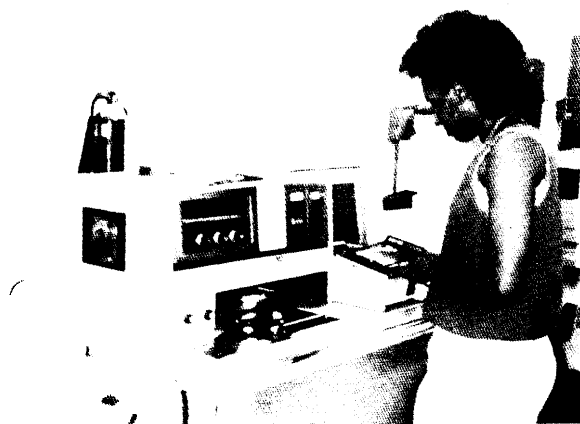
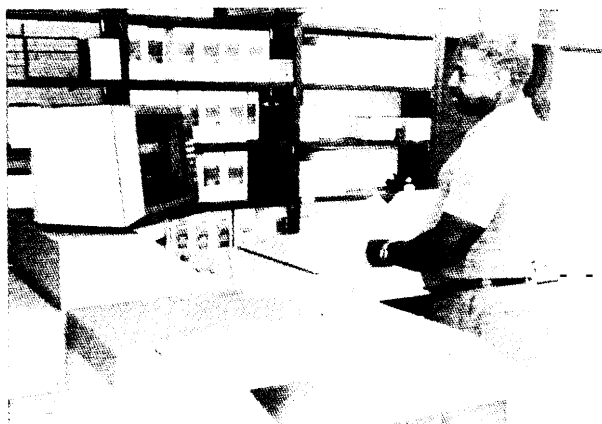


Chapter 5

An Electronic National Technical Information Service and NTIS/Superintendent of Documents Cooperation



Clockwise from top left: NTIS staff searching the NTIS database for a customer; NTIS staff "blowing back" from microfiche to produce a paper copy of a technical report; NTIS staff reproducing additional shelf stock; and NTIS staff pulling an archive document from the NTIS collection (photo credits: National Technical Information Service).

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An Electronic National Technical Information Service and NTIS/Superintendent of Documents Cooperation

SUMMARY

This chapter discusses the current status of and future prospects for the National Technical Information Service (NTIS), and opportunities for cooperation between NTIS and GPO's Superintendent of Documents (SupDocs). The debate over the privatization of NTIS is discussed in chapters 11 and 12. The discussion in this chapter assumes that this debate will be resolved by Congress in favor of retaining NTIS within the Federal Government—as a separate agency or government corporation within the Department of Commerce or consolidated with SupDocs or even with the Library of Congress. The major challenge facing Congress is defining a viable role for NTIS in the future. A variety of indicators strongly suggest that the current role may not be sustainable absent some significant changes.

NTIS operates in a highly constrained environment, characterized by ambivalent support from the executive branch, limited financial resources, mixed support from the information industry, limited technical resources, and a difficult product mix (many low volume items). In addition, the basic demand for NTIS products appears to be significantly eroding. Most NTIS users and client agencies believe in the NTIS concept and seek to find ways to strengthen NTIS or at least the core NTIS functions as a continuing element of the Federal Government.

NTIS appears to be ideally suited for the implementation of an electronic document system (with multi-format output—paper, microfiche, or electronic), regardless of organizational location. NTIS could use aversion of the Defense Technical Information Center (DTIC) system as a prototype. An electronic document system could help revitalize NTIS if coupled with improved agency participation. Overall, an electronic NTIS should be able to increase the

diversity and timeliness of NTIS (and related private vendor) offerings, increase the ability of NTIS (and private vendors) to match information products with potential users, and reduce the cost of NTIS products. An electronic NTIS should be better able to serve all users, but especially small and medium businesses and individual researchers.

NTIS/SupDocs cooperation could create new opportunities for improvements in the indexing, marketing, and international exchange of Federal information. NTIS/SupDocs cooperation could be synergistic with respect to implementing an electronic document system that would meet NTIS needs plus a broadening of the SupDocs product line to include selected low demand items. The NTIS/SupDocs combined low-demand sales volume could help justify investment in the necessary equipment, which could be funded out of the GPO revolving fund and/or NTIS retained earnings (if authorized) and charged back as depreciation. NTIS/SupDocs cooperative initiatives would need to be sensitive to concerns about separation of powers between the executive and legislative branches, and about the strengthening of government wide dissemination mechanisms at the possible expense of decentralized agency activities.

