

Chapter 2

Overview of Federal Information Dissemination



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National Institute of Health medical staff using the National Library of Medicine's
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Overview of Federal Information Dissemination

SUMMARY

Information dissemination is a significant function of the Federal Government, accounting for an estimated \$6 billion per year in annual expenditures for relevant executive agency activities (including information clearinghouse operations, printing and publishing, library operations, and related research, development, and testing). This estimate does not include expenditures for the collection and development of the information disseminated, or even a prorated portion of expenditures for basic agency automation and information technology procurement.

The primary Federal mechanisms for information dissemination are the Federal agencies themselves; the U.S. Government Printing Office (GPO), which includes about 5 percent of agency publications in the GPO Superintendent of Documents Sales Program and roughly one-half of agency publications in the Depository Library Program (DLP); the National Technical Information Service (NTIS), which sells scientific and technical documents provided by the agencies; the Consumer Information Center (CIC), which distributes free or low-cost consumer pamphlets for the agencies; and various private sector vendors operating under government contract. Federal information is also disseminated by numerous intermediary mechanisms, such as the press, libraries, and commercial vendors who, on their own initiative, enhance and/or resell government information.

The number of civilian agency publications in paper format appears to be declining slowly, while the number of publications in electronic format has more than tripled over the past 4 years. Civilian agencies reported, as of fiscal year 1987, over 7,500 information products dis-

seminated electronically. Paper is still by far the dominant format (accounting for 80 to 90 percent of total information products), but significant agency use of some electronic formats is already occurring for some purposes. For example, statistical data are highly suited to electronic formats, and, based on results of the General Accounting Office (GAO) survey, about one-third of the civilian agencies use magnetic tape or disks, one-fifth floppy disks and electronic data transfer, and one-tenth electronic mail for dissemination of statistical data. By comparison, about two-thirds of the agencies use paper and roughly one-tenth use microfiche for disseminating statistical data.

Many Federal agencies have taken initiatives with respect to the use of electronic information technologies for information dissemination. Electronic technologies have penetrated the majority of agencies in every aspect of the information process. The GAO survey results suggest roughly one-half to two-thirds of the civilian agencies make at least some use of floppy disks, magnetic tapes or disks, electronic data transfer, and electronic mail for information collection/filing and dissemination. About one-third of the agencies have desktop publishing systems, roughly one-half have electronic photocomposition capability, and roughly one-quarter have electronic publishing systems.

A key characteristic of the current Federal information infrastructure is that while Federal agencies and private companies disseminate Federal information in paper and, increasingly, electronic formats, the central governmentwide dissemination mechanisms (GPO/SupDocs, NTIS, DLP, CIC) are presently limited largely to paper (or paper and microfiche).

Evaluating agency satisfaction with the various dissemination channels is difficult. Available survey data for dissemination of paper formats are subjective in nature. Not surprisingly, the civilian agencies rated their own dissemination services as generally of high quality, timely, and moderate to low in cost. Agencies rated GPO slightly lower in timeliness and slightly higher in cost, and NTIS somewhat lower in quality and timeliness and

higher in cost. Commercial vendors were rated about the same as the agency. With respect to GPO, there appears to be overall agency satisfaction with respect to traditional ink-on-paper composition, printing, and binding. However, there is continuing dissatisfaction among some agencies with respect to GPO cost, timeliness, estimating and billing procedures, and marketing/distribution of printed products.

INTRODUCTION

The Federal Government today stands at a major crossroads with respect to numerous policy, oversight, and operational aspects of Federal information dissemination. Advances in information technology over the past decade, and especially in the past few years, have opened up many new opportunities for information dissemination for all segments of American society. Each year the private commercial sector generates literally thousands of new information technology-based products and services (including hardware, software, and application packages), many of which are currently or potentially applicable to Federal information dissemination.

Over the past several years, technological applications such as optical disks, electronic mail and bulletin boards, electronic and desktop publishing, electronic printing on demand, and the like have become technologically feasible and economically viable for widespread application in the Federal Government as well as the private sector. The vast majority of Federal agencies are experimenting with some of these technologies, and some agencies are already implementing major operational applications.

Capturing the full benefits of these technologies involves consideration of a wide range of Federal policy, oversight, and operational questions as they relate to information dissemination. In order to assess this broad topic, the Office of Technology Assessment (OTA) commissioned a series of staff and contractor research papers, sought related studies and information from various executive and legislative branch agencies, and drew on the results of an extensive GAO survey of Federal agency practices and plans.

This chapter provides a technological and institutional overview of Federal information dissemination. The chapter addresses the following specific areas:

- the size and scope of the current Federal information dissemination enterprise;
- the technological initiatives already underway in Federal agencies; and
- the institutional bases for Federal information dissemination.

Each of these is discussed below. This overall picture of the Federal information dissemination enterprise provides an important part of the context for the rest of this report.

SIZE AND SCOPE OF FEDERAL INFORMATION DISSEMINATION ENTERPRISE

For purposes of this study, OTA defined "Federal information" as information collected and/or developed by the Federal Government to carry out government functions and agency

missions and considered "public" (legally available to the public and not subject to exemptions under the Freedom of Information Act, such as law enforcement, investigative, pro-

proprietary, and classified information). Such public information runs the gamut from statistical data and computer models, to reports, periodicals, and directories, to rules, regulations, and circulars, to maps, charts, and photographs. Also, OTA included most formats of Federal information in the scope of study—including paper, microforms, and electronic.

