network of networks. For a number of reasons TCP was broken into a reliability part (TCP) and an internet routing part (IP). The combination, TCP/IP is the standard used today. In 1982 the DoD selected the TCP/IP protocols as military standards for its operational military networks, and at that time all of the operational military networks were bundled under one "umbrella" network called the Defense Data Network (DDN). The Arpanet was split into two unclassified segments – the Arpanet and the Milnet.

The initial mandate of the NIC had been to service the users of the Arpanet. In 1983 when the experimental Arpanet became a segment of the operational DDN, the NIC serviced all segments of the DDN - Arpanet, Milnet, Minet, SACDIN, TSSCI - and their contractors, as well as other government users of the Internet. As such, the SRI NIC was a forerunner of the search engines and catalog sites that later rose to prominence on the World Wide Web. The NIC ran a 24/7 computer center and a 12 hr/day 1-800 telephone and e-mail Help Desk for the DDN. It assisted users by providing telephone, e-mail, and U.S. mail reference services. It edited, published, and distributed the network reference documents needed by users, including the resource handbooks, directories, user guides, protocol handbooks, and vendor guides, among others.

When the Domain Naming System (DNS) was proposed for the Internet in 1983, the NIC created the generic, top level domain names (TLDs) still in use today of ".com," ".mil," ".gov," ".org," and ".edu." The NIC administered Internet naming until 1991 as well as the TAC access service, and did the audit trail and billing

data collection for the DDN. As the TCP/IP protocols continued to spread to other networks, the SRI NIC served as "the NIC of NICs" by sharing its resources and expertise with other NICs such as NSFnet, the NASA Science Internet, CSnet, and others to form a network of NICs around the Internet. It coordinated the official network contacts, and maintained the e-mail distribution lists for these groups. It distributed newsletters and official communiqués to users on behalf of its sponsors. It acted as a repository for the network technical notes, called Request for Comments (RFCs) and stored the archives of a number of network working groups, and itself conducted and/or participated in several network working groups. It developed online information servers, such as WHOIS, NAMSER, TACACS, and BIBLIO, and developed an early e-mail program, SAM, to allow users to download their e-mail from crowded host machines to their personal computers.

The NIC project left SRI in 1992, when work was transferred to other contractors through a competitive bid process. The project went to a consortium composed of AT&T, Network Solutions, Inc. (NSI), and the University of California at San Diego (UCSD). Its former services were split among these three organizations. In the early 1990s, commercial traffic, controlled by gateways, was allowed onto the Internet just as the World Wide Web began to spread across the Internet. NIC type servers were largely replaced by a variety of information resources including search engines, directory services, and online encyclopedias.

For a more complete history of SRI ARC and NIC see
http://www.computerhistory.org/collections/accession/500001010

Scope and Contents of the Collection
The SRI ARC/NIC records contain material that arose from the activities of the SRI ARC group led by Dr. Douglas Engelbart and the SRI Arpanet/DDN NIC, led by Elizabeth J. Feinler. The collection spans circa 1959-2006, with the bulk of the material being from 1968-1991. ARC activities documented include the development of the NLS/Augment system, which pioneered hypertext concepts and first embodied many features that later became central to personal computing as well as the World Wide Web, and the design and development of Arpanet and later, Internet protocols. Also included are the ARC Journal (incomplete), NLS source code and system design, hardware details, the original patent for the computer "mouse," and descriptions of the keyset and the NLS interactive workstation as well as the XDoc collection, which began as Engelbart's personal document collection, but evolved into a substantial library for the NIC project. Of particular interest in the ARC series are materials related to the pioneering work done by Dr. Jonathan Postel and other ARC members on developing networking protocols for the Arpanet. SRI Arpanet/DDN NIC activities documented in the collection include the following: serving as a repository for documents from early Arpanet and DDN sites, acting as the distributor of official network documents and administering the Internet naming service from 1970 until 1991. The NIC records contain an extensive collection of material related to

the early Arpanet and Internet including their design, administration, information flow, research projects, programs, protocol development, working groups, naming and addressing details, and lists of early participants.

Arrangement
The collection is organized into 4 series:
>   Series 1 SRI ARC
>   Series 2 SRI NIC
>   Series 3 Special NIC collections
>   Series 4 Other networks and NICs

Indexing Terms
Engelbart, D. C. 1925-
Feinler, Elizabeth J.
Postel, Jonathan Bruce, 1943-1998
Stanford Research Institute. Augmentation Research Center (SRI ARC)
Stanford Research Institute. Network Information Center (SRI NIC)
SRI International. Network Information Center
ARPANET (Computer network)
MILNET (Computer network)
DDN (Computer network)
United States. Defense Advanced Research Projects Agency
United States. Defense Communications Agency
Human-machine systems
NLS/Augment
TCP/IP (Computer network protocol)

Separated Material
Physical objects, a set of 9-track magnetic dump tapes from the NIC DEC-20 mainframe computer, Alohanet documentation, books, and many computer manuals were separated from the main collection. The physical objects include an Engelbart mouse and keyset, among others. To view catalog records for the separated items please search CHM's online catalog at http://www.computerhistory.org/collections/search.

Related Collections at CHM
Cerf, Vint (Vinton) oral history, Lot X4308.2008, accession number 102658186
Engelbart's Augmentation Research Center programmers oral history panel, Lot X5674.2010, accession number 102702010
Feinler, Elizabeth oral history, Lot X5378.2009, accession number 102702199
Kahn, Bob (Robert) oral history, Lot X3699.2007, accession number 102657973
Metcalfe, Bob (Robert M.) oral history, Lot X3819.2007, accession number 102657995
Taylor, Bob (Robert W.) oral History, Lot X5059.2009, accession number 102702015

Related Collections at Other Repositories
Doug Engelbart Institute http://dougengelbart.org/library/engelbart-archives.html
Douglas C. Engelbart Papers. M0638. Dept. of Special Collections, Stanford
University Libraries, Stanford, Calif.
Internet Engineering Task Force (IETF), online archives of Arpanet and Internet
RFCs (Requests for Comment) http://datatracker.ietf.org/doc/search/
The Kleinrock Internet History Center at UCLA http://internethistory.ucla.edu/

Collection Contents
Series 1, SRI-ARC circa 1968-2000
This series includes records related to research done at SRI ARC from
approximately 1968 through 1977, when the ARC group left SRI to join Tymshare
Corporation. During Engelbart's tenure at SRI, he and his group developed the
mouse, multiple windows, display editing, in-file object addressing and linking,
hypermedia, outline processing, context-sensitive help, distributed client-server
architecture, uniform command syntax, protocols for virtual terminals, remote
procedure call protocols, integrated hypermedia e-mail, document version
control, shared-screen teleconferencing, computer-aided meetings, and flexible
view control including collapsible outline views among others.

Other document and publishing features included cross-file editing, where data
from two or more files could be transferred back and forth among them;
hypermedia publishing, where automatic links created a virtual document from
several source documents; formatting directives for publishers or printers to
specify various things like font selection and size, headers, footers, indents,
subscripts, superscripts, and spacing.

Technical innovations included a universal "user interface" front-end module, i.e.
network modules were modular and separated from the rest of the program so
that they could be modified separately without affecting the program itself; multi-
tool integration, meaning that all tools were under one system "umbrella" – the
user didn't have to load or learn a different program to edit, program, debug,
calculate, print, email, etc.; and a grammar-driven command language
interpreter, which let all of the different program modules use a similar command
language. Overall, a compileable "command meta language" allowed developers
to create a variety of modules that could all run under NLS and appear to the
user as one big system with the same kinds of commands and "look and feel."

Included are an incomplete hardcopy set of the ARC Journal, reprints of
Engelbart's papers, ARC project details including proposals, contracts, project
reports, and other project documents; descriptions of the NLS/Augment system,
including source code, design manuals, and user manuals; and descriptions of
the computers and hardware in use by the group during the development of
NLS/Augment, including design details for the mouse, keyset, and line processor.
Also included is a complete set of the Bootstrap Institute seminars led by Dr.
Engelbart after he left McDonnell Douglas, as well as numerous photos and an

extensive set of videos of presentations given by Engelbart over the years. Among these is a video of the "mother of all demos" given at the ICCC conference in 1968.

In general, this series covers the development and scope of the NLS/Augment system, whereas the Douglas Engelbart papers at Stanford cover Dr. Engelbart's thinking in developing a system to augment human intellect. However, there is considerable overlap between the two collections. For instance, each collection has a set of the ARC Journal, although neither set is complete. This series is organized into 14 subseries:

Subseries 1.1 ARC organizational charts
Subseries 1.2 Engelbart resumes and awards
Subseries 1.3 Engelbart and group reprints, correspondence, and
notes
Subseries 1.4 ARC proposals
Subseries 1.5 ARC contracts and deliverable reports
Subseries 1.6 Architects Workshop Community (AWC) and
Knowledge Workers Architect Community (KWAC)
Subseries 1.7 Sale of NLS to Tymshare Corp. by SRI
Subseries 1.8 Bootstrap Institute seminars
Subseries 1.9 The ARC journal
Subseries 1.10 Early NLS system design
Subseries 1.11 ARC computers, operating systems, and hardware
configurations
Subseries 1.12 NLS/Augment user documentation
Subseries 1.13 NLS/Augment source code
Subseries 1.14 Photos, videos, and non-text media

Subseries 1.1, ARC organizational charts, circa 1975
This subseries shows the organization of the ARC
group and its relationship to the rest of SRI. See Appendix I for a list of the names of people who worked at ARC over time. Arranged chronologically.

Subseries 1.2, Engelbart resumes and awards, circa 1980-1990
Dr. Engelbart received many important awards over the years. Details of these awards are covered in this subseries. Arranged chronologically.

