
InfoVision/2000 Report

EXECUTIVE SUMMARY

As directed by Code 1001, the InfoVision/2000 Library Study Team met at NRL February 59, 1996, to "validate, or redirect, the Library's plan for providing NRL with a digital library, to assess the importance of such a capability to NRL, and to recommend specific steps that the Laboratory might take to help the Library effect an information environment appropriate to a scientific research organization." The Study Team's key findings and recommendations follow.

The Study Team was impressed with the Library's progress toward a digital future and with its users' demonstrated preference for networked delivery of information to their desktops. Although the future will be dominated by digital information, the Library must presently maintain both paper and electronic services, straining an operational budget already facing high inflation in journal prices.

The Study Team recommends that the NRL Library embark on a five-year initiative to provide increasing Web accessibility of information during which, in addition to acquiring critical journal mass, the Library:

- provides user friendly Web access, with sophisticated search and manipulation capabilities;
- transitions products now on InfoNet to InfoWeb within the next two years;
- continues to digitize NRL technical reports using Laboratory Modernization funds.

During this five-year period of digital library development, continuation of the \$100K special funding presently awarded annually for electronic journals plus an additional \$200K is requested of Code 1001.

To match the \$200K increase in special funding requested of Code 1001, the Study Team proposes that the Library redirect \$200K from the Library's G&A budget to the digital library project by discontinuing microcomputer support services and software lending. An estimated \$100K worth of staff and contractor time, already in the Library's G&A budget, will support the accomplishment of the Web journal initiative. Other actions, specified in Section 4, are recommended for Library consideration as an added means of expanding digital information services on InfoWeb.

Expansion of the Library's digital-network services to other Navy units cannot be realized without additional negotiations with publishers and added expense. In this regard, it is recommended that:

- NRL continue to provide library services, including digital services, to ONR as funded annually by previous agreement, and to include ONR in negotiations of site licenses;
- information services to remote NRL sites be provided only to the extent that incremental costs are funded by the benefiting site;
- services provided directly to other Navy or DoD units be either *quid pro quo*, or on a cost-plus-value-added fee basis.

To enable timely and efficient access to the Digital Library, it is recommended that the divisions provide full-time NRL professionals with high speed network access to the campus backbone and a graphical Web browser within the next two years.

Elevate the organizational location of the Library, perhaps to a Center, Code 50x0, to allow better focusing of the Library's evolution towards Laboratory needs, help the Library maintain required staff competence, and contribute to solving Laboratory-wide information architecture problems.

INTRODUCTION

During the week February 5-9, 1996, members of the InfoVision/2000 Library Study Team met at NRL to review the status of NRL Library and its information activities and to help identify the Library's role in the NRL information infrastructure leading into the 21st Century. Study Team Members are listed on the inside front cover of this report.

In advance of the study week, Study Team members were provided with detailed background information about the NRL Library as well as its recently developed mission, vision and goals statements ([Appendix A](#)). The study week began with a full day workshop that provided the opportunity for team members to gain a common perspective on the issues that face libraries as they move into the digital environment. The Study Team toured the NRL Library and made a visit to the National Institute of Standards and Technology to see how another federal library with similar subject focus and user clientele is developing its digital library. The remainder of the week was spent in discussions of the Library's goals and related issues, and in development of the Study Team recommendations.

The charge to the Study Team from the NRL Director of Research was to "validate, or redirect, the Library's plan for providing NRL with a digital library, to assess the importance of such a capability to NRL, and to recommend specific steps that the Laboratory might take to help the Library effect an information environment appropriate to a scientific research organization." This report summarizes the Study Team's deliberations, grouping its recommendations under the following headings:

1. Moving Toward a Digital Library, While Sustaining Paper
2. Information Activities at NRL
3. Relationships with Other Navy Units
4. Funding Library Operations
5. Additional Issues

6. Evaluating the NRL Library's Progress

Each of these areas is addressed below, with Study Team recommendations shown in boldface.

1. Moving Toward a Digital Library, While Sustaining Paper.

The Study Team was impressed with the progress already made by the NRL Library toward the digital future. In response to a 1990 Strategic Plan for Laboratory Networking (that called for network access to local and remote information resources) and to a Library User Needs Analysis later that same year (that showed that users wanted in-office access to information from their computers or workstations), the Library has demonstrated a strong commitment to the delivery of information to the desktop. The Library has taken advantage of NRL's advanced network connectivity, managed by Code 5590, to provide end-user access to a wide range of bibliographic resources, both databases and publications. In August 1992, the Library introduced InfoNet, to provide researchers and other employees with menu-driven remote access to CD-ROM databases, the Library catalog, LABMIS, online databases, and Internet resources. Dial-in InfoNet access was added in early 1994. While InfoNet tells a user where to find information, the document itself must be retrieved from the Library or other source. In 1995, with special funding from Code 1001, the Library developed and implemented TORPEDO (The Optical Retrieval Project: Electronic Documents Online). TORPEDO is designed to permit desktop searching and retrieval (display and printing) of journal articles, reports, and other documents. During 1995, the Library began to migrate its InfoNet services to a World Wide Web interface called InfoWeb. While a number of the InfoNet services that the NRL research community relies upon are not yet available via the Web, the Library's goal is to replace InfoNet with InfoWeb as quickly as practicable. In addition to TORPEDO, InfoWeb currently provides a point-and-click interface to the Library's catalog, to databases covering the scientific literature, to journal tables of contents, and to both local and external Web information resources of interest to NRL. When fully operational, InfoWeb will provide uniform access to a full range of information resources required to support the research process, whether the information resides on library, or other NRL, servers or in networked archives anywhere in the world. Figure 1, which shows remote (outside the Library) use of InfoNet and InfoWeb by NRL/ONR staff since January 1996, indicates a marked researcher preference for InfoWeb, with accesses rising steadily, while InfoNet accesses show a corresponding decline.