Estimating the magnitude of Federal information dissemination activities is difficult at best. There are no credible prior estimates and only very rough estimates can be made, since there is no systematic reporting of budget and activity data for Federal information dissemination.

Based on the GAO survey results, with 173 agency components responding, the minimum dollar amounts spent by the Federal Government (civilian and military) in fiscal year 1983 and fiscal year 1987 for relevant activities are shown in Table 2-1.

The total of about \$3.2 billion in reported fiscal year 1987 expenditures is undoubtedly conservative. Inspection of individual agency responses indicates that many agencies did not provide complete responses because they did not have and/or could not estimate relevant expenditures. Based on examination of selected agency responses that appear to be especially well done, it appears that about one percent of agency budgets on the average are devoted to information dissemination, which would translate into about \$6 billion (1 percent of the roughly \$600 billion Federal budget, excluding interest on the national debt and trans-

fer payments), or about twice the total figure reported to GAO. Agencies vary widely in the budget percentage reported to be allocated to information dissemination, and many well exceed the one percent level, as illustrated in Table 2-2.

Also, these estimates do not include the costs of dissemination of technical information for weapon systems and other applications in Department of Defense (DoD), which are largely sensitive or classified in nature. Nor do these estimates include expenditures for the collection and development of the information disseminated, or even a prorated portion of expenditures for basic agency automation and information technology procurement. And these estimates do not include the cost of federally funded research, development, or other activities on which a significant portion of the information collection, development, and/or dissemination was based.

The GAO results provide a rough profile of the number of information dissemination activities. The data are presented in Table 2-3 for fiscal year 1983 and fiscal year 1987, with a breakdown for DoD, civilian departments, and civilian independent agencies. Again, due to incomplete reporting from various agencies, these numbers must be considered as minimum estimates of activity levels. For example, GPO reports that about 58,000 titles were distributed to depository libraries in fiscal year 1987, or about 40 percent more than reported by the agencies to GAO. However, assuming a random distribution of errors, the general trends portrayed should be reasonably accurate.

The data suggest the following conclusions about the Federal information dissemination enterprise:

- DoD accounts for the largest share of total Federal Government publications, with about 82 percent of the titles and 96 percent of the pages (originals, not copies) as of fiscal year 1987.
- However, an insignificant percentage (less than 1 percent) of DoD publications are sold by GPO or included in the DLP. This may be explained in part because many of these documents are considered to be

Table 2-1.—Federal Expenditures on Information Dissemination, Civilian and Military (in billions of dollars)

	Fiscal year 1983	Fiscal year 1987
Agency information clearinghouse operations	\$1.500	\$1.70
Agency printing and publishing	0.900	1.10
Agency library operations	0.200	0.30
Agency research, development and testing on information dissemination	0.005	0.05
	<u>\$2.605</u>	<u>\$3.15</u>

SOURCE GAO Survey of Federal Agencies, 1987

Table 2-2.—illustrative Agency Expenditures for Information Dissemination, Fiscal Year 1987

Agency	Information dissemination budget (in millions of dollars)					Totals	
	Total agency budget	Research, development and testing	Printing and publishing	Library operations	Information clearing-house	dollars ^a	percent ^b
Library of Congress	239.3	0.6	4.1	—	—	4.7	2.0
US Navy	86,584.4	4.6	207.8	40.5	0.2	253.1	0.3
Economic Research Services (USDA).	44.0		1.1	0.1	0.05	1.25	2.8
Patent and Trademark Office (DOC).	255.8	32.5	18.3	4.7	—	55.5	21.7
Natn'l Bureau of Standards (DOC)	224.8	0.2	0.8	1.7	—	2.7	1.2
Natn'l Oceanic and Atmospheric Admin. (DOC)	1,113.1		56.8	1.8	—	58.6	5.3
Bureau of the Census (DOC)	363.1		7.9	1.0	—	8.9	2.5
US Geological Survey (DOI).	632.4	0.5	14.6	3.2	1.2	19.5	3.1
Federal Elections Commission	12.9		0.4	0.2	0.4	1.0	7.8
Federal Energy Regulatory Commission	101.5		2.4	0.5	0.6	3.5	3.4
Federal Trade Commission	65.0		0.6	1.2	—	1.8	2.8
Securities Exchange Commission	114.5	6.4	1.1	0.6	—	8.1	7.1

^aTotal agency expenditure for information dissemination activities

^bAgency information dissemination expenditures as a percentage of the total agency budget

SOURCE: GAO Survey of Federal Agencies, 1987

Table 2.3.—Selected Federal Agency Information Dissemination Activities, Fiscal Years 1983 and 1987

	Fiscal year 1983			Fiscal year 1987		
	DOD ^a	DEP ^b	IND ^c	DOD	DEP	IND
Publications printed						
Number of titles	339K ^d	60K	29K	334K	54K	20K
Number of pages	93M ^e	4.2M	0.63M	93M	3.7M	0.55M
Printed publications accepted into GPO's sales program						
Number of titles	323	3.6K	1.2K	295	2.8K	0.9K
Number of pages	80K	435K	182K	72K	277K	105K
Printed publications included in Federal Depository Library Program						
Number of titles	762	38K	2.7K	776	36.5K	3.6K
Number of pages	111 K	7.1 M	0.27M	110K	7.7M	0.26M
Information products disseminated electronically						
Number of titles	104	1,461	1,001	307	6,261	1,521

^aDOD = Department of Defense Agency components

^bDEP = Civilian departmental agency components

^cIND = Civilian independent agency components

^dK = thousands

^eM = millions

SOURCE: GAO Survey of Federal Agencies, 1987

sensitive and/or to have very narrow and limited demand.