Regardless of the ultimate institutional structure, there are significant opportunities for improvement in both NTIS and SupDocs product line analyses, development, and marketing. Strengthened cooperation between NTIS and SupDocs would not only help identify mutually advantageous joint activities, but would seem almost mandatory to the extent that both agencies pursue sales of electronic format products and that SupDocs enters the low-demand market.

ROLE AND CURRENT STATUS OF NTIS

The primary role of NTIS is to serve as a central governmentwide source of scientific and technical reports describing research performed by Federal agencies, contractors, and grantees. NTIS depends on the voluntary submission of these reports by the Federal agencies. NTIS maintains a permanent archive of these reports, establishes bibliographic control over these materials, prepares various index and abstract materials, and sells copies of the reports. In recent years, NTIS has increased its collection to include additional reports prepared by state and local governments and by foreign government research organizations, and to include Federal databases and software.

In addition to the basic archival and clearinghouse functions, NTIS is responsible for:

- the Federal Research in Progress (FEDRIP) Program that provides information describing on-going Federally funded research projects;
- the Center for the Utilization of Federal Technology (CUFT);
- acquisition and licensing of government-owned patents;
- provision of production and billing/collection services for information dissemination activities of other Federal agencies; and
- provision and processing of FOIA requests for agency materials placed on file at NTIS.

This discussion focuses primarily on the NTIS archival, clearinghouse, and dissemination functions.

As of fiscal year 1987, the NTIS archive included close to 2 million reports and over 2,500 data and software files. About 60,000 to 70,000 new items are added each year. About half of the NTIS reports originate from just three agencies: the Department of Defense (Defense Technical Information Center (DTIC)), the Department of Energy (DOE) (primarily the DOE Office of Scientific and Technical Information (OSTI)), and National Aeronautics and Space Administration (NASA) (primarily the NASA

Table 5-1.—Source of NTIS Reports, Fiscal Year 1987

Agency	Percent of total
Department of Defense	23
Department of Energy	23
NASA	4
All other Federal agencies	20
Non-Federal agencies	
Foreign countries	2;
Total	100

SOURCE: National Technical Information Service, 1988

Scientific and Technical Information Facility (STIF)). The percentage distribution is shown in Table 5-1.

NTIS operates under several constraints. One is the variable and limited funding commitment of the government to NTIS. NTIS began in 1945 as the Publication Board. The Publication Board was established by Executive Order 9568, which charged the Board with reviewing all government-generated scientific and technical documents and determining what could be released to the public. Executive Order 9604 expanded the Board's responsibilities to include scientific and technical documents captured from the enemy during and at the end of World War II. The Board's objectives were to organize declassified information so as to permit researchers, and especially industry, fast and easy access to information, and to notify the public and industry about what was available. The intent was to promote economic growth and development through the rapid dissemination of scientific and technical information.

Since established, questions have been raised concerning the appropriate functions and funding for NTIS. The Publications Board became part of the Office of Declassification and Technical Services (OTS) in late 1945, the Office of Technical Services in 1946, the OTS Clearinghouse in 1950, the Clearinghouse for Federal Scientific and Technical Information in 1964, and NTIS in 1970. The history of NTIS has reflected uncertainty on the part of the Federal Government as to the appropriate Federal commitment to a central clearinghouse for

dissemination of scientific and technical information, the role of the clearinghouse vis-a-vis the Federal science agencies and the private sector, and the appropriate pricing of such clearinghouse services.

In general, representatives of the scientific and technical community believe that the cost of such clearinghouse services is a very small price to pay compared to the substantial Federal investment in research and development. To place this in perspective, the fiscal year 1987 NTIS revenues and costs were about \$22 million each (breakeven operation) compared to the fiscal year 1987 Federal research and development budget of about \$59 billion. Excluding defense R&D, the NTIS operating budget of \$22 million represents about one one-thousandth of the civilian R&D budget (\$21.5 billion in fiscal year 1987). Advocates of a strong Federal role in dissemination of scientific and technical information argue that the level of Federal support is far too small. Others believe that, while a Federal role is needed, it should be limited in terms of functions and budget.

The result is that NTIS receives no appropriated funds for its basic archival and clearinghouse functions, with costs covered by sales of documents and services. NTIS does not have a working capital revolving fund. As a consequence, since any net revenues must be returned to the U.S. Treasury, it has proven difficult for NTIS to obtain up-to-date equipment—especially modern information technology.