Subseries 1.3, Engelbart and group reprints, correspondence, notes, circa 1970-1990
Engelbart was greatly influenced in his work by an article written by the late Vannevar Bush entitled, "As We May Think." This subseries contains a copy of this 1945 article complete with Engelbart's notes in the margins. Also contained in this subseries are published articles written by Engelbart and key SRI ARC staff members, as well as articles published about Engelbart and his work. Note that subseries 1.9, the ARC Journal, and

subseries 1.5, ARC contracts and deliverable reports, as well as subseries 3.1, XDoc, also contain items written by Engelbart. Arranged chronologically.

Subseries 1.4, ARC proposals, circa 1970-1977
Included in this subseries are proposals that were funded and a few that were not. Arranged chronologically.

Subseries 1.5, ARC contracts and deliverable reports, circa 1975
These reports describe the ideas and implementation details for the NLS/Augment system and subsystems, as well as progress reports and other contract deliverables. Arranged in order by agency, then contract number, and in chronological order under each contract number.

Subseries 1.6, Architects Workshop Community (AWC) and Knowledge Workers Architect Community (KWAC), circa 1975
The Architects Workshop Community (AWC) was created as an SRI multi-client project, and was an early attempt by Dr. Engelbart to create a "bootstrap" community. Several government agencies had provided users to test-bed the NLS system. They wanted to continue using the system at their facilities after the funding for test bedding ended. Others had heard about the NLS/Augment system or had seen it demonstrated, and wanted to try it. Each participating organization put a given amount of money into the AWC project with the understanding that all participants would have access to any results from the project. This was known as a multi-client project at SRI. Each AWC participant was to provide a person known as the "architect." This person was expected to attend training to learn NLS/Augment, and then act as a facilitator to move use of the system into his or her own working environment. This group was known as the Knowledge Workers Architect Community or KWAC. In addition, each KWAC participant was expected to feedback design suggestions and problems encountered from his or her "knowledge workers." Those ideas that had general merit would then be added to the NLS system for all to use. This was what Engelbart called "bootstrapping."

Some organizations embraced these new ways of using computers to do business, some were reluctant to do so. Thus, the concept of an "architect" as an in-house consultant to aid users and introduce new technologies was a very useful one. The AWC project lasted for several months at SRI with the following clients participating: DARPA, RADC, BRL, NRL, Bell Canada, Educational Testing Service (ETS), Gunter AFB, Defense Mapping Agency (DMA), and others. The KWAC collection is incomplete, but does contain names of the participants, and some minutes, newsletters, and correspondence. Arranged chronologically.

Subseries 1.7, Sale of NLS to Tymshare Corp. by SRI, 1977
By the mid-1970s, government funding was no longer available for further development of NLS/Augment. By this time there were a number of users who had been trained to use the system and who wished to buy access to it as an operational, not a research, system. The SRI-ARC host was a government-owned computer and could not be used for commercial purposes. In addition, the computer was going away, because the contracts on which it was provided had ended. SRI was a not-for-profit research organization, and as such could not make a commercial offering of NLS/Augment to users under its corporate structure. In addition, much development was needed to make NLS/Augment fully compatible with the TCP/IP protocols to which the government networks were eventually to be converted. Therefore, a decision was made by SRI management to sell the NLS/Augment system to a commercial concern. It chose Tymshare Corp. located in Cupertino, California.

Originally, the plan was to move an operational version of the NLS/Augment system to Tymshare for them to sell commercially. Most of the SRI ARC staff would join Tymshare to provide and support the commercial offering. A few researchers, including Engelbart, were to stay at SRI, and work on further design and development of NLS/Augment. Tymshare, in turn, was to purchase SRI expertise to further enhance the system, i.e. SRI was to provide research to Tymshare. However, the ARC group did not want to be split up, and many did not want to join Tymshare. Also, another bidder was trying to raise capital to bid on the group, and they did not want to work for this bidder either. Therefore, the ARC group created their own company with the idea of trying to raise enough capital to bid on NLS/Augment themselves. This was before the era of readily available venture capital, and the group was unsuccessful in their attempt to raise enough capital to purchase NLS/Augment from SRI. However, the result was that the negotiation between SRI and Tymshare did not include buying research services from SRI, and the NLS/Augment researchers either went to Tymshare, or left SRI for other pursuits. Only the NIC project, which was by now its own separate project, stayed at SRI with Feinler as the PI.

Included in this subseries is a version of the contract agreement between SRI and Tymshare, as well as some of the pro and con discussions that took place at the time. Note that the contract included here is not signed, and may or may not be the final contract agreement. Arranged chronologically.

Subseries 1.8, Bootstrap Institute seminars, circa 1990-2000
Engelbart defined "bootstrapping" as "boosting individual and organizational ability to better address problems that are complex and urgent." This work was the focus of his organization called the Bootstrap

Institute, which he founded after he left McDonnell Douglas (which had bought out Tymshare Corp.). The Bootstrap Institute was located for many years in Fremont, California with some sponsorship coming from Logitech. In 2008, it changed its name to the Douglas Engelbart Institute, and is currently (2012) run by Engelbart's daughter, Christina Engelbart, with Engelbart as Founder Emeritus. Included in this subseries are a complete set of Bootstrap Institute seminars and some details of its organization. A more complete set of materials from this organization is available at http://www.dougengelbart.org In Oct. 2007, Engelbart left Fremont and returned to SRI International as an Emeritus Senior Technical Advisor to continue his work on "bootstrapping." Arranged chronologically.

Subseries 1.9, The ARC Journal, 1973-1979
The ARC Journal was a subsystem of the NLS system. It was probably the first online hypertext library. Any user of the NLS system could submit a document online to the Journal. The document was then given an identifying journal number and was automatically indexed. Each Journal article listed the author, a time stamp, and a subject header. In addition, each statement (paragraph) of the article was stamped with a machine-readable identifier. Once an article was submitted to the Journal, the text of the article and this identifier could not be changed. If another version of an article was created, it was given a different journal number and each paragraph that was changed from the original had a different machine-readable identifier. Any paragraph that was not changed maintained its original identifier. This system ensured that an original item could not be modified without identifying the changes, and versions of a given article could be tracked.

The Journal was used primarily by SRI ARC staff; however, any user around the Arpanet who had access to the NLS/Augment system, such as the test-bed members or KWAC members, could submit articles to the Journal, and several users did so. In addition, some of the early network working groups maintained their records in the Journal.

The Journal contains design documents, early versions of protocols, discussion among staff and network users, versions of system and user documents, versions of proposals and contract documents, discussions of the management decisions on various aspects of ARC business, etc. It is a running documentary of the design of the NLS/Augment system, and the design and implementation of network protocols - particularly TCP/IP and e-mail. Note that Jonathan Postel worked at ARC until 1977. It also shows how the NLS/Augment team worked together to develop the NLS/Augment system.

As mentioned above, the ARC Journal system was an online system that was at the fingertips of any NLS/Augment user. However, NLS/Augment

was a complex system, and users needed training to use it. Therefore, there were not a lot of outside users. NLS/Augment users within SRI used it extensively. The Journal was part of the system they used to do their day-to-day work. As one developed a document or wrote a program, it could easily be "journalized," that is submitted to the journal where it was available for everyone to read and comment on, if so desired.

The computer dump tapes containing the Journal went to Tymshare when the ARC group left SRI. A hardcopy printout was maintained by the NIC group for quick access when the system was down, or for answering telephone reference questions. The version of the Journal in this subseries is the remainder of what is left of that hardcopy set. It is not complete; however, the set contains many of the early submissions and is one of the best sources of detail on the design of the NLS/Augment system, which was the forerunner of many of the programs in use today on personal computers and on the Internet. In addition, the Journal gives a valuable picture of how systems were designed and implemented on the early Arpanet and Internet. Arranged by journal item numbers - roughly equivalent to chronological order, but not strict chronological order, because a number was assigned on the date when an item was submitted to the journal, not necessarily when it was first written.

Subseries 1.10, Early NLS System Design, circa 1965-1970
Contains early ideas for NLS software. Arranged chronologically.

Subseries 1.11, ARC computers, operating systems, and hardware configurations, 1965-1983
Contains details of hardware selection and design for NLS. Arranged by system and chronologically under each system.

Subseries 1.12, NLS/Augment user documentation, 1965-1983
Manuals are available for the overall NLS system and for most of its subsystems. Arranged by subsystem and chronological under each subsystem.

Subseries 1.13, NLS/Augment source code, 1970-1984
Three versions of source code from various time periods are available. NLS/Augment was written in an Algol-like language called L-10 developed by ARC programmers. Arranged chronologically.

Subseries 1.14, Photos, videos, and non-text media, circa 1968-circa 2000
The extensive collection of Engelbart videos were all converted to DVD format for the museum by Jeff Rulifson. A set of these is available at the Computer History Museum, but they may also be viewed online at the

Internet Archive http://www.archive.org/details/dougengelbartarchives
Arranged chronologically.

Series 2, SRI NIC, circa 1970-1991
This series contains materials describing the Arpanet/DDN Network Information Center and its work. The focus of the NIC was to provide information to Arpanet/DDN users, whereas the focus of ARC was design of the NLS/Augment system and development of early network protocols. The NIC began by providing information largely in hardcopy, and evolved over time to providing most of its information online. Included in this series are reference documents produced by the NIC for internet users, including complete sets of the network directories, resource handbooks, protocol handbooks, user guides, vendor guides, etc; descriptions of NIC information servers; design and implementation details of the internet audit trail and billing system; details of software designed and implemented by the NIC; descriptions of the various computers and hardware used by the NIC; documents describing the NIC reference and help desk activities; documents describing the Arpanet/DDN Terminal Access Controller (TAC) access system; documents describing the Arpanet/DDN naming and addressing activities; proposals, projects, and project detail documents; Elizabeth Feinler's notes and papers; e-mail, and other related documents. This series is organized into 15 subseries:

> Subseries 2.1 NIC organization
> Subseries 2.2 NIC personnel
> Subseries 2.3 Feinler and group reprints
> Subseries 2.4 Feinler notebooks
> Subseries 2.5 NIC proposals and contracts
> Subseries 2.6 NIC monthly progress reports
> Subseries 2.7 NIC contract deliverable reports
> Subseries 2.8 Slides and viewgraphs
> Subseries 2.9 Videos and photographs
> Subseries 2.10 NIC planning and management
> Subseries 2.11 NIC reference publications
> Subseries 2.12 NIC activities and services
> Subseries 2.13 NIC software architecture, programs and servers
> Subseries 2.14 NIC computers and computer facility
> Subseries 2.15 Miscellaneous e-mail and correspondence

Subseries 2.1, NIC organization, 1978-1988
Contains organizational charts showing the structure of the NIC group and its relationship to the rest of SRI. Arranged chronologically.