- Of the civilian departmental and independent agency publications (totalling at least 74,000), about 5 percent are sold by GPO and about half (54 percent) are included in the DLP as of fiscal year 1987. While the number of DoD publications (titles and pages) has remained roughly constant over the past 4 years (fiscal years 1983-1987), the number of civilian agency publication titles has declined by about 17 percent and the number of pages by about 12 percent. This appears to be paralleled by even a larger decline in the number of titles accepted into the GPO sales program (down about 23 percent). GPO reports that the total number of titles in the sales program increased from 17,513 in fiscal year 1983 to 26,123 in fiscal year 1987 (up 49 percent). But this includes periodicals, forms, carryover documents, and the like in addition to current year publications, and is not necessarily inconsistent.

The number of titles in the DLP appears to have remained roughly constant over the past 4 years, with the number of pages showing a modest increase (about 8 percent). The Depository Program includes, as of fiscal year 1987, about one order of magnitude (10 times) greater number of titles than are available from the GPO sales program.

- s The number of information products disseminated electronically appears to have increased dramatically over the past 4 years, by about 200 percent for DoD, 300 percent for the civilian departments, and 50 percent for the civilian independent agencies. The estimated total number of civilian agency electronic information products for fiscal year 1987 was 7,782, up from 2,462 in fiscal year 1983.

The scope of Federal information dissemination cuts across all types of public information. As reported to GAO by 114 civilian

departmental components and 48 civilian independent agencies, the profile is shown in Table 2-4.

The formats currently used for Federal information dissemination cover the entire spectrum. Paper is still by far the dominant format. However, significant use of some electronic formats has already occurred. For the 114 civilian departmental agency components and 48 civilian independent agencies reporting to GAO, nonpaper formats are used most extensively for dissemination of scientific and technical information and for statistical information, as indicated in Table 2-5.

The use of nonpaper formats is also occurring, although on a more selective and limited basis, for certain other types of information. The uses of nonpaper formats reported by more than 5 percent of the civilian departmental agencies responding are shown in Table 2-6, by type of information.

In sum, Federal information dissemination has already begun the transition to significant use

Table 2.4.—Types of Public Information Dissemination by Federal Agencies

Types of public information	Percent of agencies responding	
	Departmental agencies	Independent agencies
Pamphlets/bulletins	82	94
Press releases	79	94
Statistical data	75	75
Directories/catalogs/ bibliographies	69	83
Manuals	64	67
Scientific and technical information	63	65
Contractual specs/ documents	63	83
Administrative reports	62	88
Rules, regulations, directives, circulars	62	85
Maps, charts, photos	54	50
Decisions/opinions	46	71
Professional journals/ proceedings	45	54
Laws/statutes	41	44
Software products	30	25
Satellite imaaetvldata	6	6

SOURCE GAO Survey of Federal Agencies, 1987

Table 2-5.-Agency Dissemination of Scientific and Technical Information and Statistical Data, by Format

Dissemination of scientific and technical information		
Format	Percent of agencies responding	
	Departmental agencies	Independent agencies
Paper	61	65
Microfiche	19	21
Electronic data transfer	15	10
Magnetic tape/ disk	14	13
Videotape	13	8
Floppy disk	9	10
Microfilm	8	6
Film	8	4
Electronic mail	6	8
Electronic bulletin board	6	2
Videodisk	2	—

Dissemination of statistical data		
Format	Percent of agencies responding	
	Departmental agencies	Independent agencies
Paper	73	75
Magnetic/tape/disk	32	29
Floppy disk	19	17
Electronic data transfer	18	10
Microfiche	12	13
Electronic mail	8	8
Microfilm	5	13
Electronic bulletin board	4	4
Videotape	2	—
Film	1	—

SOURCE GAO Survey of Federal Agencies, 1987.

of electronic formats. While paper is still dominant, it appears that electronic formats are already used more frequently than microfilm or microfiche for many types of information. While microform still has important archival benefits, the sectors in which microfiche is used relatively heavily (e.g., scientific and technical information,

Table 2-6.—Agency Use of Nonpaper Formats for Information Dissemination by Type of Information

Type of information	Percent of agencies responding
Administrative reports	
Electronic mail	14
Electronic data transfer	12
Floppy disk	8
Magnetic tape/disk	6
Microfiche	5
Pamphlets/bulletins	
Microfiche	10
Electronic mail	9
Press releases	
Electronic mail	13
Electronic data transfer	7
Videotape	6
Electronic bulletin board	5
Directories/catalogs/bib/iographics	
Microfiche	11
Electronic data transfer	9
Magnetic tape/disk	9
Floppy disk	5
Manuals	
Floppy disk	5
Contractual specs/documents	
Floppy disk	5
Rules, regulations, directives, circulars	
Electronic mail	9
Floppy disk	6
Maps, charts, photos	
Film	8
Software products	
Magnetic tape/disk	18
Floppy disk	17
Electronic data transfer	6

SOURCE GAO Survey of Federal Agencies, 1987

statistical data, directories, bibliographies) are also those in which new technologies, such as compact optical disks, offer the greatest potential.