Library Electronic Services Usage by NRL/ONR Users Outside the Library (1996)

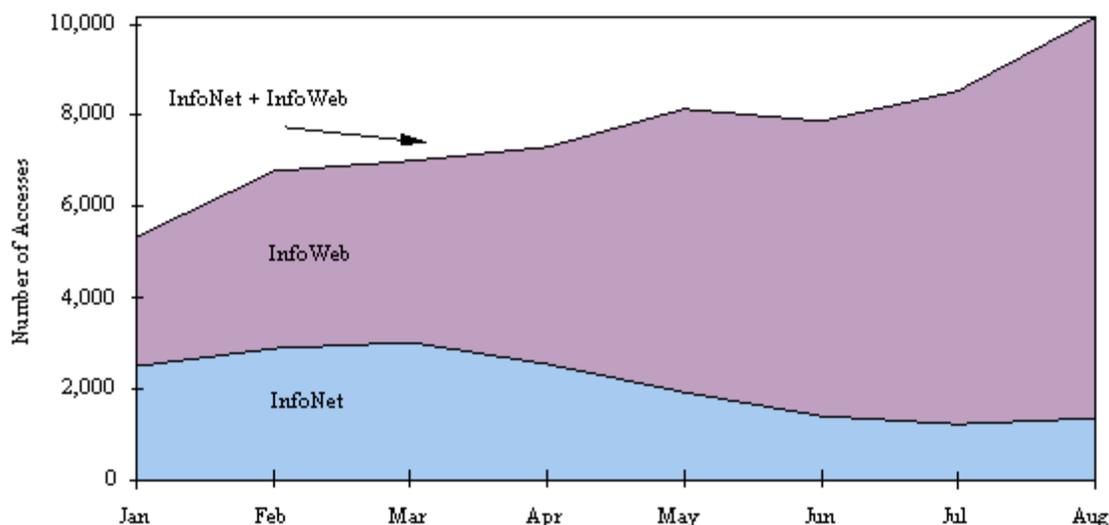


Figure 1 shows a decline in monthly access to InfoNet, an increase in monthly accesses to InfoWeb, and an overall growth in total accesses to both systems, with more than 10,000 recorded uses in August alone.

NRL and ONR researchers have readily accepted networked delivery of information to their desktops. Library usage statistics show that NRL/ONR researchers currently use the Library's networked access methods (InfoNet, InfoWeb, TORPEDO) three times more often from their offices and homes than from inside the Library, even though in-library access to electronic resources has been the traditional norm and is still the rule, rather than the exception, throughout industry, government, and academia. Furthermore, over 60% of the users responding to a 1995 InfoNet user survey stated they visit the Library less frequently than they did before InfoNet was available. As more information becomes available electronically, and the need to retrieve physical documents from the Library declines, desktop access can be expected to increase.

The Study Team was unanimous in its belief that the library of the future will be dominated by digital information services. While many issues remain unresolved, and appropriate economic models have yet to be developed, the consensus was that it is only a matter of time before digital information delivery replaces print based collections and services.

Both the publishing and library communities are currently undergoing fundamental changes as they transition from predominantly paper based operations to digital information ones. Current structures must be reengineered, both in terms of operations and staffing, to accommodate such changes. This migration will require a transition period during which both paper and electronic products must be supported simultaneously.

For the present, the NRL Library and other libraries are therefore faced with the need to sustain the traditional information resources while simultaneously moving toward the electronic environment. The requirement to operate two systems, paper and electronic, places additional

demands on libraries' budgets, which are already under considerable pressure from a greater than 10% annual inflation in journal prices. In spite of such stresses, the Study Team strongly contends that a continuing, major electronic initiative by the Library is in NRL's best interests.

There are a number of reasons for a continuing electronic initiative. A major attraction of the digital library will be access around the clock from the researcher's personal work space, wherever that space may be NRL, ONR, home, or TDY location. The digital library will bring new search capabilities, greater ease in manipulating/presenting information, and the ability to connect via hyperlinks to associated materials. Materials available digitally can be presented in multiple media, including video, audio, and interactive learning modes, which can be personalized for the individual user. In addition, a digital library holds the possibility for expanded off-site users, such as DARPA, who might be able to contribute to library finances.

Continuing to develop an NRL electronic library has the advantage of placing the NRL Library in a leadership position from which it can legitimately claim responsibility for scientific and technical information in any Navy/DoD virtual library. Given historical examples of poor performance by large external centralized systems with no local accountability, it is in NRL's interest to exercise responsibility for digital access to scientific/technical journals and to NRL reports in any distributed system. It is possible that a strong NRL electronic journal library could set the standard for, and in fact serve, the entire Navy. Of course, if this were so, then NRL would require the Navy Centers to contribute to its support.

From the perspective of Library management, the digital library when fully implemented will reduce the need for multiple copies of books/journals in auxiliary libraries (divisions, branches), reduce storage space requirements through digital storage and distributed access, and reduce staffing requirements associated with maintenance (receiving, shelving, photocopying, binding, and inventorying) of paper journals. These advantages, which will accrue both to individual researchers and to the research programs of the NRL, compel NRL to proceed with a carefully chosen, but aggressive, program toward a digital library and toward leadership in digital information storage and dissemination.

Timely action is necessary because the advancing digital opportunities provide competitive advantages in the research business. At the same time, the large number of viable alternatives and the lack of standards required for a massive commitment dictate that great care be taken in moving forward. Caution is also in order in making predictions about the future costs of the digital library, given uncertainties about what costs can be recovered in the digital environment.

The Study Team recommends that the next step for the NRL Library be a five-year period of increasing the amount of journal information that is accessible through the Web.

The Library should continue the work that it has begun with TORPEDO, entering into partnerships with publishers to provide a critical mass of electronic journals in selected areas of laboratory focus. In addition to the agreements already in place with the American Physical Society and Elsevier Science, arrangements are under development with Academic Press, the American Institute of Physics, the American Vacuum Society, the (British) Institute of Physics, the Optical Society of America, and Chapman and Hall. This group of publishers suggests

