
Information Technology and Legislators: The US Experience

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The growing use of computer and telecommunications technologies has been instrumental in improving access to information in Congress. A few statistics illustrate this fact graphically. There are approximately 5,000 terminal devices tied into the Senate system, about 4,000 in the House of Representatives, and the Library of Congress computer center services almost 3,000 terminals. The legislative branch spent more than \$100 million in Fiscal Year 1987 for information technology support compared with less than \$5 million in 1970. These growth curves are expected to continue for the foreseeable future as microcomputers proliferate, software becomes easier to use and more available, computer/telecommunications networks expand, and new congressional staff arrive with more computer skills.

The sheer volume of material that must be handled necessitates the use of computer technology in an era of tight budget constraints and no staff growth. For example, the House of Representatives received more than 250 million pieces of mail in 1987, compared with about 42 million six years earlier. Similarly, the number of requests for information received by the Congressional Research Service continues to grow with an anticipated 500,000 to be logged in 1988 compared to 430,000 for 1982.

Uses of Information Technology

The Congressional Research Service has long been involved in employing information technology to improve access to information. By the early 1970s, the Library of Congress' SCORPIO retrieval language was developed for accessing legislative and bibliographic data files. Throughout the years improvements have been made to allow for greater ease of searching, provide for full-text retrieval, and enhance the

number of files available. Today SCORPIO remains the major information retrieval service used by CRS staff, and is also used by many House and Senate staff. The key files searched are the Bill Digest files, the Bibliographic Citation file, the Issue Briefs file, and the *Congressional Record* file. Among the new files added in recent years is the Survey Polls file, which contains polling results from major survey companies, such as Gallop and Harris.

In addition to its internal databases, CRS continues to make extensive use of commercial database services. Another significant use of external data retrieval is for econometric modeling, where analysts tap into such services as Data Resources, Inc. and Wharton Econometric Forecasting Associates.

For several years the Congressional Research Service has offered audio and video briefings to congressional offices in the form of standard audio cassettes and television programs transmitted over the Capitol Hill cable television facilities. These programs focus on various aspects of the legislative process and on key issues pending before Congress. House and Senate staff can view the video programs on televisions located in Member and committee offices or in the congressional reading rooms. Many of these programs are tapes made of CRS seminars where recognized experts and CRS specialists discuss current public policy issues. Other programs are based upon discussions by CRS specialists on key topics.

The House of Representatives Information Systems (HIS) supports a number of centralized computerized information support services. Its Member Information Network (MIN) provides access to several information sources through a single terminal. These include Government statistics, legislative information (LEGIS), Federal funding data, newswire services, and various administrative services such as electronic mail and scheduling. While the House and Senate each maintains a bill status and information system called LEGIS and CRS maintains a Bill Digest file, these systems all are compiled from the same data sources. The Senate enters information relating to action taken on bills in that chamber, the House provides similar information on its

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committee and floor actions, and CRS performs the indexing, abstracting, and digesting. This information is exchanged on a daily basis to keep all systems current and to avoid duplication of data entry.

HIS also provides computerized support for searching the full text of the *U.S. Code*, analyzing budget actions, econometric modelling, printing congressional publications, preparing committee calendars, voting electronically, and revising the *U.S. Code*. It plans to offer an expanded list of databases and computerized services in the 101st Congress. In addition, each Member office is authorized to contract with an approved list of vendors for office automation systems. These systems range from remote access on timesharing services to sophisticated microcomputer-based local area networks.

The coaxial cable used to distribute TV coverage of House proceedings also provides the House with a high-speed data communications link that makes customized services possible, simplifies sign-on procedures, and enhances information sharing. The House's goal is to provide an integrated communications system that will not only link offices to HIS' computer facility, but will also serve as the interface with outside databases and district offices. Beginning in 1983, the House began TV coverage of all chamber action. Floor proceedings can be viewed from Member and committee offices and is seen by the public on the CSPAN network.

The Senate LEGIS system provides access to an array of legislative data files in the 100 Member offices, committee and administrative offices, and many district offices. In addition to the bill digest and status information, LEGIS features files with official information on Senators, Senate committees and membership, meeting and hearing scheduling information, and online access to unprinted amendments on the Senate floor. Other files include summaries of executive branch communications, Presidential appointments requiring Senate confirmation, Senate rules and precedents, status of treaties, vote reports, and information on the legislative calendar.