TECHNOLOGICAL INITIATIVES BY FEDERAL AGENCIES

Many Federal agencies have taken initiatives with respect to the use of electronic information technologies for Federal information dissemination and related activities. The number and scope of these initiatives have grown dramatically over the past 4 years. One indicator is the amount of agency spending for research, development, and testing on informa-

tion dissemination. Collectively, agencies reported to GAO that this expenditure increased from \$5 million to \$50 million between fiscal year 1983 and fiscal year 1987. This dollar amount is undoubtedly low, since many agencies did not report or reported incompletely on this item. If DoD is included, the dollar amounts are low by at least an order of

magnitude, based on separate DoD estimates. For example, the DoD Computer-Aided Acquisition and Logistics Program (CALs) alone is spending on the order of \$150 million per year. The primary focus of CALs is on weapon system technical data (including technical documents such as engineering drawings and specifications developed in support of weapon systems acquisition), much of which is sensitive or classified. However, the magnitude of increase is probably accurate—a roughly 1,000 percent cumulative increase over the past 4 years. There is, at present, no reporting system in DoD or the civilian agencies that systematically collects relevant expenditure or activity data.

The GAO survey results provide a remarkable picture of agency operational use of electronic information technologies for information dissemination. OTA has relied primarily on the GAO survey results for the civilian departmental agencies as being the most representative. As discussed in chapter 1, the defense agencies did not circulate the GAO survey instrument to many major subcabinet agency components, contrary to GAO instructions; therefore, the defense agency responses are likely to be biased by the aggregate responses of the major military departments. On the other hand, the independent agency responses are dominated by a large number of small agencies, with a similar result—the likelihood of bias in the overall aggregate results. However, both the departmental and independent agency results are reported where particularly appropriate. For 114 civilian departmental agency components and 48 independent agencies reporting, electronic technologies have penetrated the majority of agencies in every aspect of the information process. The rank order of technologies in operational use is listed in Table 2-7.

The survey results do not, of course, give the absolute magnitude of each of the above as a percentage of total activity. They provide the relative use, and thus may tend to overstate actual use. In other words, the survey results indicate the percentages of agencies responding that use a specific technology, but not the

absolute number of each technology in use. For example, 34 percent of civilian departmental agencies report use of desktop publishing, but the survey instrument did not ask nor did the agencies provide, the absolute number of desktop publishing systems. Nonetheless, the qualitative penetration levels of these technologies are, overall, far greater than indicated in any known prior survey.

It is also noteworthy that significant percentages of civilian departmental agencies are currently prototyping or pilot testing advanced technologies for information storage and dissemination including those listed in Table 2-8. Also, it appears that about half of the civilian departmental components will soon have desktop publishing systems (34 percent already have operational capability, and another 15 percent are prototyping or pilot-testing), about one-half will soon have electronic photocomposition capability (44 percent now, plus 8 percent in prototyping or pilot-testing), and about one-third will soon have electronic publishing systems (21 percent now, plus 11 percent prototyping or pilot-testing). For the independent agencies, more than one half will have desktop publishing (29 percent now, with another 31 percent prototyping or pilot-testing), one-half already have electronic photocomposition (with another 13 percent prototyping or pilot-testing), and about two-fifths will have electronic publishing (31 percent now plus 13 percent in prototype or pilot testing).

Where available, quantitative estimates of Federal Government use of key technologies are generally consistent with the results of the GAO survey. For example, based on all available data, OTA estimates that the Federal microcomputer inventory has increased from a few thousand in 1980 to (conservatively) over 500,000 today, with a million microcomputers likely within 2 years if current agency procurement plans are fully implemented. The microcomputer is a key component of agency electronic publishing and dissemination activities. OTA estimates that the Federal agency inventory of high-end electronic laser printers has increased from a handful in 1980 to several hundred today, and low-end desktop laser

Table 2-7.—Agency Use of Information Technologies

Technology	Percent of agencies responding	
	Departmental agencies	Independent agencies
Information collection/filing		
Floppy disk	73	67
Magnetic tape/disk	64	63
Electronic data transfer (computer to computer)	60	56
Electronic mail	50	48
Computerized telephone calls	18	21
Nonpaper storage		
Floppy disk	76	73
Magnetic tape/disk	66	73
Micrographics (microfilm/fiche)	54	71
Videodisk	9	6
CD-ROM (Compact Disk-Read Only Memory)	4	8
Optical disk (WORM)	1	4
CD-I (Compact Disk-Interactive)	0	2
Optical disk-erasable	0	2
Printing		
Computer graphics	66	58
Laser and non-impact printing	64	81
Photo-offset printing	54	63
Computer-aided page makeup	50	52
Electronic photocomposition	44	50
Desktop publishing systems	34	29
Electronic publishing systems	21	31
Microform printing	18	29
Electronic dissemination		
Floppy disk	61	58
Magnetic tape/disk	58	60
Electronic data transfer	50	52
Electronic mail	46	40
Videotape	46	52
Electronic bulletin board	35	17
Teleconferencing	33	33
Film	30	31
Broadcast TV	16	19
Videodisk	9	6
One-way cable TV	8	10
Videoconferencing	8	8
Digital cartographic systems	7	2
CD-ROM	4	2
Selective dissemination of info.	4	8
Expert systems	3	2
Videotext/teletext	3	6
Interactive cable TV	3	2
CD-1	0	—

SOURCE: GAO Survey of Federal Agencies, 1987.

printers and desk top publishing software have increased from very few in 1980 to several tens of thousands today. Since a microcomputer, laser printer, and software are the major components of a desktop publishing system, OTA conservatively estimates that there are 30,000 desktop publishing systems and 300 high-end electronic publishing systems in the Federal Government.