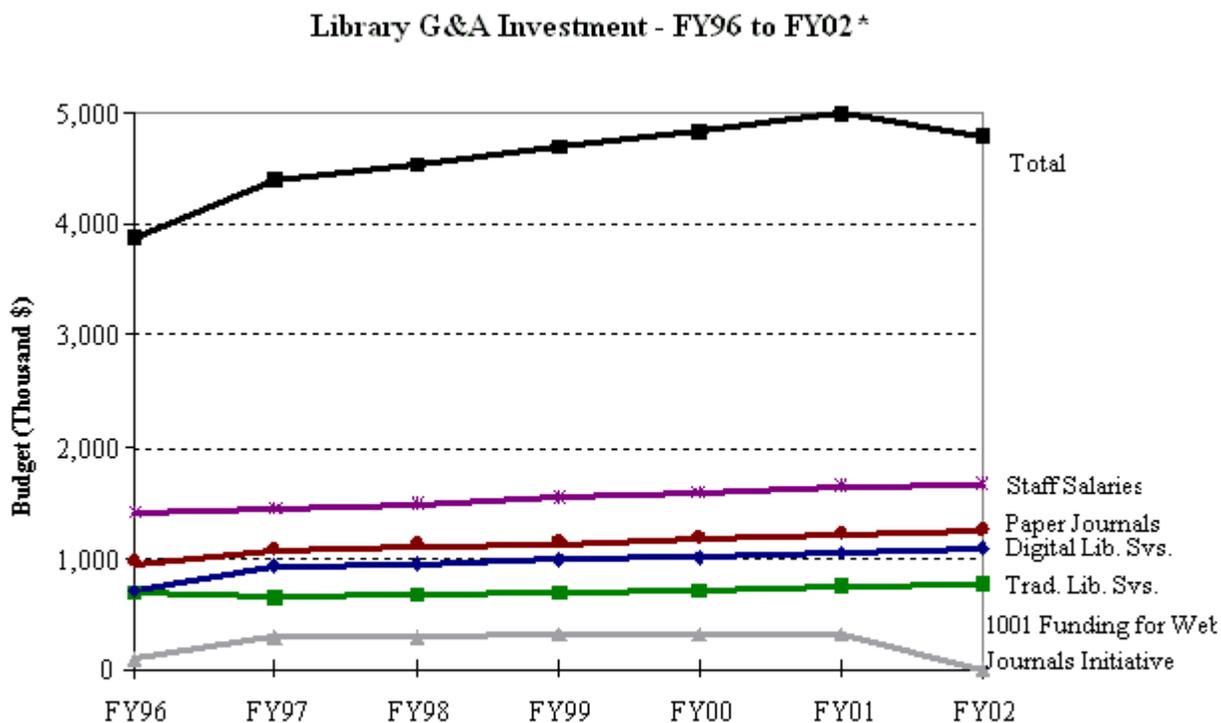
physics and materials science as the appropriate foci; this is consistent with the predominance of physics and materials science degrees at NRL. Other opportunities may arise in other interest areas, such as chemistry, electrical/electronic engineering, and computer science, which should be exploited as the budget permits. It is unlikely that the Library will be allowed by the publishers to cancel paper copies of journals that it acquires electronically. Rather, special arrangements will be sought where both digital and paper versions are acquired; current practice suggests that the cost of such arrangements will be 1020% greater than the paper cost. User feedback and usage statistics will assist publishers in assessing the digital marketplace and contribute to the setting of future prices. User feedback and usage statistics will also be useful to the Library, helping with both negotiations with publishers and with resource allocation issues.

The potential benefits of this five-year test period are: (1) augmented staff productivity resulting from improved access to information; (2) NRL staff trained and motivated to exploit expanded electronic access to information; (3) storage and file serving capacity to provide continued electronic journal access; (4) user friendly software to link users to electronic journals, (5) capability which predisposes a Navy/DoD virtual library to capitalize on NRL's demonstrated strength in delivering scientific and technical information; and (6) recognition from the greater scientific community for pioneering new forms of information access. NRL can be a leader in defining the technical library of the future and thereby shape the future of NRL requirements.

During the course of the electronic initiative, the Library will track the NRL scientific community's use of electronic information, gathering data systematically, and analyzing and validating results on a continuing basis. This effort will enable the Library to adjust its delivery methods and redirect its efforts, based on user reaction. Furthermore, it will position the Library to influence publisher direction by providing user statistics to support NRL desires and recommendations.

During the five-year electronic initiative, an additional \$300K annual allocation is requested of the Director of Research--a continuation of the \$100K special funding presently awarded the Library for electronic journals plus an additional \$200K from special project, Laboratory Modernization, and/or direct charge accounts.

The impact of the recommended Code 1001 annual contribution on the Library's overall budget is shown in Figure 2, below.



* Projects a 3.3% annual increase in all budget categories, FY98 through FY02. Based on this assumption the journal collection is projected to decrease from 1100 subscriptions in FY97 to approximately 500 subscriptions in FY02.

The anticipated costs of the recommended five-year electronic initiative are approximately \$600K per year (see tentative program budget in [Appendix B](#)). The Library can match the requested Code 1001 increase of \$200K per year by reprogramming the funds from (1) the Microcomputer Software Support Center and (2) the portion of the book budget earmarked for microcomputer software purchases for the lending collection, as described in [Section 4](#). The Library can continue to match the existing Code 1001 special funding for digital journals with an estimated \$100K worth of staff and contractor time, already in the Library's G&A budget for digital services, to support the accomplishment of the Web journal initiative.

Since the Library has already reallocated substantial resources over several fiscal years to support its existing electronic information initiatives, the Study Team believes that further redirection of the present budget would lead to inappropriate loss of necessary library capability.

Details of the costs are dependent on agreements with publishers and on the degree of processing required to make the journals available, but setting a budget for digital library development will allow the NRL Library to take advantage of rapidly emerging opportunities for

collaboration with publishers and limit erosion of basic library functions. None of these funds will be expended for ongoing Library investments in books, conference proceedings, paper journals, or reports.

See [Section 4](#) for further discussion of funding issues and [Appendix B](#) for a proposal and breakout of project costs.

To provide a single point of entry to critical information resources and databases, products currently available on InfoNet should be transitioned to InfoWeb within the next two years.

During the developmental period, the NRL Library should continue its efforts to provide desktop access to other types of materials used by NRL scientists, such as the indexes, abstracts, databases and other information resources currently available on InfoNet. Furthermore, to provide NRL researchers with a consistent, user friendly, single point of access to the totality of information resources, the Library should move as quickly as possible to transition all critical InfoNet services to InfoWeb.

InfoNet has been an important step in the evolution of electronic information access at NRL. However, it suffers from the drawbacks of telnet access and DOS based CDROMS, with functionality, such as graphics display, downloading, and printing, not fully available to all platforms. In addition, some InfoNet products are not sufficiently user friendly. By shifting to a Web based interface, NRL can take advantage of widely accepted standards and protocols.

To serve both its own users and as a contribution to any Navy or DoD virtual library, the Library should continue digitization of NRL Technical Reports at the present rate using Laboratory Modernization funds.

It is also anticipated that during the developmental period, the Library will continue with its reports digitizing project. By the end of this year, the Library will have converted its entire unclassified research reports collection (approximately 160,000 reports or 8 million pages) to optical storage. This project, which has been funded with Laboratory Modernization funds, has freed up valuable space in Building 43 and improved access to a unique research collection. With the digitizing of unclassified materials near completion, the Library will be ready by January 1997 to begin the conversion of roughly the same volume of classified reports. Vault space is currently at a premium at NRL. In fact, the Library is currently in the process of releasing its classified storage area in Building 66 to accommodate other Laboratory needs. The relocation of the classified reports to another location or locations is viewed as an interim solution by Code 1006.4 (Facilities), whose stated goal is the conversion of the Library's entire reports collection to digital storage. By continuing to scan at its current rate of 35,000 pages (700 reports) per week, the Library can reach this goal by the end of 1999. This rate of scanning is dependent upon the continued availability of Laboratory Modernization or other funding of at least \$200K per year.