The automated Program Review System and Budget Analysis System offer policy analysis support for Senate offices and committees. The Program Review System provides data about the performance and financial aspects of programs within each committee's jurisdiction. The Budget Analysis System gives committees special reports analyzing the proposed budget, budget revisions, and budget re-estimates. To supplement the services provided internally by the Senate, last year the Senate also approved funding for individual offices to subscribe to outside commercial information services, such as LEXIS/NEXIS.

Office automation and records management in the Senate is supported by the Senate Correspondence Management System (CMS) operated through a vendor mainframe in

Pittsburgh and an office automation program based upon minicomputer systems resident in Member offices. In addition, a growing number of microcomputers are appearing in Senate committees and some Member offices.

Recent Initiatives

Perhaps the most significant recent advance in the use of computerized resources is the introduction of microcomputers throughout Congress and particularly in the support agencies. The migration of computing power to the end-user has opened up possibilities for improved productivity, increased access to timely information, and new analytical tools. Within the Congressional Research Service, almost all analysts will have microcomputers located at their desks by the end of this year. By enabling information to be captured in digital form at the point of origination, the Congressional Research Service has reduced the time to get information to the congressional requestor. In addition, it has meant that reformatting of information is facilitated. That allows material to be repackaged for use by different audiences and to be more readily updated. It also means that several products can be produced from one research endeavour.

Having computers readily available also has allowed CRS analysts to make use of new analytical tools and approach issues in ways they were previously unable to do. As an example, the Sciences Policy Research Division has relied heavily on data produced by the National Science Foundation on Federal expenditures for research and development. When a request was received the analyst would consult the printed compilation of data published annually, identify the information closest to what was sought, and make a copy of the relevant pages. The copy was then passed along to the congressional requestor or retyped into a memorandum. Today when such a request is received, the analyst dials directly into NSF's computer from his or her microcomputer, downloads the necessary data, uses electronic spreadsheet software to manipulate the data as needed to respond most effectively to the request, and then incorporates the information into a memorandum or report—in graphic form if desired. Not only does this allow the analyst to respond more specifically to requests, but it also makes it possible to *analyze* the data, rather than merely copy it. In addition, because it is now easy to present the information graphically as well as in narrative form the information transfer process is enhanced. A number of government agencies are beginning to make data available in electronic form and it is anticipated that CRS analysts will increasingly take advantage of these opportunities.

While word processing remains the major use of microcomputers within CRS, electronic spreadsheet, database management, and graphics applications are

increasing. Because a great deal of work focuses on tracking federal spending for different programs, these computerized analytical tools offer an array of opportunities to explore different policy options. By tracking the federal funding for AIDS research over the last several years it is possible to identify when key decisions were made in response to public concerns over the spread of the disease. By comparing this trend line with Federal spending for research on other major diseases, it is possible to identify the trade-offs that were made and priorities that were established. This kind of visualization is useful both to the analyst for tracing developments and for congressional clients to quickly see trends.

Using this type of approach allows analysts to pose alternative scenarios for legislative consideration. For example, what would be the impact on certain programs if funding were dramatically increased or decreased, or if it were held constant? What are the policy alternatives available given future availability of certain natural resources? How much will it cost to deploy different weapons systems and what is the comparative force of different defense configurations? These are all questions currently posed by analysts and illustrated using microcomputer-based programs. They reflect the beginnings of more effective analyses of public policy issues that can be done in the future.

Another use of microcomputers is to provide more effective control over and access to internal CRS documents. The Science Policy Research Division has developed a bibliographic file containing citations to all general distribution products written since the division was established over 20 years ago. That file is regularly updated and today customized bibliographies can be created by author, subject, or year. Most of the source materials are contained on microfiche, but in the future it is expected that the actual reports will be stored electronically—perhaps in some optical storage medium.

Finally, it should be noted that recent and forthcoming enhancements to SCORPIO are improving congressional access to computerized information. New screen prompts now make reading online material significantly easier and make use of the system much “friendlier.” The new prompts and help screens also assist the user by giving examples that provide guidance for more effective searching. In the 101st Congress a new file called the CRS Products File will become operational as well. This file will identify recent Congressional Research Service reports and issue briefs, provide one-page summaries of the reports, and be searchable by subject area. A number of stored searches can be invoked by the user to quickly identify new products on major issues. Thus, a congressional staffer wanting to locate recent material on key topics will be able to quickly identify

these items online. A new “order” command will also allow users to remotely order the desired reports.