Subseries 2.2, NIC personnel, circa 1975-circa 1990
Contains resumes and/or job descriptions of NIC personnel. See Appendix II for a list of names of people who worked on the NIC project. Arranged alphabetically by last name.

Subseries 2.3, Feinler and group reprints, circa 1970-1990 Contains reprints of papers written by Feinler and staff. Arranged chronologically.

Subseries 2.4, Feinler notebooks, 1974-1989
Contains many notes taken by Feinler at various project and Arpanet/DDN and Internet meetings. Most are dated; however, some are not. It is not evident in all cases what the occasion of the note taking was. The NIC often sat in on government or research meetings as an observer, and in such cases, Feinler took extensive notes. Feinler tended to use a "squiggle" character to indicate that the notes were not keeping up with the conversation and are at that point incomplete. Unarranged.

Subseries 2.5, NIC proposals and contracts, 1973-1992
At the beginning, the NIC contract was not broken down into tasks. By 1987, the NIC contract consisted of many tasks, each one of which had an assigned task leader and budget. For a list of tasks and task leaders, see the NIC Organization Charts in subseries 2.1. Arranged by contract number, then by category, such as statement of work, proposal, contract, contract modifications, e-mail, and so forth, then chronological under each category.

Subseries 2.6, NIC monthly progress reports, 1975-1991
The first accounts of NIC progress were embedded in ARC progress reports to DARPA, see subseries 1.5. In the mid 1970s, the NIC submitted only informal quarterly progress reports, and these were submitted by e-mail to DCA. Later the NIC was required to submit formal monthly reports. A complete set of these formal monthly reports is included. Arranged chronologically.

Subseries 2.7, NIC contract deliverable reports, 1980-1990
Contains CDRLs (Contract Deliverable Requirements List) required for all government contracts. Generally, they are task reports of one kind or other describing NIC project activities. They may describe software, servers, services, databases and data dictionaries, or overall project details. See also subseries 2.11, NIC reference publications, as these were also project deliverable reports. However, the reports in 2.11 do not describe NIC project activities. Rather they were written as reference documents for network users by the NIC. Arranged chronologically.

Subseries 2.8, Slides and viewgraphs, 1976-1990
Contains some slides from periodic "in-progress" presentations made to DCA by its various contractors, of which SRI was one. See also subseries 3.3, DCA Library collection, for more in-progress presentations by the NIC and other DCA contractors. Arranged chronologically, if a date was available.

Subseries 2.9, Videos and photographs, 1980-1990
Dated and identified when occasion, person, and/or date were known. Unarranged.

Subseries 2.10, NIC planning and management, 1968-1989
Contains early planning from the Engelbart years, and continues after the NIC became a separate contract. In 1983, when the DDN was created, the NIC contract expanded considerably and thus required a completely different management and organization, which is reflected in this subseries. Arranged chronologically.

Subseries 2.11, NIC reference publications, 1969-1993
Contains a complete set of all versions of the NIC reference publications (sometimes referred to as the functional documents) including: the *NIC Catalog*, *NIC User Handbook*, *Arpanet/DDN Resource Handbook* ("Yellow pages"), *DoD Protocol Handbook*, *Arpanet/DDN Directory* ("White pages"), *TCP/IP Vendors Guide*, *TAC User Guide*, and other miscellaneous Arpanet/DDN user documents. The first two copies of the Protocol Handbook may be the only ones still available. See also subseries 2.7, NIC contract deliverable reports. Arranged by document type (e.g. resource handbooks, directories, etc.) then in chronological order under each document type.

Subseries 2.12, NIC activities and services, 1970-1990
Over the years the NIC participated in many activities and provided many services to network users. The nature of these changed as user's' needs changed and the Arpanet/DDN and then Internet expanded. See also subseries 2.6, NIC monthly progress reports and subseries 2.7, NIC contract deliverable reports for more detail on NIC activities. Also, subseries 2.15, Miscellaneous e-mail and correspondence gives an indication of the extensive back and forth that took place between the NIC and various persons providing the information; as well as the extent of network collaboration that took place on the various NIC activities and publications. This subseries is organized into 10 sub-subseries:

 Sub-subseries 2.12.1 Document production
 Sub-subseries 2.12.2 Reference/hotline
 Sub-subseries 2.12.3 Naming and addressing
 Sub-subseries 2.12.4 TAC user access registration
 Sub-subseries 2.12.5 DDN audit trail and billing services
 Sub-subseries 2.12.6 Administration of network contacts
 Sub-subseries 2.12.7 Maintenance of the Defense Communications
  Agency (DCA) technical library
 Sub-subseries 2.12.8 Protocol information locator
 Sub-subseries 2.12.9 Document and software sales
 Sub-subseries 2.12.10 Special projects and miscellaneous

Sub-subseries 2.12.1, Document production, 1972-1987
Details of the NIC publishing procedures are contained in this sub-subseries. From its inception the NIC was responsible for editing and publishing the network reference books, such as the directory (phone book), resource handbook (yellow pages), user guides, vendors guide, protocol handbook, etc. Consequently, document production, editing, and distribution were a large part of the NIC effort. The content for these documents was gathered by the NIC from the host personnel and users on the network; and was entered online at the NIC. In turn, the NIC edited, published, and distributed these documents to users. Many NIC publications were voluminous in size, and exacting in detail, and thus difficult to publish. Online document-publishing software did not yet exist. Line printer listings (the norm at first) did not make acceptable camera-ready copy. Print shops were not equipped to handle copy on media other than paper, i.e., they could not accept magnetic tape output or other computer media, or if they did, there were gross incompatibilities between systems. Consequently, the NIC was on the forefront of doing this kind of document production.

Originally, NLS was used to produce NIC documents. Over time, other programs were also used, and interface programming was written by NIC programmers when needed. The cost of producing the reference documents was also a serious consideration, because the nature of the documents was such that they were reproduced periodically, and previous versions were then obsolete. The final documents produced are contained in subseries 2.11, NIC Reference Publications. Arranged chronologically.

Sub-subseries 2.12.2, Reference/Hotline, 1969-1988
From 1970 until 1991, the NIC provided telephone and conventional mail reference services to Arpanet, and eventually DDN and Internet users. In 1983, when the DoD adopted the TCP/IP protocols, and the Arpanet/DDN became an operational military network, the NIC was tasked to run an internet Help Desk, 12 hrs/day, 5 days/week to answer e-mail and telephone queries. This sub-subseries contains administrative papers reflecting the day-to-day operation of the reference/hotline. Note that each NIC monthly progress report contains statistics on the amount of reference activity. Arranged chronologically.

Sub-subseries 2.12.3, Naming and addressing, 1972-1989
From 1971 onwards, the NIC maintained the Arpanet Host Table for DARPA. Later the same activity was carried out by the NIC for the DCA and the DDN, of which the Arpanet eventually became one segment. At first the Host Table was not machine-readable and

tended to be adapted by each site to suit its local machine types. In 1974, the NIC defined an online, machine-readable standard for the Host Table. For many years, the Host Table remained a centralized "flat" ASCII text file that hosts downloaded from the NIC, first via FTP, and later via the NIC Name Server. The table continued to grow until the host addresses were about to exceed the address space allotted to them in the packet headers, and the table itself was too large for small hosts to house in its entirety. Aside from its size, maintenance of a single, centralized Host Table had become cumbersome and inefficient, and did not serve the needs of the expanding internet. At this time, the hierarchical Domain Naming System (DNS) was adopted by the internet.

The transition from the "flat" ASCII text Host Table to the hierarchical DNS took place in stages over time. The Arpanet transition first began in 1983. Later in 1987-88, the DDN finally made its transition to the DNS. During the transition, the NIC maintained two host tables – the old and the new. It also updated the Name Server and naming database to handle old or new requests, and wrote the *Domain Administrators Operations Guide*. The NIC developed the top-level domain-naming scheme of .gov, .mil, .edu, .org, and .com; implemented the network domain-naming server based on Paul Mockapetris' program called Jeeves; and served as the network registrar for the top level domains (TLDs). In 1987, administration of the Assigned Numbers, global IP address allocation, and root zone management were transferred to the NIC contract from USC-ISI. At that point, the NIC became the naming and addressing registration authority for the Internet. This work continued until 1991, when the NIC contract left SRI.

This sub-subseries contains material that describes naming and addressing activity from 1970 to 1991. Included are Feinler's notes on the generic TLD system, as well as e-mails on the subject. Also included is an anecdotal article written by Feinler in 2010 on the history of the TLDs. Much of the work on naming, WHOIS, and the DNS was described in the RFCs (particularly RFCs 22, 95, 226, 235, 247, 252, 273, 289, 606, 627 739, 810, 811, 812, 881, 882, 883, 897, 952, 953, 1031, 1032, 1034, and 1035 among others), and the Namedroppers Working Group. See also subseries 2.11, NIC reference publications, which contains copies of early host tables. Arranged chronologically.