The Study Team strongly recommends that during the five-year developmental period, the Library form a standing committee consisting of NRL researchers, information technologists, and others to meet on a regular basis to provide feedback on the need for improved user interfaces to the Digital Library.

In addition to acquiring critical journal mass and expended information resources, the NRL Library must provide NRL Web users with user-friendly, sophisticated search and manipulation capabilities. This requirement necessitates augmented storage/file server capacity for rapid access to digital journals, enhancements to database licenses, special purpose programming to make commercial products user friendly to NRL staff, and training of NRL staff in the use of the Web-accessed journals and specialized databases. The Library should also continue to experiment with interface development for its electronic services. User friendliness, convenience, minimizing and standardizing keystrokes, intuitive flow, etc. are key elements in determining how often digital information will be used, and NRL can enhance the use of resources by ongoing attention to its information interfaces.

2. Information Activities at NRL

Increasingly, all types of information are being provided to NRL employees electronically at their desks. There are a number of organizational units at NRL, in addition to the Library, involved in producing and distributing electronic information which is either now or will soon be available. Those units include Management Information Systems, Code 3030 (LABMIS); the ADP Program Management Office, Code 3004 (PIPS); the Center for Computational Science, Code 5590 (NRL WWW pages); TID Publications Branch, Code 5230; TID Administrative Services Branch, Code 5260; the Technology Transfer Office, Code 1004; the Public Affairs Office, Code 1230; NRL Directives, Code 1006.16; the Human Resources Office, Code 1800; as well as many others.

To enable timely and efficient access to this information by all employees, it is recommended that divisions work with Code 5590 to provide each full-time NRL professional with high-speed network access to the campus backbone and a graphical Web browser within the next two years (to provide timely access to the Digital Library).

This is an essential step so that NRL researchers can take advantage of the electronic information provided for them, especially the planned Library initiative in virtual journals recommended by the Study Team and outlined in [Appendix B](#).

The Study Team urges that NRL management review the organizational location of the Library, with a view to elevating that location appropriately.

The Study Team believes such an elevation would

- **Improve communication between the Librarian and NRL management.** More direct access would give the Librarian a better understanding of NRL's information needs and overall needs and constraints, thereby allowing better tailoring of the Library's program to those needs and better opportunities to convey how the Library is responding to them.
- **Ease a grade constraint that threatens the future of the Library.** If NRL's Library is to maintain an excellence commensurate with that of the Laboratory, the Library will need to be able to compete in the marketplace for staff with information skills that are in high demand. The Library's current organizational location depresses its grade structure at least one grade below that found in peer organizations, such as the National Institute of Standards and Technology, the National Oceanic and Atmospheric Administration, and the U.S. Geological Survey.

- **Offer a needed information architecture service to the Laboratory.** NRL suffers from its disparate and sometimes incompatible information architectures in its various business and management functions. The Library has demonstrated in InfoNet and InfoWeb that it can build interfaces that permit Laboratory people to use a single interface to access heterogeneous databases from multiple platforms. The Library, if properly positioned organizationally, could make important contributions to evolving a uniform Laboratory-wide information access capability.

The Study Team noted that over the years the Library appears to have fared well in its present organizational location as a Branch in the Technical Information Division (TID). While the interaction of the Library with other TID components does not appear to be strong, an obvious commonality of interest exists between the Library and the Publications Branch. If the Library changes its reporting structure, attention needs to be paid to maintaining the channels of communication between the Laboratory's publisher and its archiver to assure that NRL realizes the benefits of a life-cycle approach to the management of digital information.

There was unanimity on the need for elevation, but not on the details of location. However, the desirability of retaining the Library on the research side of the house was endorsed by both NRL and external Study Team members. A majority of the Study Team favored the elevation of the Library to a non-divisional Center reporting directly to an Associate Director for Research, probably Code 5000. Some would have preferred that the Library report directly to the Director of Research, despite his anticipated reluctance to have an additional direct subordinate. Some thought that placement in Code 5500, following the precedent of the Center for Computational Science, would offer closer coupling both to that Center's resources and to the information sciences capabilities of that Division. In addition, some members observed that many organizations were appointing Chief Information Officers (CIOs), in some instances to acquire and operate information services, in others to prescribe compatible architectures for others to acquire and operate. The Library could be part of the CIO's organization in some models, in others the Librarian could be the CIO.

The Study Team noted that the Library is administratively self sufficient and could change its reporting structure without burdening its new home.

While the details of the Library's elevation remain unspecified, the Study Team believes that some elevation should be crafted that improves mutual visibility of Library and Laboratory needs, eases the grade constraint, and makes the skills of the Library available to help rationalize the Laboratory's information architecture.

3. Relationships with Other Navy Units

The issues here are primarily the provision of digital information services to NRL sites at Stennis and Monterey, and to non-NRL entities, such as ONR and other Navy or DoD units. While the digital environment greatly simplifies access from remote sites, there can be considerable incremental costs associated with licensing the information for additional sites or user groups, delivering it to more users, and with supporting users, both in terms of end user training and in complying with networking requirements at each site.

It is recommended that NRL continue to provide library services, including digital services, to ONR as funded annually by previous agreement, and to include ONR in negotiating for site licenses.

In 1993, NRL agreed to provide library services to the Headquarters of the ONR for a fixed annual fee based upon staff costs and anticipated incremental costs for online searches and use of InfoNet. ONR makes substantial use of NRL Library services and funds are transferred annually as agreed upon. To date, no additional incremental costs have been assessed for InfoWeb, for TORPEDO, or for enhanced InfoNet services.

It is the Study Team's understanding that ONR is interested in obtaining additional electronic services from NRL, and would like to be considered as NRL negotiates licensing agreements for databases. ONR will evaluate the incremental costs and indicate whether or not they wish to receive that service.

It is recommended that, in the future, information services to remote NRL sites should be provided only to the extent that incremental costs are funded by the benefiting site.

In the case of other NRL sites, InfoNet was mandated to be provided, but no official mechanism for providing the associated funding has been established. The Study Team recommends that other NRL sites pay the incremental cost of services received.

Library services provided directly to other Navy or DoD units, should be either *quid pro quo*, or on a cost-plus-value-added fee basis.