A second major constraint is that NTIS has a voluntary relationship with the source agencies and cannot require agencies to submit materials. NTIS estimates that more than one-third of Federal scientific and technical reports are never submitted. There is also concern that agencies may delay submission of key reports and/or submit primarily reports with less perceived interest or demand. NTIS functions, for the most part, as a secondary distributor of Federal scientific and technical information. The key Federal science agencies, such as DoD, DOE, and NASA, have their own mechanisms

for direct dissemination of reports to agency personnel and contractors. NTIS then makes secondary distribution to the business community and general public. In addition, the GPO SupDocs includes some scientific and technical reports in the SupDocs sales program. NTIS includes some GPO titles in the NTIS clearinghouse. However, the overlap is thought to be small, since SupDocs selects titles based on significant market potential (projected sales of several hundreds to thousands of copies), whereas almost all NTIS includes titles are included regardless of demand, which is generally very small (an average sales of 10 copies per title). In sum, NTIS must achieve break-even operations working with a substantially incomplete collection of reports that sell very few copies on the average. This is a difficult challenge.

A third major constraint is a complex relationship with the private sector and the information industry in particular. On the one hand, NTIS was established to help serve the scientific and technical information needs of business and industry. NTIS estimates that about 75 percent of its business customers are small firms, with major corporations accounting for the other 25 percent of business customers. Overall, the U.S. business community accounts for about two-thirds of NTIS sales, as shown in Table 5-2.

The information industry appears to be generally comfortable with the NTIS archival function and clearinghouse activities with respect to dissemination of paper and microfiche copies. However, NTIS initiatives with respect

Table 5.2.—Distribution of NTIS Sales, Fiscal Year 1987

Customer	Percent of NTIS sales, fiscal year 1987
U.S. business	64
Foreign (business and government)	20
U.S. Federal and State government	6
Academic researchers/institutions and public libraries	6
General public	4
Total	100

SOURCE: National Technical Information Service, 1988

to direct electronic dissemination of documents and derived products (e.g., indices, abstracts, searches) are perceived by NTIS as meeting resistance from the information industry. The record of debate over NTIS privatization suggests a basis for this concern, although the views of industry are varied and complex. As a matter of practice, NTIS depends on the private sector for dissemination of online products (such as the NTIS Bibliographic Database available via DIALOG, BRS, and the like). NTIS estimates that private sector revenues derived from adding value to or re-marketing NTIS products totals about \$11-12 million annually. NTIS reliance on the private sector for electronic and/or enhanced dissemination has had the perhaps unintended effect of discouraging NTIS from aggressively pursuing how electronic technology might improve even the NTIS core archival and clearinghouse functions. Improvements here could benefit both NTIS customers served directly by NTIS and those served indirectly via private sector vendors.

There is also an equity issue involved concerning access to the online NTIS Bibliographic Database and other online products. Some customers, and especially small businesses, independent researchers, and the general public, may not be able to afford the commercial rates (which can typically range from \$50 per online hour and up). Since online searching of the NTIS database offers significant advantages, these customers could be disadvantaged in terms of their ability to effectively access and retrieve Federally funded scientific and technical reports.

In sum, NTIS presently operates in a constrained environment, characterized by ambivalent support from the government, limited financial resources (no public appropriation for the core clearinghouse and archival operations), mixed support from the information industry, limited technical resources, and a difficult product mix (many low volume items). In addition, the basic demand for NTIS products appears to be significantly eroding, thereby placing in considerable jeopardy the overall viability of NTIS as it is presently operating. At the same time,

most NTIS users and client agencies believe in the NTIS concept and seek to find ways to strengthen NTIS or at least the core NTIS functions as a continuing element of the Federal Government.

The record of the NTIS privatization debate provides ample evidence of support for the NTIS concept. For example, in response to an April 1986 request for public comment,¹ NTIS received 138 written responses from executive agencies, the legislative branch, the information industry, and individuals or organizations that used NTIS.² Review of the responses, by NTIS³ and OTA, indicates that:

- The NTIS user community overwhelmingly opposed privatization, supported NTIS as a government entity, and testified to the importance of scientific and technical information available from NTIS. The user community was heavily represented by library associations and individual university, public, and technical libraries.
- The Federal agencies which supply the source documents to NTIS opposed privatization, cited numerous problems that could or would result if NTIS were not a government entity, and emphasized their reliance on NTIS clearinghouse and archival functions.
- The information industry and individual company representatives overwhelmingly opposed privatization of the core NTIS functions on the grounds that these functions were not appropriate for the private sector and/or would create unfair competitive conditions. However, industry and company representatives strongly favored privatization of various dissemination and value-added functions.