Sub-subseries 2.12.4, TAC user access registration, 1974-1990
The terminal access controllers (TACs) permitted a user to access a host computer on the network via dial-up using a terminal, a telephone, and an acoustic coupler. To make this connection, one

needed an access telephone number provided by the government. These numbers were to be used sparingly by authorized users. However, as time went on, the phone numbers became widely distributed and were a potential security risk. Also, when government and contractor personnel were traveling, they could not login via a TAC if they did not have the TAC access numbers with them. Consequently, they would often call the   NIC for a list of the numbers, and the NIC, in turn, would have to try to determine if the caller was authorized before releasing the numbers.

After the DDN was created, the decision was made to install a TAC access and user registration system. The NIC was tasked with this activity along with BBN, who controlled the TACs and TAC software. Host administrators sent the NIC a list of authorized users at their respective facilities, including name, address, telephone number, host and site affiliation, and e-mail address. These data were entered into the NIC's WHOIS database. In turn, each approved user was issued a TAC access card by the NIC, which allowed that user to access the TACs using the card for access control. Because the card controlled the access, TAC phone numbers could be made public and were no longer a security problem or a bottleneck. Later the NIC installed a registration service online so an individual could register him or herself.

This sub-subseries contains papers that describe the TAC access system. Also included is the first TAC access card issued by the NIC. Arranged chronologically.

Sub-subseries 2.12.5, DDN audit trail and billing services, 1984-1988
When the network was only a research network, the costs were divided equally among the participating government agencies (Sponsors). Once the Milnet became an operational military network, and was no longer a research network only, this cost algorithm was not equitable. Some agencies were large and had many users, while some were small and had few users, some used the network extensively, while others used it sporadically. Therefore, a new charging algorithm was needed. In addition, security was more of an issue on an operational military network than it had been on an experimental research network. Consequently, DCA and DECCO decided to develop an audit trail and billing system that could be billed or tracked to an individual user, if requested. The NIC was in charge of developing the data collection system, collecting the data, and issuing the usage reports. The work was a joint project with BBN, who was responsible for the security aspects of the project and for funneling

the usage data to SRI. This sub-subseries contains the actual audit trail and usage reports produced by the NIC for DCA as well as papers describing the process of collecting the audit trail and usage data. The audit trail and usage reports, and the descriptive papers are arranged separately, and each is arranged chronologically.

Sub-subseries 2.12.6, Administration of network contacts, 1970-1991
The NIC was tasked with administering the mailing lists for the official network contacts. The first contacts to be appointed were the network Technical Liaisons. These were technical representatives involved in bringing computers onto the network, and implementing the network protocols. In general, they did not have authority to speak for the administration at the site where they were located. Consequently, the Host Administrator (HA) role was created. The HA had authority to authorize an action at their respective sites. As the network further evolved, the role of Node Site Coordinator (NSC) was created to deal with problems and directives affecting network nodes. Domain Technical Contacts were appointed to assist with domain naming. There was also the Arpanet Sponsors Group, and other such official distribution groups.

The NIC maintained the membership and mailing lists for these groups, and sent both informational and official action messages to them at the request of DCA and/or DARPA. Each contact, in turn, was expected to pass on the information or action to appropriate personnel at his or her site. This created a very effective people network that could be contacted via e-mail whenever needed. This sub-subseries contains records that describe the role of the various official contacts. Also included are lists of the names of the people who filled the various roles. The people who served as Liaison make up a veritable "who's who" in networking in the early years, and the liaisons played a very important role in building the Internet. See also subseries 2.11, NIC Reference Publications, each of which contains lists of the people filling these official roles at the time of publication. Arranged chronologically.

Sub-subseries 2.12.7, Maintenance of the Defense Communications Agency (DCA) technical library, circa 1985-1990
At the request of DCA, the NIC built and staffed a document library in Washington, D.C. for their use. A duplicate set of the Washington documents was maintained at the NIC in Menlo Park, California for cataloging and reference purposes. The BIBLIO and VOID software were used to process and catalog this material, see

subseries 2.3. This sub-subseries contains detail of software, processing, and administration of the library. See also, subseries 3.3, DCA Library collection below for the actual contents of the library. Arranged chronologically.

Sub-subseries 2.12.8, Protocol information locator, circa 1980
This sub-subseries contains records about an idea that was proposed by SRI as a way for the DDN Program Management Office (PMO) to track the many protocols that were being developed and considered in the 1980s. The original concept was to put together diagrams of the various protocol suites being proposed or in use, with hyperlinks to the full-text protocol documents themselves. The NIC started on this work, which was then halted and restarted, and eventually died out because there were other more pressing matters at hand, and because the DoD chose to implement the TCP/IP protocols for its military networks. Preliminary to this work, the NIC collected an extensive reprint collection on protocols and their implementation. These reprints make up subseries 3.9, Protocol reprint collection. See also subseries 3.3, DCA Library collection which contains many U.S. and international protocol documents. Arranged chronologically.

Sub-subseries 2.12.9, Document and software sales, 1985-1991
In the early years, each document produced by the NIC had to be written into the NIC contract along with the number of copies to be produced. Contracts often took many months to negotiate and finalize, and during that time the need for documents often changed – either too many or too few were authorized. When the DoD chose to implement the TCP/IP protocols on Jan. 1, 1983, they did not think about the requirement for documentation, which was provided by the NIC. Consequently, there were no up-to-date Protocol Handbooks available for the cutover. At that time, SRI made an agreement with the DDN PMO to change the way document production was funded. Under the new arrangement, the NIC contract covered content and preparation of camera-ready copy of each document the NIC produced for DCA. DCA then granted SRI the right to reproduce and sell copies of the documents for cost plus a small profit to cover labor, postage, packaging, and other related costs. This meant that DCA no longer had to guess in advance how many documents might be needed and factor this into the NIC contract; and the NIC could publish the necessary amounts of documents without lengthy negotiations and contract modifications. This system was jokingly referred to internally as "NIC, Inc." and was in place for production of various documents and software packages until the NIC project ended in 1991. Arranged chronologically.

Sub-subseries 2.12.10 Special projects and miscellaneous, 1970-1991

From time to time, the NIC was asked to take on special projects such as issuing a questionnaire to users on network usage. Feinler was a representative-at-large to the White House Conference on Libraries and Information Centers. The NIC was also often involved in security issues. Note that SRI carried on a security forum, called *RISKS Forum*, for a number of years, edited by Peter Neumann, who also worked on the NIC project. See http://catless.ncl.ac.uk/Risks. Details of such projects and issues are contained in this sub-subseries. Arranged chronologically.

Subseries 2.13, NIC software architecture, programs and servers, 1970-1989

This subseries contains descriptions of the NIC software architecture, database system, and servers. The early NIC prototype was originally embedded in the NLS/Augment system. Over time, NLS was abandoned and a series of network servers were developed by the NIC to handle the network information services. These servers did not require the user to have an account on the NIC computer in order to obtain information. The servers used network protocols, and were not embedded within another software system, and were therefore faster, more efficient, and easier to use. See also subseries 2.6, NIC monthly progress reports, and subseries 2.7, NIC contract deliverable reports. This subseries is organized into 6 sub-subseries:

> Sub-subseries 2.13.1 NIC software architecture
> Sub-subseries 2.13.2 VOID
> Sub-subseries 2.13.3 NIC/Query
> Sub-subseries 2.13.4 Memlist/Identfile/WHOIS
> Sub-subseries 2.13.5 Biblio
> Sub-subseries 2.13.6 SAM

Sub-subseries 2.13.1, NIC software architecture, circa 1975-circa 1985

This sub-subseries includes architectural diagrams of all the NIC software showing how it was interrelated. Also included are programming notes, some source code, design documents, and similar materials. Arranged chronologically.

Sub-subseries 2.13.2, VOID, 1987-1989

This sub-subseries contains material describing VOID, the NIC data base management system (DBMS) designed by Ken Harrenstien. As the NIC grew, it needed a database management system to manage the various NIC databases. However, DCA would not

authorize this expenditure, so the NIC built its own DBMS tailored to NIC needs. Arranged chronologically.

Sub-subseries 2.13.3, NIC/Query, 1973-1987

This sub-subseries describes the evolution of the NIC/Query server and its contents. NIC/Query was the first server developed by the NIC. It began in 1972, and was a simple menu-driven system, whereby a user chose a topic from a menu or list of topics by typing the number or letter next to that topic. In return, text describing the topic was printed out. This system was expanded over time to deliver the information in the *Resource Handbook* and other pertinent information to users. Arranged chronologically.

Sub-subseries 2.13.4, Memlist/Identfile/WHOIS, 1972-1986

Originally the NIC used the Identfile system within NLS to produce membership lists and content for the *Arpanet Directory.* Over time, the NLS Identfile was phased out in favor of the WHOIS server, whose data came from the VOID DBMS. WHOIS was a "white-pages" server wherein a user typed, "Whois [lastname]," and received the name, address, e-mail address, and phone number of that person. The server was later expanded to include host names and other information as well. Papers in this category describe the Identfile, as well as the WHOIS server. See also, subseries 2.6, NIC monthly reports and subseries 2.7, NIC contract deliverable reports for more detail on NIC servers. Arranged chronologically.