Digital information services should be provided to non-NRL entities when doing so is supportive of the goals and objectives of NRL. This continues the leadership role that the NRL Library is already playing for Navy, DoD, and other Federal libraries with hundreds of visitors to the Library each year, presentations at national meetings attended by the defense and government community, and papers in technical publications. The Study Team envisions that the sophistication of the NRL Digital Library and the availability of the NRL reports in digital form will contribute to emerging Navy efforts toward a Navy-wide digital library, and supports participation in those efforts. At the same time, it is recommended that such cooperation be carefully reviewed to assure that the benefits to NRL outweigh the costs.

4. Funding Library Operations

In reviewing NRL Library expenditures, the Study Team recognized that the Library's significant advances to date in the digital library arena have been accomplished through reallocation of budgeted funds and special project funds. There is some room for additional reallocation, but the primary reliance will need to be on special project, Laboratory Modernization, and external funding sources.

To contribute \$200K annually to the costs of the five year initiative proposed in Section 1, the Study Team suggested two primary areas in which the Library may be able to reduce expenditures and apply the savings to the electronic journal initiative.

Reallocate \$200K to the electronic journal initiative by eliminating MSSC services and software lending.

While the Microcomputer Software Support Center (MSSC) met a valuable need when it was created in 1989, at a time when personal microcomputers were just coming into general use,

it appears to have outlived much of its initial criticality. The Library can realize \$160K annually, primarily by reprogramming funds associated with the operation of the MSSC User Evaluation Laboratory. The User Evaluation Laboratory serves principally to provide users with robust and enhanced computer systems (PC-based and Macintosh) on which to test and evaluate the high end software in the Library's Software Lending Collection.

During the past two fiscal years, more than 50% of MSSC staff hours have been applied to supporting Library automation and end user access to InfoNet, InfoWeb, and TORPEDO. With anticipated sharp increases in FY97 contract costs, coupled with the Library's increased need for computer support for the NRL Digital Library, the Study Team recommends that the Library apply any contract cost savings that are realized through changes in microcomputer support directly to the electronic journal initiative or the expansion of InfoWeb services.

Eliminating further purchases for the microcomputer software lending collection (\$40K/yr), while it may cause some inconvenience to a portion of the user community, appears to be supportable given the more than 50% drop in circulation of software from a high of over 3,500 in 1993 to 1,650 in 1995 and a projected total of 1,300 in 1996. Carrying the electronic journal initiative will require the support of library administrative and technical staff. These contributions, shown in the cost breakout in [Appendix B](#), are estimated at \$100K annually.

Having agreed with the Library's plan to phase out InfoNet in favor of Web access through InfoWeb, the Study Team considered how the Library could reallocate the resources presently used to develop InfoNet to facilitate the migration of resources to a Web based interface through InfoWeb.

This transition has already partially occurred, as some of the InfoNet resources are also on the Web and have been licensed by the Library for NRL/ONR access. In addition, TORPEDO is now available through InfoWeb and some user support savings from this transition are anticipated. However, while the Library could potentially speed up the InfoNet migration to the Web by licensing tape databases, buying commercial software, and building its own Web accessible interface, the cost of making most of the remaining InfoNet-exclusive products available on the Web immediately would be a fixed, one time cost of approximately \$500K, plus \$150K annually above the Library's current InfoNet expenses for information. Since it is anticipated that in the next 1 to 2 years most published information will be sold in Web compatible format anyway, an immediate transition from the InfoNet to InfoWeb does not appear to be economically justifiable. However, the transition to InfoWeb should be accomplished as soon as all NRL critical resources (the Library catalog, INSPEC and other FirstSearch databases, the Official Airline Guide, Science Citation Index, Materials Safety Data Sheets, etc.) can be provided through InfoWeb.

It is recommended that the Library fund expanded non-journal InfoWeb services by:
(a) continuing to allocate 30% of its book budget to the procurement of digital information;

The Library already spends approximately 30% of its book budget on electronic resources for inlibrary use and for remote access through InfoNet and InfoWeb; the Study Team believes that this amount (\$100K/yr) should be dedicated as far as possible to

InfoWeb. This investment will help provide a critical mass of information to the Website and encourage a greater number of users. It is recognized that the Library needs to maintain a core collection of books, annual reviews, and reference materials, some of which are only currently available in non-networked electronic versions, to support the research program.

(b) redirecting that portion of its materials budget currently used for microfilm (requiring either the provision of on-Laboratory storage facilities or alternative funding sources for microfilm, such as Laboratory Modernization funds);

Loss of the ability to replace older journals with microfilm on a regular basis would have serious consequences for the Library and for the user community; the Library is literally out of space to shelve materials, but must house over 30,000 new journal issues each year. However, the Library microform budget of \$50K/yr could be redirected to the development of InfoWeb if a satisfactory alternative were found: either providing space for shelving lesser-used materials elsewhere on the Laboratory or funding microfilm purchases from the Laboratory Modernization budget. Tapping Laboratory Modernization funds for microfilm conversion appears warranted since (a) additional space must otherwise be renovated to house the paper collection and (b) such funds are already being applied to the conversion of reports to digital storage. The Laboratory has made available Laboratory Modernization funds for Library space saving efforts in the past; the Study Team suggests that \$50K/yr be formally designated for the procurement of microfilm (with continued use of any additional remaining funds to accelerate the microform purchases).

(c) locating external paying customers and project sponsors with needs compatible with NRL's.

The Library has already entered into a Cooperative Research and Development Agreement (CRADA) with the American Physical Society to investigate Internet-based journal search and retrieval, and into an Inter-Agency Agreement (IAG) with the National Institute of Standards and Technology (NIST) to develop online access to research products generated by the two participants. Other publishers and agencies have expressed interest in similar funded endeavors. The Study Team advises the Library to pursue such opportunities to the extent that they do not detract from the Library's core mission, and to use the funding thus generated to expand the range of electronic resources available through InfoWeb.

As the user community accesses journals and other materials electronically, the need for in-library photocopiers and related supplies, including paper, is expected to decline. As savings materialize, they will provide another source of funding for the digital library.

5. Additional Issues

Paper Journal Costs

Over the last four years the Library has discontinued subscriptions to 330 journals; in spite of this reduction, the total Library journal cost has increased by 30%. If one projects NRL journal budget increases at 0% after 1997, coupled with the present journal cost increase rate of 14% per year, the NRL Library would have 56 journals in its collection by the year 2010.

The inflationary pressure on journal subscriptions has many factors and no simple solution. A substantial part of the problem is an increasing number of published pages (about 8% annual growth).