We have experimented with a number of uses of telecommunications for improving the receipt and distribution of information. The Congressional Research Service has a “mailbox” on the House electronic mail system which permits House offices to send requests for information any time of day, seven days a week. This is particularly attractive to district offices located on the west coast because of the different time zones. A California office can send a request after Washington staff have left for the night and have a response by the time their office opens the next day.

“The newest area of data transmission in which the Congressional Research Service is a participant involves the use of radio broadcasting.”

The Government Printing Office, in cooperation with a private contractor, is testing the feasibility of disseminating the *Federal Register* daily in digital form using FM sideband transmissions and microcomputer workstations. The digital form of the *Federal Register* containing Government Printing Office print codes is transmitted nightly over telephone lines to the contractor who enhances the data and returns it via telephone lines to a Washington, D.C. radio station which then broadcasts it using their FM subcarrier. The microcomputers at selected sites contain FM receiver boards tuned to receive the broadcasts. The *Federal Register* can then be stored on the microcomputer and subsequently queried by the end user. Our preliminary tests indicate that while the transmission of the data works well and may present an interesting method for receiving data in the future, the search software will need to be greatly improved before this could become an effective way to access outside information.

It is clear that the demand for computer support will continue to grow as users rely increasingly on automated information services and discover new applications. Now that CRS has an installed base of microcomputers that allows analysts to explore the potential of “personal computing” and the number of users has increased dramatically, requests for more computing power and new software may be expected to grow concomitantly. The rapid pace of hardware and software development, along with the discovery of new applications also will contribute to the growth of computer-based activities.

We are exploring new possibilities offered by microcomputers is improving the look and readability of CRS products. Word processing software combined with laser printers can now produce copy that is a significant

improvement over previous computer output. New software also allows for integration of text and graphics – an increasingly important feature as more analysts employ graphics in their reports.

The next major phase in automation efforts will most likely involve the development of networks linking different internal work groups. Experiments are already underway in CRS to test networking configurations that would support interaction among staff working on common products. More effective group collaboration among analysts could be established if an interactive research network where colleagues jointly contributed to projects were available. The installation of digital switching equipment for voice and data transmission in the House, Senate, and Library of Congress promises to ultimately facilitate networking on Capitol Hill. It is hoped that once these switches are interconnected computer-to-computer interaction will be improved and access to district offices, as well as other national and international networks enhanced.

The distribution of digital information via a telecommunications network presents a number of opportunities. Direct transmission of congressional material to the Government Printing Office is being done on a limited basis and is expected to increase significantly in the near future. Distribution of documents via a telecommunications network also could eliminate the need to stock large amounts of printed materials and could facilitate remote printing at other locations on Capitol Hill. It could also speed the receipt of information by the requestor, although this raises certain concerns about ensuring adequate quality control and institutional review processes. Now that more staff have microcomputers at their desks, there will be a growing impetus for an improved and integrated electronic mail capabilities, in particular, on Capitol Hill. A recent survey of telecommunications needs in the Library of Congress identified electronic mail as a high priority in most departments.

The Library of Congress has initiated a Strategic Information Systems Plan to set automation priorities and establish a planning process for upgrading the Library's bibliographic/mission-oriented systems. The initial phase recommended that commercially supported database management systems be used where feasible, that distributed processing be coordinated and supported throughout the Library, and that a "resystemization" of the major automated systems be undertaken immediately. Resystemization is expected to take approximately five years and will consume considerable resources in the Library's Automated Systems Office. It is hoped that the new software developed will consolidate the several existing mainframe systems and establish mechanisms for data sharing among the various departments.

Issues to the Future

As automation becomes increasingly critical for the performance of legislative functions and for effective information transfer from the congressional support agencies to Member and committee offices a number of issues need to be addressed. Without adequate attention to these problems, the advantages offered by computers and telecommunications will not be realized, unnecessary expenses will be incurred, and inefficiencies will develop. The effective integration of information technology into the legislative environment necessitates substantial planning and support efforts. The following are a few key issues that organizations relying increasingly on computerized information face.