Sub-subseries 2.13.5, BIBLIO, 1970-1988

This sub-subseries describes the BIBLIO system and server. BIBLIO was originally designed as a bibliographic search system wherein a user would be able to search the contents of a NIC-provided bibliographic database. It was to have been a part of the Protocol Locator system. Large search services were available in this period; however, they were not accessible yet over the Arpanet/DDN. Dialog, one of these search services, had a feature called "Private Files" which allowed a customer to use Dialog programs to build a subscriber's own bibliographic search service. The BIBLIO server was designed to be a bibliographic system for the NIC and its users, as well as a reach through to the Dialog search service. This was rather ambitious for the time in which it was being developed. The NIC at first built the BIBLIO system in dBase III, designed the reach-through software, and was in the process of negotiating a pricing algorithm with Dialog, when work was halted. Instead, the BIBLIO system was ported to VOID, and was used to catalog the DDN-PMO library contents. It could be accessed and searched across the network; however, it was never publicly released to Internet users because of bandwidth

considerations, and was used primarily to work back and forth between the NIC and DDN-PMO library personnel. See also subseries 2.6, NIC monthly progress reports, and subseries 2.7, NIC contract deliverable reports for more detail on BIBLIO and the DDN PMO library. Arranged chronologically.
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Sub-subseries 2.13.6, SAM, 1984-1989.
SAM (Simple Access to eMail) was a program that allowed a user to access a mail host and download his or her e-mail to a personal computer. PCs were proliferating, but LANs were not yet common. A personal computer at the time functioned as a "dumb" terminal, when connected to the Internet. Users wishing to view their e-mail accounts had to use the PC to connect to a host computer, where their e-mail resided. Host machines were very crowded with users logging on and spending time trying to read and answer their e-mail. The NIC developed SAM to allow PC users to automatically connect to a host machine, grab their e-mail, and download it to their personal computer for processing. Mail, in turn, could be bundled on their PCs and returned to the host computer for delivery. This program was a forerunner of the way mail is handled today.

Originally, it was to be based on the Kermit upload/download protocol. Although Kermit was free software, the author did not wish to make it widely available to military users. Consequently, SAM was based on a commercial protocol, which the NIC licensed from a company called Transend Corp. SAM was to be one of those products where the NIC contract paid for development up to proof-of-concept and beta-test phases. Then the NIC would produce and distribute the software and train users, for cost plus handling fees. The NIC was in beta test with this software, when an anonymous letter was sent to the DCA (incorrectly) complaining that the NIC was selling a commercial product on a government network. Work on SAM was halted until this issue was resolved. By the time it was, SAM had been overcome by the events of LANs and PC mail protocols. A copy of SAM software and its documentation is included. Papers in this sub-subseries describe the development of SAM. See also subseries 2.6, NIC monthly progress reports, and subseries 2.7, NIC contract deliverable reports, for more detail on SAM. Arranged chronologically.

Subseries 2.14, NIC computers and computer facility, 1981-1991
Contains system diagrams describing the NIC computer facility, as well as details of its management and operation. After Engelbart left SRI the NIC was run on rented space on a number of computers. This was not adequate to do the job, so in 1981 DCA authorized purchase of first the

Foonly and later the DECSYSTEM-20 computers for NIC use. After 1983, the NIC ran a large computer facility which included a DECSYSTEM-20, running the TOPS-20 operating system, a Tymshare F3 upgraded to an F4 Foonly, a mail machine, mail bridge, two gateways, a LAN, and an IMP. By this time the NIC had written its own database management system, called VOID, and had phased out NLS/Augment for any part of its work. The Foonly was used exclusively for the NIC audit trail and billing tasks using the Ingres database management system, and had limited network access. By the late-1980s, the NIC converted much of its code to the C programming language, and began using Sun servers as well as the DECSYSTEM-20, and Foonly. The DECSYSTEM-20 computer became the NIC host accessible by network users. It was multi-homed on both the Arpanet and the Milnet. The NIC continued to maintain a 24 hr/day, 7 day/week online computer center until the NIC project left SRI in 1991. See also subseries 2.6, NIC monthly progress reports and subseries 2.7, NIC deliverable reports for more detail on the NIC computer facility. Arranged chronologically.

Subseries 2.15, Miscellaneous e-mail and correspondence, 1976-1989
Contains e-mails found throughout the collection and not filed with the topics they related to. The e-mails cover a wide range of subjects. Some are between NIC personnel, others from users, working groups, various contracting agencies, especially DARPA and DCA, and still others from the network contacts. The e-mails indicate what problems were being addressed at the time of issue, and what the thinking was at the time. They also show the extent of collaboration that took place on the network. Arranged chronologically.

Series 3, Special NIC collections, 1960-1993, bulk 1970-1985
The NIC put together a variety of special collections for the Arpanet, and later for the DDN. These collections were assembled at the request of network users and contracting agencies. This series contains material describing the design and development of the Arpanet/DDN, development of its protocols, and details of its management. Included are: The first 1,500 RFCs; a complete set of the Internet Engineering Notes (IENs); early working group papers; background and history of the Internet Engineering Task Force (IETF); an extensive collection of technical reports from sites on the early Arpanet; an extensive protocol reprint collection; the TCP/IP bibliography and working group online dialog; protocols and standards in use on the Arpanet/DDN; protocols and standards from organizations other than the Arpanet/DDN, including international standards and ISO/OSI and IFIP working groups; an extensive e-mail design and development reprint collection; a set of papers and reports issued by the National Software Works (NSW) project; a set of the National Bureau of Standards (NBS now NIST) GOSIP working group papers and standards; and meeting notes and papers from the DoD Protocol Standards Technical Panel (PSTP), and DDN

Management Bulletins and DDN Newsletters, among others. This series is organized into 16 subseries:

> Subseries 3.1 Xdoc collection
> Subseries 3.2 Site reports collection
> Subseries 3.3 DCA Library collection
> Subseries 3.4 RFC collection
> Subseries 3.5 IEN collection
> Subseries 3.6 NSW collection
> Subseries 3.7 E-mail and reprint collection
> Subseries 3.8 Network working groups collection
> Subseries 3.9 Protocol reprint collection
> Subseries 3.10 Interop collection
> Subseries 3.11 DARPA contractors meetings
> Subseries 3.12 Network maps
> Subseries 3.13 Network traffic statistics
> Subseries 3.14 Field installation schedules
> Subseries 3.15 Internet monthly reports
> Subseries 3.16 Miscellaneous

Subseries 3.1, Xdoc collection, 1960-1994
Starting in the early 1960s, Engelbart and the ARC group had amassed a sizeable collection of documents pertaining to their work or interests. Once SRI accepted the NIC contract in 1970, this in-house collection made up the beginning of a NIC library of offline documents, called Xdoc. Xdoc continued to grow because each site on the network was asked to deposit copies of its technical reports at the NIC, along with any other significant documents pertaining to networking or network resources available to users at its site. As more and more documents were created, stored, and exchanged online the XDoc collection became less significant. When funds for the NIC project were cut back in the mid 1970s, the NIC discontinued officially building the Xdoc collection. By this time, there were so many sites on the network that maintaining a collection of all their significant network publications was beyond the scope of the NIC project.

The Xdoc collection is a mixture of everything that happened in computing, information processing, and networking from 1960 to 1990. It describes early work on things that evolved into today's computer and networking environment, but it also describes things that did not work or have long since been forgotten, such as teaching machines. The collection contains memos from the early days of the Arpanet, when researchers all over the network often sent pertinent documents to the NIC as the network repository or distributor. The bulk of items are reprints from journals of the time – many of which are now out of print. It has meeting reports, early ideas, decisions from DARPA to its early contractors, contents of seminars, and product descriptions.

Each Xdoc document was assigned an accession number, called a NIC number. The collection was formally maintained, abstracted and indexed until approximately 1973. However, ARC and NIC personnel continued adding to the collection informally, until the ARC group left SRI in 1977. Then NIC continued to collect pertinent articles pertaining to its activity until the NIC project left SRI in 1991. After NIC numbers were discontinued, the reprints were simply arranged in chronological order. There is an index that can be used as a guide filed at the end of the Xdoc subseries in boxes 062300487, 062306145, and 062306146. The index contains author, subject, report number, and NIC accession number indices. Early technical reports were originally part of the Xdoc collection, and were indexed in the Xdoc catalog. These reports may have been moved to subseries 3.2, Site reports. Arranged by NIC number, if one exists, otherwise in chronological order.

Subseries 3.2, Site reports collection, bulk 1968-1980
This subseries is an incomplete but extensive collection of early technical reports from sites around the early Arpanet. Each site added to the Arpanet was instructed to send the NIC a copy of any reports emanating from its facility pertaining to computing or networking research. In addition, SRI itself subscribed to and/or exchanged reports with many research facilities with which it shared a mutual interest. All of these reports make up the Site reports collection. Even though the effort to collect site reports by the NIC formally ended about 1973, many sites continued to send their reports to the NIC as a courtesy. These reports describe in detail the activities of such key players in Internet development as BBN, UCLA, CMU, Harvard, MIT, Stanford, SRI, USC, Rand Corp., U. Illinois, U. Utah, Xerox PARC, and others.

Early technical reports were originally part of the XDoc collection. They were assigned NIC numbers and entered into the XDoc catalog. As stated, many sites continued to send reports to the NIC long after cataloging and NIC numbers were discontinued. See also subseries 3.1, XDoc collection, as there is overlap. Arranged by agency or organization where the report originated, and chronologically under each agency or organization.

Subseries 3.3, Defense Communications Agency document library collection, 1971-1991
In the mid 1980s, the NIC was tasked to provide a document library for the Defense Data Network Project Management Office (DDN-PMO) in Washington, D.C. The NIC maintained an identical library at SRI in Menlo Park, CA for reference and processing. The collection contains documents that were of interest to the DDN-PMO in managing the DDN. It includes such things as: Arpanet newsletters, DDN newsletters, DDN management bulletins, minutes of the Arpanet Sponsor's meetings, Protocol Standards

Technical Panel (PSTP) minutes and handouts, in-progress reports of DCA contractors, Autodin II reports, Computer Operations Group (COG) minutes, and many documents from ISO, IFIP, and NBS protocol working groups.

The NIC added an accession number which contained a date portion, i.e., 1234-72, where "1234" was the accession number and "72" was the date of publication. Indexes referring to these accession numbers are available in box 062309881, including author, title, and subject indices. A chronological index is also available online at http://www.computerhistory.org/collections/accession/500001011 Arranged by NIC accession number.