The reasons for this growth include the "publish or perish" policy of academic science and institutions such as NRL, publisher interests in higher income streams, and the economic recoveries of Asia and Europe that have resulted in larger science programs in those countries. The complexity of this problem almost guarantees continued growth in the near term. In addition, as prices increase, and libraries respond by canceling institutional subscriptions, publishers must raise prices to compensate for reduced revenues.

Currently, the NRL Library subscribes to approximately 1,100 journals, more than one per Ph.D. professional, at a cost of \$0.95M. The Library should ascertain the use rate of these journals. For example, some titles might be so specialized that it is not cost effective to subscribe, and access to articles might be obtained from external document delivery services. (When such titles are identified, the Library should notify the affected division of its intention to drop the journals to give the division the option to subscribe with their own funds).

While, in the long run, the digital library may reduce the problem of spiraling journal costs by changing the paradigms for scientific publication, for the short term, journal costs of digital access are in addition to paper subscription costs. Uncertainties in how digital materials will be archived make it wise to retain paper subscriptions and, in any case, licensing agreements with publishers generally require that the paper subscription be retained. It seems clear that the NRL journal budget must continue to rise over the next five years unless some drastic action is taken. The Study Team suggests that the Library explore with the divisions a shift in responsibility for maintaining paper subscriptions, particularly for those publications that can be provided digitally. This will allow some Library subscription monies to be saved by canceling the central Library subscription to selected journals that are also in NRL branch/division libraries or reading rooms. Savings should be applied to expanded digital journal access and InfoWeb services.

In addition to the central Library, the divisions subscribe to \$0.67M worth of journals (many of which duplicate Library holdings). Journal expenditures could be reduced overall by eliminating duplicate subscriptions. This approach becomes particularly attractive when the journal is available electronically. If the division subscription is canceled, any funds thereby saved might be reallocated to the Library in order to avoid cancellation of other Library journals.

If the Library subscription is canceled, then the division copy might be designated the official NRL copy. (Some consideration would need to be given to the long term journal preservation if the division copy is the only copy.) As a note of caution, cancellation of multiple subscriptions adds to the publisher cost problems and will probably accelerate subscription price increases. NRL might also participate in, or take steps to form, a regional consortium of technical libraries (for example, NASA, NIST, Carderock, University of Maryland, etc.) or the purpose of coordinating dropping low usage, but still worthwhile journals. This would ensure that at least one copy of these journals is available regionally.

In the short time available to the Study Team it was not possible to determine the best course of action for NRL. But since any solution to the problem of spiraling journal expenditures will dramatically affect Library users, the Study Team suggests that as future subscription cancellations become necessary, the Library Committee plan to work with the Chief Librarian in developing a journal spending plan that adequately supports NRL research needs within the Library's budget allocation.

Archival Materials

One major area of uncertainty with digital information services is how and where archives will be maintained. With print journals, the primary options have been retention of the paper copy or purchase of microfilm. With electronic journals, access as well as the existence of the material itself becomes an issue, and the options expand to include CDROM, onsite retention of the electronic material, and access to publishers' electronic archives. While it seems likely that most publishers will ultimately provide some sort of electronic access to archival materials, few do so at this point and in fact most of the current arrangements for obtaining electronic journals and other materials are licenses, providing access to the information only for the period of the license. Only a few publishers, including Elsevier and Academic Press, provide libraries with the right to archive their digital subscriptions permanently at no added cost.

The implications of the archival question are considerable for both the Library budget and its space planning. The Study Team believes it is important that the NRL Library monitor developments in this area and work with publishers to ensure that the archival needs of libraries will be well met in the future. The Library Committee could serve as a source of counsel and advice to the Library as it evaluates the need to retain paper or microfilm archives of materials that are also available digitally.

Space

Another issue requiring further study is space. The Library has been out of space for journal growth since 1988, and this problem will continue for the foreseeable future. There have been significant changes in the way that Library space, particularly space for NRL scientists, is used, and a redesign of user areas is greatly needed. While the emerging digital library makes it unclear what the long term facility needs will be, it is clear that some changes should be made in the short run. Further, any changes should reflect the fact that the future library will likely not need significantly more space for journal storage.

However, in the short term, some solution needs to be found for the Library's critical space problem because at this time the Library is completely out of space for journal growth. If, as a strategy for funding the electronic library, the Library is to curtail its purchase of \$50.0K

worth of microfilm annually, some other mechanism needs to be found so that researchers can access the 30,000 new journal issues coming into the Library each year.

The Study Team suggests remote, but on-Laboratory, shelving of older journals.

What is recommended here is on Laboratory closed stack storage for journals more than 25 years old, with the ability of Library staff to have the journal, or article photocopy, available within 24 hours. Compact shelving has been determined to be available for this purpose from Code 1006.4. While there would be some negative impacts in terms of delayed access and staff time required to service a remote collection, there would also be benefits by opening up in-library shelving. These include: making it easier for researchers to locate materials in the Library, which has resorted to shelving journals on study carrels and sometimes even permanently on book trucks; freeing staff, with some potential cost saving, from the continuing two step process of deselection and shifting materials to make room for incoming items; and reducing the level of staffing required for shelving that is necessary when shelves are essentially full. The Library staff should consult closely with users to identify the most appropriate journals for remote storage.

Because of the Library's key role in NRL's fulfillment of its research program, the Study Team suggests that a renovation plan (Laboratory Modernization) be developed that is consistent with the evolving digital library.

The Study Team identified major difficulties in the layout of the Library that actually may discourage users from learning to exploit the capabilities of the electronic access tools that the Library has developed and placed at their disposal. While user workstations with large monitors are available for integrated access to the online catalog, InfoNet, CDROM products, TORPEDO, and InfoWeb, space constraints have required their placement in crowded entry halls, where help in using the Library's computer capabilities is not immediately available; in management areas, where users are likely to overhear distracting discussions on budget, personnel, contracts, procurement, and other management issues; and in the Reference Area, where space is so limited that they are interspersed with, and encroach upon, staff workstations and spaces, deterring users from viewing them as "public" access tools, and interfering with their intended use for navigating library databases and materials. While in the long term, these problems may be irrelevant, in the short term they need to be addressed in connection with the need to educate and train researchers in the benefits of accessing digital journals and other information. The Study Team also believes the physical appearance of the Library may in fact communicate to visitors that NRL Management does not consider the Library's role as information provider important to the Laboratory, and could therefore undermine the Library's efforts to form cooperative agreements with other organizations with the potential for substantially benefiting NRL. The Study Team encourages the Chief Librarian and the Library Committee to work together to find a satisfactory solution to this issue.