The GAO survey results are generally consistent with the results of OTA's own research and contractor case studies of selected agencies. For example, all three military services (Army, Navy, and Air Force) as well as the Office of the Secretary of Defense, have major electronic publishing and dissemination systems under development or in operation. In the civilian sector, the U.S. Geological Sur-

Table 2-8.—Agency Prototyping or Testing of Advanced Technologies

Storage technology	Percent of agencies responding	
	Departmental agencies	Independent agencies
CD-ROM ^a	15	1
CD-Ib	6	2
WORM ^c	10	10
Dissemination technology		
CD-ROM	11	10
CD4	5	2
Expert systems	7	8

NOTES

^aCompact Disk Read Only Memory

^bCompact Disk Interactive

^cWrite Once Read Many Times

SOURCE GAO Survey of Federal Agencies 1987

vey and Bureau of the Census (among others) are collaborating on information dissemination via Compact Disk-Read Only Memory (CD-ROM) and digital cartographic technologies. A capsule description of selected highlights is given below.

- DoD, Office of the Secretary of Defense (OSD): DoD is implementing the Computer-Aided Acquisition and Logistics Support (CALs) program designed as an integrated system for the creation, storage, revision, and dissemination of technical information relevant to weapon systems. CALs is designed to use state-of-the-art electronic publishing technology and incorporates an extensive set of technical standards for electronic exchange of information, page markup, graphics, and the like. The objective is eventually to convert current paper flows of information to digital electronic flows, so that engineering drawings, technical manuals, logistics records, and life-cycle data are created and accessed in electronic formats. CALs participants include OSD, Army, Navy, Air Force, the Defense Logistics Agency, and the private defense contractors. The CALs consolidated budget for DoD is roughly \$150 million per year.
- DoD, Defense Technical Information Center (DTIC): DTIC, a component of the Defense Logistics Agency, is implementing a Defense Applied Information Technol-

ogy Center, in cooperation with OSD and the Joint Chiefs of Staff. The Center includes four laboratories:

1. Defense Gateway Laboratory, which will facilitate electronic access to over 800 diverse DoD, commercial, and Federal databases via the Defense Gateway Information System, and will utilize user-friendly search software along with an online database catalog;
 2. High-Density Information Systems Laboratory, which will develop high-density optical disk storage and retrieval systems with electronic printing, publishing, and dissemination capabilities;
 3. Artificial Intelligence/Decision Support Laboratory, which will explore state-of-the-art software for diagnostics, monitoring, control, and information retrieval, and will research the application of AI/expert system software and display techniques to defense information needs, including online interfacing with the Defense Gateway Information System; and
 4. Interactive Video Laser Disk Systems Laboratory, which will explore innovative disk techniques for training prospective users of the various high-technology systems under development.
- NOAA, National Geophysical Data Center (NGDC): NGDC has prepared a prototype CD-ROM on selected geomagnetic and solar-terrestrial physics data, including data on solar flares, sunspots, and wind. NGDC makes this data available to users at reduced cost (e.g., the disks cost about \$50 each at a volume of 600 copies—including costs of data preparation, software, premastering, mastering, and duplication—compared to a cost of about \$500 for the same data on magnetic tape). The CD-ROM runs on any IBM-PC AT or XT or compatible microcomputer with 512 kilobyte random access memory, 10 megabyte hard-disk drive, standard floppy-disk drive, and CD-ROM reader and software using the High Sierra standard at a total

cost of under \$4,000. By comparison, magnetic tapes require a mainframe or mini-computer and peripheral equipment at a total cost of several tens to hundreds of thousands of dollars or more.

- DOI, U.S. Geological Survey (USGS): USGS has prepared a prototype CD-ROM on mapping data for the Gulf of Mexico, known as Project Gloria. The prototype was prepared with NOAA (which developed the search software) and the Jet Propulsion Laboratory (which developed an interactive image display program). The combined software permits the user to search the database by geographical mapping areas, latitude, and longitude, and to display the data in graphic and variable image formats. USGS views microcomputer-based CD-ROM applications as the key to dramatically improving access to and reducing the cost of many earth science databases maintained by USGS, NOAA, NASA, and other Federal agencies, and, accordingly, has already purchased CD-ROM mastering equipment.
- DOC, Bureau of the Census: The Census Bureau offers a full range of products in electronic format in addition to paper and microfiche. Electronic formats include: CENDATA, an online information service including press releases, statistical summaries, product announcements, and the like, and available via DIALOG Information Services, a private vendor; electronic bulletin boards that provide instantaneous access to selected census data (including most CENDATA entries) to participants in the State Data Center program and the Federal-State Cooperative Estimates Program; floppy disks contain-

ing data from such Census reports as the *County and City Data Book* and *County Business Patterns* and, on request, data downloaded from magnetic tapes in the Census inventory; and magnetic tapes that contain large volumes of Census data, frequently in more detail than is available in the paper publications, and sell for \$175 per tape (6,250 bits per inch). In the future, CD-ROMs will be used for dissemination of statistical data to microcomputer users (Census has already prepared prototype disks and envisions a significant role for CD-ROM for distributing the results of the 1990 census).