Subseries 3.4, Requests for comments (RFCs), 1968-1993
RFCs (requests for comments) are a set of technical notes pertaining to the design and development of the Arpanet, and later the Internet. They were first issued by the Network Working Group (NWG), a DARPA-sponsored group, as an informal, non-bureaucratic way of sharing technical information. In 1985, DCA was about to create a working group similar to the NWG. It was decided that having two similar groups running in parallel would be counterproductive. In 1985, the two groups agreed to work as one working group called the Internet Engineering Task Force or IETF. From 1969 to 1991, the NIC was the official repository and distribution site for the RFCs, and Jonathan Postel served for 28 years as Editor-in-Chief of the RFCs on behalf of the government. Since 1991, the RFCs have been officially managed by the IETF, which has become the coordinating body for the Internet protocols and procedures under the auspices of the Internet Society (ISOC). RFCs are available online at http://datatracker.ietf.org/doc/search/. For further information on the RFC process see RFC 3, RFC 2555, and RFC 4677.

SRI NIC was the official distributor of, and repository for, the RFCs from 1969 to 1991. As such, The NIC worked closely with DARPA and DCA to maintain the official distribution list for the RFCs. It sent out RFC publication notices to all the official network contacts, working group members, and others who asked to be added to the RFC online notification and distribution list. As the network grew, duplicate sets of RFCs were also maintained at other sites on the Arpanet/DDN and on other interested networks, such as CSNet, Bitnet, UUCPnet, NSFnet, NSInet, etc, so that users could obtain them from more than one place. However, SRI NIC maintained and issued the official set of RFCs and maintained the official online notification and distribution list. It also sold a RFC hardcopy subscription to subscribers not on the Internet.

The RFC subseries contains the first 1,500 RFCs, from 1968 to 1993, indices are in box 062300486. RFCs numbering higher than 1,500 may be

obtained from http://datatracker.ietf.org/doc/search/. Arranged by RFC number.

Sub-series 3.5, Internet Engineering Notes (IEN), 1977-1979
Internet Engineering Notes were publications of the Network Working Group (NWG). These were semi-private documents when they were first published, and were started because the RFC process was attracting redundant discussions that were taking a great deal of everyone's time. However, keeping up two sets of technical notes became even more tedious, and also confusing, so eventually all the IENs were either updated and converted to RFCs or declared obsolete and dropped. They differ from the RFCs in that they were written by members of the NWG for review by members of the NWG, whereas an RFC could be written by anyone and was open for wider discussion. A complete set of all the IENs published is included. Arranged by IEN number (roughly chronological).

Sub-series 3.6, National Software Works (NSW) collection, 1974-1984
The National Software Works was an Arpanet-based system designed to provide programmers access to a large range of software tools, e.g. text editors, compilers, assemblers, and debuggers, which could be used in software development. From the standpoint of the programmer or program manager, the NSW environment consisted of numerous software development tools, running on a variety of computer systems which were geographically and administratively distributed across the country, but accessible through a single access-granting, resource-allocating monitor with a single, uniform file system.

The major components of the NSW were the front-end (FE) system through which the users accessed the NSW; the access granting, resource controlling central component, called the Works Manager (WM); and the NSWExec foreman (FM) module that interfaced tools on the tool-bearing hosts (TBHs) to the WM; and communication protocols (MSG) that specified the communication links between the various NSW components. Included in this subseries is "The National Software Works: It's purpose, status, and future plans," by R. A. Robinson, Proj. Engineer, Rome Air Development Center, Rome, NY, 1976. Arranged chronologically.

Subseries 3.7, E-mail reprint collection, 1970-1980
In the early 1980s, there was a great deal of interest in e-mail programs and e-mail program interoperability because e-mail programs were often operating-system specific. The NIC was asked by DCA and the Navy to put together a document collection and bibliography on e-mail. The bibliography was available for public distribution. This collection contains both the bibliography and the documents cited in it. The bibliography is located at the beginning of box 062309802 and can be used as a finding

aid to the subseries. Arranged by author's last name, then chronological within each author.

Subseries 3.8, Network working groups collection, 1968-1994, bulk circa 1970-1990

Business was originally conducted on the Internet by working groups (w.g.), also called "special interest groups" or SIGs. These groups usually carried out their discussion by e-mail. Some were more formal and held face-to-face meetings. However, in-between discussions were still usually done by e-mail. Contract work might involve more than one organization, and the participants would set up a working group to coordinate their activities. In addition, groups with a special interest or problem often formed an ad hoc working group or SIG. Early on, much technical and/or administrative collaboration was needed, and this was often done through working groups. Protocols were developed by working groups. Consequently, working groups were very important in the design and construction of the Internet.

The NIC tried to follow as many working groups as it could, but there were many of them and the sheer volume of e-mail dialog was daunting. Several people around the network tried to make lists of the working groups. Some of these lists are included here. Note that documents of the very early working groups (before e-mail) can be found in subseries 3.1, Xdoc Collection. Complete records of the TCP/IP working group and the NameDroppers working group are available on a CD published by the NIC, which is located at the end of this subseries. The rest of this subseries is hardcopy, and is very incomplete. See also subseries 2.15, Miscellaneous e-mail for more working group dialog. See appendix III for acronyms of working groups included in this collection. Arranged alphabetically by the acronym of the working group, then chronologically within each working group.

Subseries 3.9, Protocol reprint collection, 1986-1992

In preparation for the development of a protocol locator, the NIC amassed a large collection of protocol reprints covering both domestic and international network protocols. The locator work was dropped, at which time the protocol reprint collection was discontinued. Arranged chronologically.

Subseries 3.10, Interop collection, 1986-1992

Once TCP and IP were adopted as official government protocols, many vendors were eager to sell TCP/IP products to the government. In turn, government agencies wished to buy COTS products, so that they no longer had to develop and maintain these products themselves. The NIC published a series of Vendors Guides listing companies that had products to sell. However, the NIC was not allowed to recommend any one product

over another, as it was considered unfair advantage under government rulings at the time. Dan Lynch, formerly of SRI and USC ISI, started an organization called Interop to fill this need. Interop put on seminars and trade shows, where vendors were required to show that their products would run over the TCP/IP protocols. The NIC usually had a booth at these trade shows and attended many Interop seminars. Ole Jacobsen, a former NIC employee, became the editor of ConneXions the Interop newsletter. Other former NIC employees also joined Interop. This collection contains most of the Interop ConneXions newsletters and an incomplete set of other Interop publications. Arranged chronologically.

Subseries 3.11, DARPA contractors meetings, 1971-1980
When the Arpanet first began, all of DARPA's contractors met periodically for an in-progress report. Each contractor submitted a brief summary of work and resources available from his or her site. These make up the ARPA Contractors Meetings. Arranged chronologically.

Subseries 3.12, Network maps, circa 1970-1990
BBN issued a set of network maps on behalf of DARPA and DCA. These were both logical and geographical maps showing where network nodes were located and various logical network configurations. The NIC kept a duplicate set of these maps. This series contains an incomplete set of maps of the Arpanet, Milnet, Minet, and NSFnet over a range of time. Maps are arranged first by type, then chronologically under each type.

Subseries 3.13, Network traffic statistics, 1978-1988
BBN issued traffic statistics for the network. The NIC was on distribution for these reports. This series contains an incomplete set of these traffic statistics. Arranged chronologically.

Subseries 3.14, Field installation schedules, 1975-1985
These were distributed to the NIC by BBN. They describe what was being added to the network, and the estimated schedule. This collection contains an incomplete set of the field installation schedules. Arranged chronologically.

Subseries 3.15, Internet monthly reports, circa 1975-1990
The University of Southern California's Information Sciences Institute (USC-ISI) collected progress reports and other pertinent information from DARPA contractors on behalf of DARPA, and issued a monthly report via e-mail summarizing this information. This subseries contains an incomplete set of the Internet monthly reports. Arranged chronologically.

Subseries 3.16, Miscellaneous, 1976-1988
Contains miscellaneous non-DARPA or non-DCA military documents. Arranged chronologically.

Series 4, Other networks and NICs, 1972-2000
SRI-NIC provided information and coordinated the dissemination of information to NICs on other networks. Because the various NICS were duplicating efforts to gather information from sites, and it was so difficult to send e-mail from one network to another, Feinler began a working group called Internics w.g to create a network of NICs, and to coordinate NIC-type activities. Internics later morphed into the IETF Users Working Group This series does not represent every other network or NIC on the early Internet. However, it does show how the various early networks and NICs collaborated before the World Wide Web took over as the primary information interface on the Internet. It includes descriptions of other early networks and their NICs, including papers describing the inception of some of these networks and NICs, their scope, user communities, operation procedures, newsletters, etc. Audio tapes are available for one of the NSF subnet planning sessions, to which the SRI NIC Head of Reference, Francine Perillo Bion, was invited. This series is arranged in 7 subseries:
Subseries 4.1 BITnet
Subseries 4.2 CSnet
Subseries 4.3 NREN
Subseries 4.4 NSFnet
Subseries 4.5 NSInet
Subseries 4.6 UUCPnet
Subseries 4.7 Other

Subseries 4.1, BITnet, circa 1980-circa 1990
The "Because It's There" network, or BITnet, was an early cooperative, ad hoc network used by universities in the U.S. It was founded by Ira Fuchs at the City University of New York (CUNY) and Greydon Freeman at Yale University. It used a series of local phone calls relayed from one node to the next, was inexpensive (long distance phone calls were very expensive at the time), and provided effective networking for student use. BITnet did not use Arpanet/DDN protocols. BITnet users often wished to interconnect with other networks, and vice versa, so its users often called the SRI NIC for details of how to go from one network to another. Arranged chronologically.