Staff Training/Expertise

The Library staff is commended for laudable progress in pursuit of an electronic library. Nevertheless, the Study Team agrees with the contention of the Chief Librarian that an even greater level of technological expertise will be desirable as the Library pursues its digital library objectives.

The Study Team recommends that the criteria for selecting new hires and promotions include a strong emphasis on electronic information acquisition, storage, and dissemination.

The Study Team believes that the Library needs to build the technical expertise of its federal staff to effect a more appropriate balance between corporate capability and contract support. During the past five years, as the Library has moved to provide remote access to both internal and external information resources, it has relied almost exclusively on contract support for the development of its networked information storage and retrieval capabilities. However, it is essential that as the Library transitions more fully from a print-based facility to an electronic environment, it have sufficient Civil Service technical expertise to evaluate contractor recommendations and set the course for its future. Since the age distribution of library staff creates the possibility of significant turnover during the next five years, the Library and Laboratory will have the opportunity to correct the current imbalance by selecting library decision makers and implementers with strong technical credentials not only in library/information management but in telecommunications, networking, and computer science. To attract and retain Federal staff with the right mix of education and experience to develop the digital library, the Laboratory needs to examine and correct any policies that may disadvantage the Library in competing for the services of highly marketable personnel.

Library Mission, Goals, and Objectives

The Study Team agrees generally with the mission, goals, and objectives developed by the Library ([Appendix A](#)). In a few instances, the Study Team felt that the breadth of the objectives could divert the Library's attention from addressing its core mission and attaining its stated vision. The stress of coping with both paper and a rapidly changing electronic information environment argues for keeping the Library goals and objectives sharply focused. If, at some future time, NRL moves to a more centralized model of managing its diverse information resources, it may want to look again at the [Section 4](#) of this report. The goals and objectives presented in [Appendix A](#) have been modified to reflect the following revisions recommended by the Study Team:

Restate Goal III: ~~Manage Laboratory information resources to create~~ ***Provide leadership in creating*** a shared NRL knowledge base by maximizing the utility of the Library's information storage, retrieval, and delivery capability.

Delete the following Goal III objective in its entirety: Integrate NRL Archives into the Library in order to provide seamless retrieval of both research products and research data, capitalizing on existing information dissemination investment.

Restate the following Goal III objective by deleting the concept of "systems management.": Develop policies, practices, and procedures that advance the dissemination and archiving of NRL research results by providing ~~systems management~~ and expert guidance to the Laboratory.

6. Evaluating the NRL Library's Progress

Given the anticipated evolution of the NRL Library over the next five years (and beyond), it is recommended that:

The Chief Librarian report annually to the Library Committee on progress toward the goals outlined in the Library Mission, Vision , and Goals Statements and in this document;
and

A Study Team be convened in year four of the five-year developmental period to set the course for the next five-year period.

APPENDIX A: LIBRARY MISSION, VISION, AND GOALS STATEMENTS

MISSION

The mission of the Ruth H. Hooker Research Library is to:

- Advance the research efforts and mission of the Naval Research Laboratory by providing access to information that supports current Navy and Department of Defense initiatives and contributes to the nation's scientific and technical knowledge base.
- Facilitate the use of information technology to improve research productivity, foster creativity in research and development, and enhance the acquisition of scientific and technical knowledge.
- Collaborate in the research process by working in partnership with the scientific community.
- Develop information products and services which effect the transfer of information tailored to the needs of the Naval Research Laboratory community.
- Serve as an official repository for the results of Naval Research Laboratory scientific research and discovery.

VISION

In an increasingly digital environment, the Ruth H. Hooker Research Library will provide the Naval Research Laboratory with a centrally planned and managed information infrastructure to enable NRL and ONR researchers and other knowledge workers to meet their information needs conveniently, consistently, and cost effectively, anywhere and at any time.

GOALS

Goal I: Build digital collections that effectively meet Laboratory scientific and technical information needs.

- Expand efforts to negotiate agreements with publishers and others for the dissemination of copyrighted information, stored locally or accessed remotely, to all NRL and ONR users.
- Select and digitize printed materials in the Library's collection that are not subject to copyright restrictions.
- Identify and acquire other relevant materials for the Library's digital collection.
- Seek to implement a life cycle approach to the NRL publications process with the goal of producing a single digital research product that supports: document creation, print production, online access, document delivery, archiving, and preservation.
- Actively participate in Navy and other government library consortia and digital information initiatives to share development costs and efforts, achieve savings through consortium pricing, and provide distributed access to shared resources.
- Vigorously support the development of the National Information Infrastructure Program by partnering in information networking initiatives with other digital library enterprises.

Goal II: Provide uniform, transparent, and convenient access to locally mounted and worldwide networkbased information.

- Analyze and categorize the contents of the NRL digital library to create the organizational structure and metadata (information about the collection) for efficient and effective information retrieval.
- Develop discovery tools and search systems to support NRL scientists in identifying, locating, and selecting information.
- Design and implement scalable systems for the storage and retrieval of onsite digital collections.
- Provide a single point of entry to all information, local and remote, that comprises the NRL digital library.
- Support end users in exploiting the capabilities of library systems and in using digital information.
- Conduct a program of research and applications development enabling NRL researchers to apply advances in information technology and networking.

Goal III: Provide leadership in creating a shared NRL knowledge base, maximizing the utility of the Library's information storage, retrieval, and delivery capability.

- Promote a Laboratory policy of library information management to apply economies of scale, to obtain preferred pricing, to facilitate migration to electronic sources, and to realize future savings in Laboratory space allocations and overall expenditures.
 - Preserve a record of the Laboratory's scientific achievement and provide institutional continuity by managing information archives to ensure present and future access.
 - Develop policies, practices, and procedures that advance the dissemination and archiving of NRL research results by providing expert guidance to the Laboratory.
 - Acquire, maintain, and improve physical spaces, equipment, and cabling to ensure dependable electronic data delivery and optimum performance of digital systems.
 - Continually evaluate staffing requirements to ensure the availability of appropriate knowledge, skills, and abilities required to exploit emerging technologies; recruit highly qualified personnel with the skills to adapt the latest technologies; and provide learning opportunities for current staff to update skill levels.
 - Maintain a staff with the scientific background necessary to build collections and support users with specialized requirements.
-

APPENDIX B: NRL DIGITAL LIBRARY INITIATIVE IN WEB JOURNAL ACCESS

The proposed five-year project will lay the groundwork for an NRL Digital Library by acquiring digital journals for NRL/ONR use and by providing 24-hour desktop access to such information. The development of such a Laboratory asset is achievable with a modest investment (\$300K annually over the next 5 years) because of NRL's existing network infrastructure (managed by Code 5590), its computer-sophisticated and well equipped research community, and the capability already developed by the Library for delivering digital information to the desktop. The NRL Digital Library will take advantage of established network protocols and technologies to deliver digital publications to the researcher. It will be capable of handling the many formats currently in use or under consideration by the publishing industry (TIFF, PDF, SGML, and HTML) and of supporting a full range of planned publisher enhancements including use of color, video, and multimedia. The NRL Digital Library will offer users a common interface for retrieving information from various sources (including publishers, government document providers, library consortia) to provide researchers at their desktops with a "virtual" library. The project will incorporate user feedback into the process of enhancing and refining the NRL Digital Library through user surveys and automated tracking and analysis of user activity.