In the legislative branch, GPO has initiated technology innovation projects in several areas, including dial-up desktop to mainframe electronic printing capability, dial-up fiber optic links for remote photocomposition, and long-distance electronic data transfer. While GPO disseminates its information products primarily in paper format (and secondarily microfiche), the majority of inputs to GPO is already in electronic format. (GPO pilot projects are discussed in ch. 4, 7, and 8. Other executive agency electronic pilot projects are discussed in ch. 3, 5, and 10.)

In sum, the current initiatives of the Federal Government, taken as a whole, indicate a very significant use of advanced information technology. While use varies widely by agency, and even within agencies, overall the government appears to be at or close to the threshold where technology-based electronic information dissemination can be a significant and integral part of the Federal information infrastructure.

INSTITUTIONAL INFRASTRUCTURE FOR FEDERAL INFORMATION DISSEMINATION

The primary institutional mechanisms used for Federal information dissemination are the Federal agencies themselves, GPO, NTIS, Consumer Information Center (CIC, located in Pueblo, CO), DLP, and private sector vendors/contractors. Federal information is also

disseminated by numerous intermediary mechanisms, such as the press, libraries, interest groups, congressional offices, and the like.

Almost all Federal agencies, and certainly all Cabinet departments, have some explicit

statutory authority for information dissemination and many have multiple statutory authorities. Because Federal agencies collect and/or develop the bulk of Federal information, they are generally the most knowledgeable about their own information products and services, and frequently are the best informed about the current and potential users of that information. Many agencies have formal and/or informal mechanisms to discuss information needs and problems with users. According to the GAO survey results for 114 departmental agency components, many agencies directly disseminate a wide range of types and formats of Federal information.

GPO, or more precisely the GPO Superintendent of Documents (SupDocs), is statutorily authorized to sell selected agency documents to the general public. The documents selected for the GPO sales program represent only a small fraction (a few percent) of all government publications, and are ones judged by GPO marketing specialists to have significant demand and/or those that by law must be sold to the public. Documents sold by GPO cover a wide range of types of Federal information, but the formats are limited primarily to paper and microfiche, with a few items available in magnetic tape format. (See ch. 4 and 5 for further discussion of SupDocs activities.)

NTIS, pursuant to public law, sells scientific and technical information provided by the mission agencies. The types of information products available from NTIS are much more limited than those available from the agencies or GPO, and are provided to NTIS on a voluntary basis. NTIS products have very limited demand (about 10 copies per item) compared to GPO products. NTIS sells primarily microfiche and paper formats, with some sales of magnetic tape and floppy disk formats. (See ch. 5 for further discussion of NTIS activities.)

CIC (operated on a reimbursable basis by GPO for the General Services Administration), pursuant to public law, primarily facilitates the distribution of consumer-oriented pamphlets and bulletins from the agencies. These materials are usually short and are available free or at a small fee. CIC products are limited to paper formats.

DLP is a cooperative program by which agency documents, whether or not they are sold via GPO or NTIS, are provided to a network of about 1,400 libraries around the United States. Over 50 regional depository libraries receive all documents distributed, while the other depository libraries select which types of documents or titles they wish to receive. DLP was established by public law and is operated by GPO. It serves as part of an "information safety net by which the government funds the distribution of materials to designated libraries. DLP includes all types of Federal information, but has been limited, until now, to paper and microfiche formats. (See ch. 6 and 7 for further discussion of DLP activities.)

Finally, private sector contractors play a role in disseminating information for many of the agencies. Since, in general, government information cannot be copyrighted, numerous private sector vendors repackage, add value, and sell or resell a wide variety of types of Federal information in a wide variety of formats. The dissemination of agricultural information developed by the U.S. Department of Agriculture (USDA) provides a good illustration of the private sector role. USDA information is disseminated directly by agency components, through private contractors, via private sector online gateways, and by private sector value-added providers. For example, the ED I (Electronic Dissemination of Information) service is provided online on a fee-for-service basis by the U.S. Department of Agriculture (USDA) through a contract with Martin Marietta Corporation. ED I provides time-sensitive daily, weekly, and monthly reports and news releases from USDA agencies. AGRICOLA, an extensive USDA bibliographic reference database on all aspects of agriculture, is provided online via DIALOG Information Services, a commercial database vendor. USDA Online, a USDA current information service including news releases and short reports, is provided via ITT Dialcom, a commercial online electronic mail gateway.

ED I, AGRICOLA, and USDA Online are information products developed by USDA, but disseminated online via private vendors or

contractors. There are also many online information products that make use of USDA information, but are developed as well as disseminated by the private sector. For example, Deane Publishing sells AgLine, an online information service that covers USDA daily commodity reports and updates and also offers electronic mail and software capabilities. Pioneer Hi-Bred International sells AGRIBUSINESS U. S. A., a comprehensive online database that indexes agricultural business, trade, and government publications. This database is available via DIALOG Information Services, a commercial vendor. As a final example, Vance publishing sells ProNet, an online news and information service on the produce industry that incorporates a variety of price, market, weather, and related information from USDA and elsewhere.

The GAO survey results indicate that the 114 civilian departmental agency components responding use several institutional mechanisms for information dissemination with respect to the formats indicated, as shown in Table 2-9.

This highlights one of the key characteristics of the current Federal information infrastructure: while individual Federal agencies and private companies disseminate Federal information in paper and electronic formats, the central governmentwide dissemination mechanisms are presently limited largely to paper (or paper and microfiche). Both GPO/SupDocs and NTIS sell a small number of products in electronic format, but this represents an insignificant percentage of total sales volume for either.