Subseries 4.2, CSnet, circa 1980-circa 1990
The Computer Science Network (CSnet) was an NSF-funded network developed in the early 1980s that was run by BBN under contract to NSF from 1981-1984. CSnet was headed by Dick Edmiston of BBN. It tied computer science departments at various universities together. CSnet was initiated by Peter Denning (Purdue U.), Anthony Hearn (RAND Corp.), and Larry Landweber (Wisconsin U.), and was the forerunner of the NSFnet. It used the TCP/IP protocol suite. Arranged chronologically.

Subseries 4.3, NREN, circa 1990-circa 2000

The National Research and Education Network (NREN) was the follow-on to the Arpanet and NSFnet, and is often referred to as Internet-2. It was designed by a consortium of industry, government, and academia as a high-speed network that could handle the increasing requirements of the Internet including the World Wide Web. It has since spread throughout the world. Arranged chronologically.

Subseries 4.4, NSFnet, 1985-circa 1990

NSFnet was created in 1985, and was a NSF-sponsored education network. NSFnet was a follow on of CSnet. Originally, it connected the supercomputer centers at Princeton, UC San Diego, Illinois U., Cornell U., and U. Pittsburgh, as well as the National Center for Atmospheric Research (NCAR) at Boulder, CO. As it grew, more and more colleges and universities connected to it through regional centers. NSFnet ran over TCP/IP and was compatible with the Arpanet/DDN. Arranged chronologically.

Subseries 4.5, NSInet, 1991-1996

The NASA Science Internet (NSInet) was a global system of communications transmission, switching, and terminal facilities that provided NASA with wide-area network communications services. It was managed for NASA by Sterling Software Federal Services, and was located at NASA Ames Research Center in Mountain View, California. It was essentially a clone of the Arpanet/DDN running TCP/IP. It's NIC was originally at Goddard Space Flight Center, MD, but was moved to Ames in the early 1990s. NASA Internet services were eventually moved from Ames Research Center to Huntsville, Alabama. Arranged chronologically.

Subseries 4.6, UUCPnet, circa 1980-circa 1990

UUCP abbreviates "Unix to Unix Copy," and is a protocol that allowed informal sharing of files, emails, and Usenet news data between computers. Started in the late 1970s, it quickly evolved into an ad hoc network with a large user base. It was notable for its ability to use ordinary phone lines and freedom from the strict use policies and expenses that were common to other networks of the time. UUCPnet was also known for the number of working groups and news groups it supported and shared with other networks. Arranged chronologically.

Subseries 4.7, Other, circa 1980-circa 1990

This subseries contains information on miscellaneous early commercial networks or services, such as the Dialog search service. Arranged chronologically.

Appendix I
Acronyms and Abbreviations

ADA	A structured, statically typed, wide-spectrum, and object-oriented high-level computer programming language, extended from Pascal
AFB	Air Force Base
AMC	Army Materiel Command
ANSI	American National Standards Institute
ARC	Augmentation Research Center
ARPA	See DARPA
Arpanet	Experimental packet-switched communications network supported by DARPA; forerunner of the Internet
ASIS	American Society of Information Scientists
ASN	Autonomous System Number [domain naming]
ASPER	Armed Services Procurement Equipment Regulations
ASS	Atlantic Satellite Systems
Augment	Name of Engelbart's NLS system once it was transferred to Tymshare Corp.
AWC	Architects Workshop Community
BBN	Bolt Beranek and Newman Inc.
BBN-NOC	Bolt Beranek and Newman Inc – Network Operations Center; one of the two official service centers on the Arpanet/DDN
BITNET	Because It's There Network; educational network; forerunner of NSFnet
BOF	"Birds of a Feather" interest group
BRL	Ballistics Research Laboratory
CCC	Communications Command and Control
CCITT	Comité Consultatif International Téléphonique et Télégraphique
CERT	Community Emergency Response Teams
CDRL	Contract Deliverable Requirements List
CHM	Computer History Museum
CIA	Central Intelligence Agency
CMU	Carnegie-Mellon University
CNP	Certified Network Professional
CNRI	Corporation for National Research Initiatives
COG	Communications Operations Group
COTR	Contracting Office Technical Representative
COTS	Commercial Off The Shelf
CSnet	Computer Science Network
CUNY	City University of New York
DARCOM	Department of the Army Command (?)
DARPA	Defense Advanced Research Projects Agency

DCA	Defense Communications Agency
DCEC	Defense Communications Engineering Center
DEC	Digital Equipment Corporation
DECCO	Defense Commercial Communications, Office
DDN	Defense Data Network
DDN-PMO	Defense Data Network Program Management Office
DEI	The Douglas Engelbart Institute
DIA	Defense Intelligence Agency
DMA	Defense Mapping Agency
DNLS	Display NLS
DNS	Domain Naming System
DoD	U. S. Department of Defense
DOTS	Documents Online Tracking System
ECMA	European Computer Manufacturers Association
EISN	Experimental Integrated Switching Network (MIT Lincoln Labs.
ELITE	Executive Level Interactive Terminal (software tools used by Army users on the road)
E-mail	Electronic mail
ETS	Educational Testing Service
FCCSET	Federal Coordinating Committee for Science, Engineering and Technology
FNC	Federal Networking Council (formerly FRICC)
Foonly	A computer sold by Tymshare Corp. similar to a DECSYSTEM-10
FRICC	Federal Research Internet Coordinating Committee
FTP	File Transfer Protocol
HA	Host Administrator
HEADER-PEOPLE	Working group interested in packet headers
HUMAN NETS	Working group interested in humans and their relation to networks
GOSIP	Government Open Systems Interconnection Profile
IAB	Internet Advisory Board
ICCB	Internet Configuration Control Board
IEN	Internet Engineering Note
IETF	Internet Engineering Task Force
IFIP	International Federation of Information Processing
IBM-PC	International Business Machines – Personal Computer
IDEAS	A set of technical notes putting forth new ideas for networking
IG	Inspector General
IMLAC	An early graphics workstation
IMP	Interface Message Processor
INARC	Internet Architecture working group

INENG	Internet Engineering working group
INFO ATARI	Atari special interest group
INFO H2100	H2100 special interest group
INFO VAX	VAX special interest group
INSAP	Internet Service Access Protocol
INTERNICS	Working group of various Network Information Centers
INWG	International Working Group
IP	Internet Protocol
IPTO	Information Processing Techniques Office
ISO	International Standards Organization
ISOC	Internet Society
IVV&T	Integrated Verification, Validation, and Testing
JPL	Jet Propulsion Laboratory
KWAC	Knowledge Workers Architect Community; Augment users group
LAN	Local Area Network
LOI	Letter Of Intent
LUG	Local User Group
MARDIS	Modernized Army Research and Development Information Systems
METANICS	See Internics
MICROS	Micro computer special interest group
MIIS	[DDN} Management Information Interface System
MILNET	MILitary NETwork; operational unclassified military packet-switched network; the unclassified segment of the Defense Data Network; a clone of the Arpanet
MINET	Movements INformation NETwork; a military logistics network
MIT	Massachusetts Institute of Technology
MMM	Early e-mail program; follow-on of MSG
MOD	A contract modification or change
MSG	Early e-mail program written by John Vittal
MSG GROUP	MSG working group
NAC	Network Access Component, a mini-TAC produced by Aydin Corp.
NAMEDROPPERS	Network naming and addressing working group
NASA	National Aeronautics and Space Administration
NASA AMES	NASA Ames Research Center, Mountain View, CA
NAURS	Network Audit-trail and Usage Reporting System
NBS	National Bureau of Standards
NCAR	National Center for Atmospheric Research, Boulder, CO
NCD	Network Change Directive
NESI	Network Engineering Subscriber Integration

NIC	Arpanet/DDN Network Information Center
NISC	[SRI] Network Information Systems Center
NIST	National Institute of Standards and Technology
NOC	Network Operations Center
NLS	oNLine System
NMG	Network Management Group special interest group
NMSIG	Naming special interest group
NREN	National Research and Education Network
NRL	Naval Research Laboratory
NSA	National Security Agency
NSF	National Science Foundation
NSFnet	National Science Foundation [educational] network
NSW	National Software Works
NSC	Node Site Coordinator
NSI	Network Solutions, Inc.
NSInet	NASA Science Internet
NWG	[Arpanet] Network Working Group
NUG	[Arpanet/DDN] New User's Guide
NURS	Network Usage Reporting System
OBE	Overcome By Events
OPR	Office of Primary Responsibility
OSI	Open System Interconnection
PACER	Personal Access Computing Environment Resource
PARC	See Xerox Parc
PC-IP	Personal computers – Internet Protocol
PCCB	Protocol Configuration Control Board
PI	Principal Investigator
Pluribus IMP	A BBN-produced IMP that could accommodate more than 4 host computers
PSSG	Protocol Standards Steering Group
PSTP	Protocol Standards Technical Panel
RADC	Rome Air Development Center, Griffiss AFB
REACH	Report Editing and Coordinating Helper (Army)
RFC	Request For Comments
RYO	Roll Your Own
SACDIN	Strategic Air Command network
SAM	Simple Access to electronic Mail
SDSC	San Diego Supercomputer Center
SIG	Special Interest Group
SIG COMM	Computer communications special interest group
SMTP	Simple Mail Transfer Protocol
SOW	Statement of Work
SRI	Stanford Research Institute, now SRI International
SRI ARC	Stanford Research Institute. Augmentation Research Center

SRI NIC	Stanford Research Institute. Network Information Center
SUR	Speech Understanding Research working group
TAC	Terminal Access Controller
TACACS	TAC Access Control System
TACAUD	TAC Audit Trail Analyzer
TBD	To Be Determined
TCP/IP	Transmission Control Protocol/Internet Protocol
TECOM	Testing and Evaluation Command (Army)
TIP	Terminal Input Processor
TIPUG	TIP user's group
TLD	Top-Level [naming] Domain
TNLS	Terminal [input to] NLS
TOPS-20	DEC-20 operating system
TS/SCI	Top Secret/Science network – classified segment of the DDN
UCSD	The University of California at San Diego
UCLA	The University of California at Los Angeles
UCLA-CCN	The University of California at Los Angeles, Campus Computing Network
UCSB	The University of California at Santa Barbara
UCSD	The University of California at San Diego
UDCP	Usage Data Collection and Processing System
UNIX PEOPLE	UNIX special interest group
URDB	See URIS
URIS	User Requirements Information System
USC	University of Southern California
USC-ISI	University of Southern California, Information Sciences Institute
USING	A network user's working group
USSR	The Union of Soviet Socialist Republics
UTAH	The University of Utah
UUCPnet	Early network that used the UUCP protocol
VAX SECURITY	A working group interested in security of VAX computers
VLSI	Very Large System Integration
WBS	WideBand Satellite working group
w.g.	Working group
WHCLIS	White House Conference on Libraries and Information Services
WHOIS	The SRI NIC "white pages" server and protocol
WORKS DIGEST	An internet working group
XDOC	The NIC collection of hardcopy documents
XEROX-PARC	The Xerox Palo Alto Research

Appendix II
ARC Personnel

Note: The names are the ones used while the person worked for SRI ARC. No attempt has been made to update name changes since that time.