¹U.S. Department of Commerce, "Study of Alternatives for Privatizing the National Technical Information Service", Notice and request for public comment, *Federal Register*, vol. 51, No. 81, Apr. 28, 1986, pp. 15868-15870.

²U.S. Department of Commerce, NTIS *Privatization Study Responses to April 28, 1986 Federal Register Notice Request for Public Comment*, PB86-21 1240, National Technical Information Service, Springfield, Virginia, June 1986.

³U.S. Department of Commerce, National Technical Information Service, "Analysis of Comments to Federal Register Notice", prepared by NTIS staff, 1986.

These general positions were reaffirmed at congressional hearings held in July 1987 and February 1988 by the House Committee on Science, Space, and Technology, Subcommittee on Science, Research, and Technology. At the latter hearing, the Subcommittee chairman released a letter from the Information Industry Association stating its position that "the Administration's proposal to privatize NTIS is not in the public interest in that it will ultimately reduce the availability of Federally funded scientific and technical information.

Overall, the years-long debate over privatization of NTIS has further constrained the ability of NTIS to take initiatives, and has diverted substantial NTIS and Department of Commerce resources (primarily staff time and attention). Members of Congress and public witnesses have criticized the Administration for prolonging the debate when congressional sentiment against privatization is clear. In a February 23, 1988 letter, the Chairman and Ranking Minority Members of the House Committee on Science, Space, and Technology and Senate Committee on Commerce, Science, and Transportation wrote the Secretary of Commerce and requested delay in the privatization of NTIS activities until Congress completed legislative actions

⁴Letter to Hon. Doug Walgren, Chairman, Subcommittee on Science, Research, and Technology, House Committee on Science, Space, and Technology, from Kenneth E. Allen, Senior Vice President, Information Industry Association, Feb. 12, 1988.

⁵Letter to Hon. C. William Verity, Secretary of Commerce, from Hon. Ernest F. Hollings, John C. Danforth, Robert A. Roe, and Manuel Lujan, Jr., U.S. Congress, Feb. 23, 1988.

In a March 3, 1988 letter, the Chairman of the Subcommittee on Science, Research, Technology, and Space sought the views of the Secretary of Commerce on legislation to establish a National Technical Information Corp. The Chairman advised that "[i]t is clear to me that privatization of NTIS will not occur in the near future . . . To engage in a protracted NTIS privatization argument would be less than productive. I would much prefer to look beyond the privatization controversy to implementing everyone's underlying goal of transforming NTIS into a modern, low-cost deliverer of scientific and technical documents."~ Congressional and agency officials, as well as public witnesses, have concluded that the drive for NTIS privatization was not based on a balanced analysis and finding of clear net benefits, and furthermore that the Administration did not have the capacity to successfully implement the NTIS privatization plans, even if thought to be desirable. (For further discussion, see chs. 11 and 12 on policy issues and implications.)

⁶Letter to Hon. C. William Verity, Secretary of Commerce, from Hon. Doug Walgren, Chairman, Subcommittee on Science, Research, and Technology, House Committee on Science, Space, and Technology, Mar. 3, 1988.

⁷See U.S. Congress, House Committee on Science, Space, and Technology, Subcommittee on Science, Research, and Technology, *National Technical Information Service*, Hearing, 100th Congress, 2nd Session, U.S. Government Printing Office, Washington, D. C., Feb. 24, 1988. Also see A.S. Levine, "Legal Financial Woes Hamper NTIS Plan", *Federal Computer Week*, May 2, 1988, pp. 15-16.

OPPORTUNITIES AND CHALLENGES

The major challenge facing NTIS is defining a viable role for its future. A variety of indicators strongly suggest that the current role *may* not be sustainable absent some significant changes.

Trends in Demand and Revenues

The starting point for this analysis is the historical trend in demand for (and sales of) the

major NTIS products and services. As shown in Table 5-3, NTIS appears to have had a healthy total revenue and cost performance in recent years, with net revenues realized in fiscal years 1981, 1983, 1984, 1986, and 1987, and net losses experienced in fiscal years 1982 and 1985. For the entire eight year period, NTIS realized net revenues of \$4.6 million or about 2.8 percent of total sales.