A great deal of attention has been given to the need for adequate training on computer hardware and software for end users. The Congressional Research Service has long maintained a strong emphasis on training users of computerized information dating from the introduction of SCORPIO. The House and Senate similarly have training staffs for introducing users to online retrieval systems. The explosion of microcomputers has heightened training requirements considerably. While microcomputing offers new capabilities to the user, it also requires new skills to effectively employ them.

The transition to computer-based operations must include adequate time for learning these new skills. Also, a number of obstacles need to be overcome. Analysts often comment that they would like to use a new software package that they know will ultimately be of value, but they simply do not have the time to invest in learning it. In addition, unless software is used on a regular basis the skills will be lost and additional training will be required to employ it at some future time. Users approach computerized resources from different levels of knowledge and interest. While some might desire an in-depth understanding of the technology and systems, others only want to learn the minimum necessary to accomplish their tasks.

Thus, different training approaches work better depending upon the individual users. We have explored a number of approaches to training in order to address this situation. Classroom sessions with hands-on training are available for the major software packages used. In addition, demonstration sessions that highlight major features or focus on special functions have been successful in reaching larger numbers of staff that do not want to spend the time required in a hands-on course. Finally, informal training accomplished by staff working with their colleagues on an *ad hoc* basis contributed to the overall training process. Often staff members that take a particular interest in computers and develop stronger skills

serve as focal points for helping others learn new systems or explore new capabilities.

One of the factors that contributes to the need for ongoing training is the constant upgrading of software and improvements in online retrieval systems. Because these developments will continue to occur, training likewise will continue to be critical to the successful use of computerized information. Computer literacy increasingly is a job requirement, whether the staff person is a policy analyst, a librarian, or a production assistant.

The migration of computerized resources to the end-user necessitates an increase in distributed technical support. When all computer activity came from a centralized mainframe with a limited number of standardized remote terminals, technical support could be provided by the computer center staff. The proliferation of microcomputers and associated peripheral equipment, combined with a variety of software packages changes that situation considerably. The fact that staff use their equipment for a whole range of activities from word processing to information retrieval means that more problems are bound to arise and when they do, they need more rapid resolution.

As individual departments and offices move to automated information systems, they begin to require their own technical support staff that is closer to the end user and understands the work environment. The type of support required includes everything from setting up equipment, to solving hardware problems, to answering questions on software difficulties. "Troubleshooting" support is particularly critical where tight deadlines necessitate rapid responses to computer resource problems. These requirements quickly strain the technical support resources at the department level and have begun to suggest the need for additional support on-site in the divisions and offices.

“Training and technical support activities together may prove to be the major factors that determine the successful employment of automated information systems.”

Despite the rapid decrease in costs for computing technology, requisite investments in information technology remain substantial. In particular, the initial costs for providing a critical mass of hardware to support basic organizational functions can be considerable. As a result it is often a problem for a government organization to make all

its desired acquisitions within certain timeframes. This can make transitions to new systems even more difficult. It also necessitates special attention to what components of an automated system should be acquired first in order to establish the foundation for further development. Organizational priorities need to be identified early in the process and kept in mind throughout.

An additional complication is the rapid development of new hardware and software that may make earlier acquisitions obsolete. Organizations are confronted with the decision about the best time to make purchases in a rapidly changing industry where costs are constantly declining and capabilities increasing. One of the critical elements to be considered in this environment is the ability to migrate from one generation of equipment and software to the next.

While microcomputers and distributed processing offer end users new potential for computerized applications, they also can contribute to problems of standardization and coordination. Without adequate attention to these points, incompatibility among systems can be substantial and individualized approaches can undermine organizational standards. Unless both hardware and software are compatible, the potential for improving information exchange and enhancing collaborative endeavors can never be realized. This is particularly important as new equipment and software upgrades are acquired.

Conclusion

Advances in computer and telecommunications technologies have dramatically improved access to automated information and documentation. The introduction of microcomputers has distributed computing power to the end user and thus created new opportunities to apply information technology. The advent of telecommunications networks promises to have an equally important impact as users connect to each other and to remote sources of information. Whereas as the early online retrieval systems greatly facilitated locating documents, these current trends offer improved possibilities for delivering documents. They also significantly add to the analytical tools available to information providers and enhance the information transfer process.

To maximize the potential offered by these technological advances, however, requires adequate planning and sufficient resources for effective implementation. The issues identified above reflect the types of problems that need to be addressed to ensure a smooth transition to the new "digital" environment. ■