NAME	ARC JOURNAL IDENT
Allen, Pamela	PKA
Andrews, Donald	DIA
Auerbach, Marilyn	
Bair, James	JHB
Ball, Donald	
Ball, Geoffrey H.	
Bass, Walter L	
Bates, Roger D.	
Baughman, Vernon R.	
Beck, Jeanne	JMB
Belleville, Robert	RLB2
Bolf, Maxine	MRB
Boli, Beverly	BEV
Bondurant, Rodney	RAB
Brooks, Dee	DMB
Brown, David	
Byrd, Kay	
Caldwell, Mary G.	
Carillon, Roberta A.	
Carter, Ellen	
Casseres, David	
Church, Mary S.	
Cooke, Judy	
Coppernoll, Mary	
Cox, Bonar	
Cornish, Jan	JAC3
Daul, William	
Davis, Tom	
Dornbush, Charles	
Duvall, William S.	
Ehardt, Joseph	
Engelbart, Douglas C	DCE
Engelbart, Christina	
English, William K	
Evans, David A.	
Feinler, Elizabeth	JAKE
Ferguson, William	
Garlick, Larry	LLG

Geoffrion, Ann R.	
Guilbalt, Carol	
Hall, David J.	
Hardeman, Beauregard	
Hardy, Martin	MEH
Harrenstien, Kenneth L.	KLH
Harris, Jared M.	
Hopper, Jon David	JDH
Huddart, Bonnie	
Humphrey, Thomas	
Hysmith, Rita	RH
Irby, Charles	CHI
Jernigan, Millicent	MEJ
Kaye, Diane	
Keeney, Marsha	
Kelly, Kirk	KIRK
Kirkley, Charles R.	
Kremers, Jan	JHK
Kudlick, Michael D.	MDK
Landsbergen, Johanna	JOJO
Leavitt, Jeanne	
Lehtman, Harvey	HGL
Len, Carolyn M.	CLEN
Leonard, Stephen	
Levine, Steve	
Lieberman, Robert	RLL
Limuti, Donald	
Lister, Priscilla	
Louvigny, Josette	
Lynch, Daniel C.	DCL
McGinnis, Adrian	ACM
Martin, Karolyn	KJM
Maynard, David	DSM
Melvin, John T	
Metzger, Laura	LJM
Meyer, N. Dean	NDM
Michael, Elizabeth	EKM
Miranda, Sandy	SLM2
Morgan, Beverly	
Mosher, Bonny	BPM3X
Norton, James	JCN
North, Jeanne B.	JBN
Ocken, Susan Kahn	SKO
Page, Cynthia	
Panko, Raymond R	RA3Y
Parsley, Bruce L.	BLP

Paxton, William H.	
Peters, Jeffrey	JCP
Pine, Bud	BJP
Poggio, Andrew	ANDY
Postel, Jonathan B.	JBP
Prather, Ralph	
Prince, Helen	
Ratliff, Jake	
Rech, Paul	
Retz, David	
Roetter, Susan	
Rom, Raphael	ROM
Rose, Caroline	ROSE
Row, Barbara E	
Rulifson, Johns	
Shapiro, Elmer B.	
Sherwood, Glenn	
Smith, David	DAV
Stanley, Linda	
Stoner, Mary L.	
Stroud, Linda	
Tisue, Gerald L.	
Torres, Israel	IAT
Trundy, Martha E.	
Vallee, Jacques	
Van de Riet, Edward K	
Van Nouhuys, Dirk	DVN
Victor, Kenneth	KEV
Wallace, Donald (Smokey)	
Watson, Richard W	RWW
Weinburg, Ann	POOH
Whitby, Oliver	
White, James E.	JEW
Wold, Priscilla	PAM2
Yarborough, John M	
Zolotow, Nina.	

Appendix III
NIC Personnel

Note: The names are the ones used while the person worked for the NIC. No attempt has been made to update name changes since that time.

Anderson, Virginia
Barker, Trudy L.
Belmonte, Michele A.
Bjork, Steven
Brown, Harriet A.
Camph, Barbara
Chen, Henry
Clark, Joane D.
Collins, Valerie C.
Craighill, Earl J.
Cross, Perry F.
Curiel, Frederick K.
Curiel, Ray
Dennett, Stephen C.
Dorio, Nancy A. (Nan)
Earle, Joy
Feinler, Elizabeth J. (Jake)
Fischer, Nancy C.
Garcia-Luna-Aceves, Jose
Gazis, Lynn L.
Haddick, C.
Haddick, R. D.
Haley, Barbara M.
Hamamoto, Mark K.
Hardie, E. T.
Harrenstien, Kenneth L
Hedrick, C.
Hood, V. A.
Huntley, Haraold L. (Hal)
Jackson, Mark D.
Johnson, Marlyn H.
Jones, Angela M.
Kahn, Susan Ocken
Kanerva, Lori A.
Kaattari, Katy A.
Kelly, Patrick R.
Knight, Robert
Konopik, Michael J.
Koumrian, Todd L.
Kuo, Frank

Landsbergen, Johanna M. (Jojo)
Lederman, Sol
Lim, B.
Lottor, Mark K.
Lucas, S. P.
Macky, Ian
Marine, April N.
Mason, Stephen B.
Maynard, David
MacGowan, Douglas D. J. (Weiman)
McGregor, Sharon C.
McGinnis, Adrian
Medina, Linda L.
Miller, Henry
Miller, Richard
Neou, Vivian F.
Neumann, Peter
Oakley, Daniel J
Ostapik, Fred M.
Perillo, Francine
Postel, Jon
Recker, Margaret (Mimi) M.
Redfield, Elizabeth
Reynolds, Susan
Roach, L.
Romano, Susan M.
Roode, David
Sameshima, Harry S.
Satz, Greg
Sherwood, Glenn
Smith, Michele
Smith, Scott E.
Spence, Gae Ann M.
Stahl, Mary K
Su, Zaw Sing
Tu, James K.
Tu, Janice
Walsh, Wanda
Ward, Carol A.
Wilson, Chandin
White, Victor
Wong, Barry
Wright, Bryan
Voropaeff, Leda
Younquist, Deborah F.

Appendix IV
Working Groups in subseries 3.8

Note: Acronyms have been identified when they are known; however, the identification may be approximate or incorrect as this was done from memory.

- ADA – DoD standard high-level programming language named after Ada Lovelace
- ANSI – American National Standards Institute
- ASS – Atlantic satellite systems
- CBI
- CERT – Computer Emergency Response Team, a security working group
- CNP
- COS – Commercial open systems
- HAWGS – interested in congestion and large bandwidth projects
- HEADERPEOPLE – interested in packet headers
- HUMANETS
- IAB – Internet advisory board
- IAFA
- IBM-PC – interested in use and compatibility of IBM personal computers on the internet
- IDEAS – an NSFnet note series discontinued after NSFnet joined IETF
- IETF – Internet Engineering Task Force
- IFIP 6.5 working group – an IFIP e-mail working group
- IMLAC – interest group for a type of graphics terminal (IMLAC)
- INARC – internet architecture interest group
- INDRA
- INENG – internet engineering interest group
- INFO-ATARI – Atari interest group
- INFO-H2100 – H2100 interest group
- INFO-VAX – DEC VAX computer interest group
- INTERNET MEETINGS
- INTERNICS – Interest group for coordination of NICs
- INWG – International working group
- LUG – [DEC] local users group
- MICROS – micro computer interest group
- MMM – MMM e-mail program interest group
- MSG GROUP – MSG e-mail program interest group
- NAMEDROPPERS (see also cd containing Namedroppers dialog) – naming and addressing interest group, emphasis on domain naming
- NBS SIGS – National Bureau of Standards interest groups (mostly OSI protocols)
- NSC
- NWG – Network working group
- OPEN ROUTING
- PACKET RADIO – official packet radio working group

- PC-IP – Personal computers-Internet protocol interest group
- PERFORANCE CONGESTION
- SDSC
- SECC
- SIG COMM - special interest group on communications
- SMTP – Simple mail transfer protocol interest group
- SUR – speech understanding interest group
- TIPUG – TIP users group
- TOPS 20 – DEC TOPS-20 operating system interest group
- UNIX PEOPLE – UNIX operating system interest group
- USING – users interest group
- VAX SECURITY - VAX computer security group
- VLSI – Very Large System Integration working group
- WBS or W NOTES – Wideband Satellite group
- WORKS DIGEST