Table 5.3.—NTIS Revenues and Costs, Fiscal Years 1980-87

Fiscal year	Total revenues \$ millions	Total costs \$ millions	Net revenues or loss	
			\$ millions	Percent
1980	18.6	17.8	0.8	4.3
1981	21.3	18.6		12.7
1982	19.4	19.8	(:::) ^a	(2.1)
1983	21.4	20.4	1.0	4.7
1984	20.7	20.4		1.5
1985	21.3	22.1	(N)	(3.8)
1986	22.4	21.6	0.8	3.6
1987	22.3	22.1	0.2	0.9
Totals	167.4	162.8	4.6	2.8

^aParentheses indicate net loss

SOURCE National Technical Information Service, 1988

However, a detailed analysis by major NTIS product line reveals a much different picture. Sales of all major NTIS products have declined markedly since 1980, in most cases by about 50 percent. For example, sales of paper copies dropped from 752,000 copies in fiscal year 1980 to 393,000 copies in fiscal year 1987. Sales of microfiche copies declined from 155,000 copies in fiscal year 1980 to 67,000 in fiscal year 1987. This pattern is repeated throughout the NTIS product line, as shown in Table 5-4.

Overall, sales of the above seven major NTIS products collectively declined from about 3.69 million units (copies or subscriptions) in fiscal year 1980 to about 1.82 million units in fiscal year 1987, a net decline of 51 percent. A review of all other NTIS products indicated that sales increased only for CUFT publications, data tapes, and data diskettes, but these items account for a small percentage of total NTIS sales. Trends in these three items and for software tapes and catalogs (which declined) are shown in Table 5-5.

An obvious question is how could NTIS maintain a breakeven operation with slightly increased revenues (in current dollars) over the fiscal year 1980-87 period, given the large reduction in product sales? Part of the answer is that NTIS per unit prices increased significantly over this same period of time, and with net price increases that typically equalled or exceeded the rate of inflation. For example, while paper copy sales decreased by about 50 percent, the average per unit price for paper copies increased by 70 percent over the 1980-87 period while inflation averaged 45 percent. Thus, in the case of paper copies, net revenues actually increased despite the drop in demand. This general pattern holds for all of the major NTIS products, as illustrated in Table 5-6.

In addition to maintaining revenues through increased prices despite declining demand, NTIS augmented sales revenues through:

s services to other agencies (such as order billing and processing),

Table 5-4.—Demand for Selected Major NTIS Products, Fiscal Years 1980-87

Product	Demand by fiscal year								Net change	
	1980	1981	1982	1983	1984	1985	1986	1987	Number	Percent
	(On thousands of copies)									
Paper copy demand	752	676	550		493	457	451	393	-359	-48
Microfiche copy demand	155	154	134	120	121	101	85	67	-88	-57
	(in millions of copies)									
Selected research in microfiche (SRIM)	2.72	2.74	2.48	2.37	2.34	1.94	1.78	1.33	-1.39	-51
	(in thousands of subscriptions)									
Government research announcements and index	2.22	2.01	1.85	1.61	1.49	1.38	1.25	1.15	-1.97	-48
Annual index	0.91	0.84	0.96	0.82	0.73	0.63	0.61	0.50	-0.41	-41
Abstract newsletters	16.0	14.0	12.5	12.2	11.0	10.4	8.6	6.8	-9.2	-58
Published searches, ...	33.9	41.0	32.7	28.9	27.7	31.0	26.8	21.2	-12.7	-38

SOURCE National Technical Information Service, 1968.

Table 5-5.—Demand for Selected Minor NTIS Products, Fiscal Years 1983-87

Product	Demand by fiscal year (number of copies)					Net change	
	1983	1984	1985	1986	1987	Number	Percent
CUFT publications	NA	4,227	5,412	6,577	5,552	+ 1,325	+31
Software tapes	524	586	537	638	380	- 144	-28
Data tapes	1,405	1,783	2,174	2,493	2,503	+1,098	+78
Data diskettes	NA	NA	100	179	338	+238	+238
Software catalog	2,064	648	3,486	1,622	969	-1,095	-53

NOTE NA=not available

SOURCE National Technical Information Service, 1988

Table 5-6.—Average Per Unit Prices for Selected Major NTIS Products Compared to Inflation Rate, Fiscal Years 1980-87