The four governmentwide dissemination agencies collectively distribute about 107 million copies of documents (in paper or microfiche format) per year, as summarized in Table 2-10.

Of these dissemination agencies, only GPO/SupDocs and NTIS maintain customer profiles. Percentage estimates are shown in Table 2-11. The profiles for SupDocs and NTIS are fairly similar, although the use of different categories makes comparisons somewhat difficult. In any event, the largest customer group is business. To keep this in perspective, consumers are, by definition, the primary customer group for CIC, and the libraries are the primary DLP customers. Of course, libraries largely serve an intermediary role, and the ultimate customers of DLP are the patrons of the individual depository libraries. DLP does not at present maintain comprehensive user statistics, although a survey is in progress. However, a 1985 estimate suggests that over 10 million persons use DLP each year, as detailed in Table 2-12, although these estimates have not been validated.

The GAO survey attempted to measure agency satisfaction with the various dissemination channels for typical agency reports (i.e., 50-100 pages, paper format, typeset, some graphics, specified deadline). There are numerous problems in interpreting and using these data. Not surprisingly, the civilian departmental agencies rated their own dissemination services as generally of high quality, timely, and moderate to low in cost for paper products. This is, of course, a self-assessment, and

Table 2-9.—Federal Agency Use of Institutional Mechanisms for Information Dissemination, by Format

Institution	Percent of agencies responding					
	Paper	Microfiche	Electronic mail	Electronic data transfer	Magnetic tape/disk	Floppy disk
Own agency	92	11	25	9	40	33
Gpo/Sup Docs	65	9	1	1		3
NTIS	37	23	1	—	:	7
CIC	18	—	—	—	—	—
Depository Libraries	52	12	—	—	2	1
Private sector vendors/contractors	48	7	9	3	15	11

SOURCE GAO Survey of Federal Agencies, 1987

Table 2-10.—Approximate Distribution Volume, Fiscal Year 1987

Dissemination agency	Distribution volume (millions of copies)
GPO/SupDocs (free) ^a	30
GPO/SupDocs (sales) ^b	27
NTIS (sales)	6
CIC (free)	21
DLP (free)	23
Total	107

^aBylaw and reimbursable^bIncludes CIC sales

SOURCE U S Government Printing Office and National Technical Information Service 1988

Table 2-11.—GPO/SupDocs and NTIS Sales Distribution, Fiscal Year 1987

	Percent of total sales	
	GPO/SupDocs	NTIS
Business	59	64(U.S. only)
Private individuals	27	4 (general public)
Foreign	— ^a	20 (business and government)
Federal, State, and local government	8	6
Universities and colleges	6	6 (includes public libraries)

^aGPO foreign customers included in all other categories as appropriate except Government

SOURCE U S Government Printing Office and National Technical Information Service 1988

Table 2-12.—Estimated Use of Depository Libraries, Fiscal Year 1985

	Actual ^a	Projected ^b
No. libraries reporting	1,188	1,400
Avg. no. weekly users per library	141	141
Total weekly users	167,508	197,400
Total annual users	8,710,416	10,264,800

^aBased on library estimates, numbers not validated and may include undercounts, overcounts, or doublecounts (multiple users per person)^bProjects the average use based on the 1,188 libraries reporting to all of the approximate 1,400 depository libraries

SOURCE U S Government Printing Office and Office of Technology Assessment, 1988

its validity cannot be objectively determined from the survey results. Agencies rated GPO slightly lower in timeliness and slightly higher in cost for paper products relative to agency views of themselves. NTIS was rated by agencies as somewhat lower in quality and timeliness and higher in cost for paper products.

DLP was evaluated as slightly less timely. Commercial vendors were rated about the same as the agency itself. The full comparative data are shown in Table 2-13 (normalized to 100 percent) and expressed as a percentage of the agencies responding to each question, based on 114 civilian departmental components responding.

Given the subjective and general nature of the agency evaluations, these results should be interpreted cautiously. For example, the perceived problems with the quality and timeliness of NTIS documents could be due largely to poor quality and late delivery of copies provided to NTIS by source agencies. Also, the perception that GPO, NTIS, and DLP dissemination is less timely than agency dissemination could reflect the role of GPO and NTIS as secondary rather than primary distributors of agency documents and the delays inherent in a secondary role. And the perception that NTIS documents are more costly than agency, GPO, and commercial sources may reflect the very low volume of sales per NTIS title (and resulting higher per unit costs). Finally, some of the agency responses appear to be questionable. For example, the majority of agencies rated the cost of DLP dissemination as moderate (rather than low or very low), yet for many agencies there is no cost for DLP dissemination. Agencies only pay printing and binding costs when they provide copies directly to DLP for documents not produced by or procured from GPO.