While the scope of this proposal is limited to providing end-user access to scientific journals for the NRL/ONR research communities, it is anticipated that the digital journal component will, at all stages of its development, be seamlessly integrated into the Library's InfoWeb interface. The journal project and the continued development of InfoWeb will interact synergistically, benefiting both endeavors and enabling the Laboratory to take advantage of resulting economies of scale. Such an integrated approach to information delivery will benefit the end user by providing unified access to a full range of scientific and technical information--journal articles, technical reports, agency publications, reference tools, catalogs, directories, tables of contents, indexes, and databases. It will at the same time benefit the Library by allowing it to concentrate its limited resources on the development and maintenance of a single method for delivering digital information.

It should be noted that this proposal is not a solution to escalating journal costs, which have been rising 14% on average annually. Nevertheless, digital journals are clearly the wave of the future and this proposal will position NRL to take advantage of an expected change in which publishing costs for digital journals level off, while the cost of paper journals continues to climb at historical rates. At the end of this project, it is anticipated that the Library will have 400-500 journals available digitally. In the final project year, the benefit of digital journals to the research community will be assessed and an algorithm for funding continued Digital Library development will be provided. The exact cost and methodology for funding will be known after usage statistics are analyzed, surveys are conducted, and a value analysis has been performed in the final project year (FY01).

In terms of government staff changes factored into this proposal, the Library will add two full-time temporary librarian positions, GS-9 and GS-12. The GS-9 will be responsible for helping the research community effectively exploit the electronic resources that the Library provides by conducting end-user training and developing user guides. The GS-12 will perform project management and carry out negotiations with publishers of digital information. It is anticipated that by the end of the project, the Library will have established a permanent GS-9 position through other staff attrition.

NRL Digital Library Experiment in Web Journal Access

Expenses	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
ADP Equipment*	78.1	87.4	89.1	55.8	37.2	55.3
Disk Space	9.0	14.7	14.7	4.5	4.5	4.5
Cluster Server	25.0		25.0			8.3
Juke Box		15.5		15.5		5.2
Tape Autochanger	13.0	13.0	13.0		4.2	4.2
Development Workstations	9.0	9.0	6.0	5.6		4.1
NICEnet standard network cards and hub		15.0	9.0		4.5	4.5
End-user Training Systems	15.0	5.8	3.0	15.0		8.0
Maintenance & Tech Support	7.1	14.4	18.4	15.2	16.0	16.5
Digital Journals	95.0	120.0	140.0	160.0	180.0	210.0
Digital Journals	95.0	120.0	140.0	160.0	180.0	210.0
Software Development	168.7	189.0	170.5	189.2	160.8	25.0
Programmer	120.0	123.6	127.3	131.1	135.1	
SGML Viewer			9.0	9.0		
RetrievalWare License	20.5			11.1		
EFS License Upgrade	11.0	11.0	11.0	11.0		
Profiler		21.0	10.0	10.0		
Doc Conversion	8.2	3.4	3.2			
Pattern Matching SW		30.0				
Pattern Matching UPG			10.0	10.0		
Tracking	5.0			5.0		
STILAS Interface	4.0					
Add'l Maintenance & Tech Support				2.0	25.7	25.0
Project Development Staff	159.5	112.2	114.9	117.8	150.6	0.0
GS-12 Librarian (Full-time Temp) **	51.6	53.1	54.7	56.4	58.1	
GS-09 Librarian (Full-time) ***	37.9	39.0	40.2	41.4	42.6	
Document Format Study	50.0					
Contract for value analysis					40.0	
Travel	20.0	20.0	20.0	20.0	9.9	
Project Staff Support	103.2	106.3	109.5	112.8	116.1	95.9
GS-14 Librarian (1/4 Time)	21.5	22.2	22.8	23.5	24.2	
GS-13 Librarian (1/2 Time)	35.7	36.7	37.8	39.0	40.1	
GS-07 Mgmt Asst. (1/4 Time)	8.0	8.2	8.5	8.7	9.0	
Unix Administrator (1/2 Time)	38.0	39.1	40.3	41.5	42.8	
Unix Administrator (1/4 Time) - On-going support						22.0
GS-12 Librarian (1/2 time) - On-going support						29.9
GS-09 Librarian (Full-time) - On-going support						43.9
Expenses Total	604.5	614.9	624.0	635.6	644.7	386.2
Funding						
Redirected Library Budget	304.5	309.9	314.0	320.6	324.7	261.2
Staff Support ****	103.2	106.3	109.5	112.8	116.1	51.9
Division Book Procurement (GS-6 part-time, eliminated)	20.0	20.6	21.2	21.9	22.5	23.2
Microcomputer Center Redirection	140.0	140.0	140.0	140.0	140.0	140.0
No Additions to Software Collection	40.0	40.0	40.0	40.0	40.0	40.0
Savings in photocopier maintenance and paper	1.3	3.0	3.3	6.0	6.0	6.1
Digital Journal Experiment	300.0	305.0	310.0	315.0	320.0	0.0
Present Code 1001 Supplement	100.0	100.0	100.0	100.0	100.0	0.0
Additional Code 1001 Supplement	200.0	205.0	210.0	215.0	220.0	0.0
Post Experiment	0.0	0.0	0.0	0.0	0.0	125.0
Fee from Digital Users						125.0
Funding Total	604.5	614.9	624.0	635.6	644.7	386.2

* FY02 ADP equipment costs are average costs incurred for FY02-FY06

** Project management and digital journal licensing negotiations

*** End-user training; user guide development and maintenance. This position moves to project staff support in FY02 and beyond.

**** Same as the project support staff in the expenses, except for the GS-09 Librarian who replaces a GS-06 Library Technician