The GAO survey requested additional evaluation detail for GPO. The results indicated that the majority of the departmental agency components responding were satisfied or very satisfied with publications layout, composition, printing quality, printing timeliness, binding, cataloging, marketing/sales, distribution, and depository library services provided by GPO. The one area where one-half were neutral (neither satisfied or dissatisfied) or dissatisfied was printing cost. Some dissatisfaction was also indicated with respect to marketing/sales, printing timeliness, and distribution, as indicated in Table 2-14 (in normalized percentages), based on the civilian departmental

Table 2-13.—Federal Civilian Departmental Agency Evaluation of Information Dissemination Channels

Dissemination channel	QUALITY				
	Percent of agencies responding				
	Very high	High	Moderate	Low	Very low
Agency	29.8	45.2	25.0	—	—
GPO	20.9	56.9	19.4	1.4	1.4
NTIS	12.5	30.0	30.0	25.0	2.5
Clc	45.0	50.0	5.0	—	—
DLP	19.3	44.2	34.6	—	1.9
Commercial	22.2	53.7	22.2	1.9	—

Dissemination channel	TIMELINESS				
	Percent of agencies responding				
	Very great	Great	Moderate extent	Some extent	Little or no extent
Agency	27.9	45.2	23.1	2.9	1.0
GPO	9.6	31.5	45.2	11.0	2.7
NTIS	—	22.5	57.5	10.0	10.0
Clc	21.1	36.8	31.6	10.5	—
DIP	14.8	25.9	50.0	3.7	5.6
Commercial	13.0	37.0	40.7	7.4	1.9

Dissemination channel	COST				
	Percent of agencies responding				
	Very high	High	Moderate	Lo-	Very low
Agency	1.9	15.3	63.5	13.5	5.8
GPO	6.9	23.3	61.6	8.2	—
NTIS	22.5	45.0	27.5	2.5	2.5
Clc	—	15.0	65.0	5.0	15.0
DLP	1.9	7.5	56.6	11.4	22.6
Commercial	—	14.8	79.6	5.6	—

SOURCE GAO Survey of Federal Agencies, 1987

agency components responding. Note that of the 114 agency components that participated, the number that actually commented on specific GPO services ranged from 54 to 91, as indicated in Table 2-14. These 1987 GAO survey results can be compared with the results of a 1987 survey conducted by the Federal Publishers Committee (FPC— an interagency group of printing, publishing, and public information officials, and a 1983 survey conducted by GPO itself. While the FPC survey included many other topics, it did cover several cost, timeliness, and marketing/distribution topics, with the results indicated in Table 2-15. The FPC survey results must be interpreted cautiously since the overall response rate was only about 10 percent (48 respondents out of the 475 persons who were sent the questionnaire). FPC has noted that the 48 respondents included officials from nine cabinet departments (Agricul-

Table 2-14.—Federal Civilian Departmental Evaluations of GPO Services

GPO Service	No.,*	Percent of agencies responding		
		Satisfied	Neutral	Dissatisfied
Publications layout	47	78.0	12.0	10.0
Composition	66	81.5	10.8	7.7
Printing quality	91	80.0	12.2	7.8
Printing timeliness	91	66.7	17.8	15.6
Printing cost	87	50.0	36.0	14.0
Binding	82	74.1	19.7	6.2
Cataloging	39	73.0	24.3	2.7
Marketing/sales	57	57.9	26.3	15.8
Distribution	67	67.2	21.9	10.9
Depository library	54	78.9	19.3	1.8

*Number of agency components commenting on each GPO service
 SOURCE GAO Survey of Federal Agencies, 1987

ture, Commerce, Defense, Energy, Health and Human Services, Housing and Urban Development, Interior, Justice, and Labor) and about a dozen independent agencies. FPC has

Table 2-15.—Federal Publishers Committee Survey of GPO Services, Selected Results

Area of concern	Number of respondents	
	Adequate	Needs improvement
Billing delays and discrepancies	8	29
Cost of GPO Inhouse work	9	7
Delivery date reliability.	14	22
Quality, timeliness, and cost controls of GPO contractors	11	25
Accuracy and adequacy of SUPDOCS sales information	13	11

SOURCE: Fed2rd Publishers Committee Survey 1987

submitted the complete survey results and related recommendations to GPO for comment and followup action where appropriate.]

In 1983, the GPO Inspector General conducted an audit of customer satisfaction with GPO services, based on a questionnaire sent to agency customers. The response rate was over 90 percent, with 125 out of 136 agencies completing the questionnaire. Six areas appeared to be of greatest concern to customers, with 38 to 70 percent of the respondents dissatisfied at least some of the time with regard to:

1. lack of advance notice to agencies when due dates slip;
2. failure to complete jobs on time;
3. failure to bill jobs in a timely manner;

¹Memorandum from John E. Mounts, Chairman, Federal Publishers Committee, to Ralph E. Kennickell, Jr., Public Printer, on "Recommendations from Federal Publishers Committee to Government Printing Office," May 13, 1988.

4. failure to provide accurate cost estimates in a timely manner;
5. improper or unclear levying of surcharges; and
6. improper packaging, labeling, or delivering of jobs by GPO contractors.

This survey is, of course, dated, and GPO has not conducted a similar followup survey.

In addition to being 5 years old, the 1983 GPO survey has been criticized because it was based on the opinions and perceptions of GPO's customer agencies. The GPO Inspector General did not attempt to validate the responses by checking records or seeking corroboration from multiple sources within a given agency. However, the 1987 GAO and FPC surveys are subject to this same criticism.

Taking all information into account, there appears to be overall satisfaction with GPO services with respect to traditional ink-on-paper composition, printing, and binding, but continuing dissatisfaction among some agencies with respect to cost, timeliness, estimating and billing procedures, and, possibly, marketing/distribution of printed products. GPO has instituted improvements in its customer service operations in recent years. And FPC has acknowledged that GPO "has greatly increased its responsiveness to agency needs; but FPC "is not satisfied that many of the long-standing problems are being resolved. Opportunities for further improvement are considered in chapters 4 and 11.

¹Ibid.