Product	Fiscal year 1980 per unit price	Fiscal year 1987 per unit price	Net change		Inflation rate
			Dollars	Percent	
			Average price per copy		
Paper copies	\$16.50	\$27.87	\$11.37	+690/o	+450/0
Microfiche copies	3.50	6.50	3.00	+86	+45
Selected research in microfiche.	0,85	1.25	0.40	+47	+45
			Average price per subscription		
Government research announcements and index	\$275	\$379	\$104	+38V0	+450/0
Annual index	375	479	104	+28	+45
Abstract newsletters	62	89	27	+44	+45
Published searches	30	45	15	+50	+45

SOURCE National Technical Information Service, 1988

- sales of computer-related products (which have a high average per unit price, about \$67 per unit compared to \$28 for paper and \$6.50 for microfiche, as of fiscal year 1987) and
- NTIS brokerage fees on sales of other agency materials.

In fiscal year 1987 these three items together accounted for over a quarter of total NTIS revenues. The fiscal year 1986 and fiscal year 1987 revenue breakouts are shown in Table 5-7.

The comparison between fiscal year 1986 and fiscal year 1987 revenue data shows how NTIS has offset revenue decreases in full text reports and subscription, bibliographic, and announcement products with revenue increases in computer products and services to other agencies.

Whether and how long NTIS can be expected to remain viable operating on this basis requires examination. One risk is that continued reductions in the sales volume of reports, subscriptions, bibliographies, and the like could

Table 5-7.—NTIS Revenues by Product Group, Fiscal Years 1986-87 (in thousands of dollars)

Product group	Fiscal year 1986		Fiscal year 1987		Net change	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Full text reports	11,195	50.0	10,403	46.6	- 792	-7.1
Subscription, bibliographic, and announcement products	6,100	27.3	5,429	24.3	-671	- 11.0
Computer products	1,416	6.3	2,167	9.7	+ 751	+53.0
Services to other agencies	1,811	8.1	2,451	11.0	+640	+35.0
Patent licensing fees	617	2.8	575	2.6	-42	-6.8
Brokerage fees	1,095	4.9	1,220	5.5	+ 125	+ 11.4
Other	147	0.7	102	0.5	-45	-30.6
Totals	22,381	100.1	22,347	100.2		

SOURCE National Technical Information Service, 1988

necessitate further price increases, which could, in turn, further reduce sales, and so on. The elasticity of demand for NTIS products is not precisely known. NTIS staff believe that increasing price is one significant factor contributing to the decline in sales. For example, various library officials observe that rising NTIS prices have been a major factor contributing to reductions in NTIS subscriptions, especially as libraries are faced with increasingly tight budgets. This view is supported to some extent by results of the GAO survey of Federal agencies. Of the 114 civilian departmental components responding, 40 agency components evaluated the cost of NTIS reports in paper format and 27 evaluated the cost of microfiche format. Two-thirds of the agencies evaluated the costs for paper as high or very high, while two-thirds evaluated microfiche cost as moderate or low, as indicated in Table 5-8.

NTIS staff believe that online searching of the NTIS bibliographic database may also be contributing to a reduction in the number of requests for reports. The NTIS index products offered directly in paper or microfiche form and in electronic form via private sector vendors may well be improving the efficiency of customer searches of the NTIS archives, while at the same time may be undercutting sales of NTIS documents. The effects of online searching on overall NTIS demand are debatable. The experience with other online bibliographic databases has tended to be just the opposite; online searching has facilitated more awareness of and requests for the referenced documents. This subject warrants further research

Table 5-8.—Federal Agency Evaluation of the Cost of NTIS Reports, Paper and Microfiche Formats, 114 Agency Components Responding

Cost of NTIS report	Percent of agencies using NTIS	
	Paper	Microfiche
Very high	22.5	
High	45.0	2.0
Moderate	27.5	63.0
Low	2.5	7.4
Very low	2.5	—

SOURCE: GAO Survey of Federal Agencies, 1987.

by NTIS and the library and information science community.

Other contributing factors include declining agency participation in the NTIS program and limited customer awareness of NTIS products. With respect to the former, NTIS reports that the number of new titles provided to NTIS by Federal agencies has declined by about 20 percent over the fiscal year 1983-87 period, as shown in Table 5-9. Assuming that NTIS was not receiving one-third of relevant agency materials in fiscal year 1983 (NTIS estimate), the fugitive document percentage would now be up to about 47 percent. In effect, this trend may compromise both the perceived and real utility of the NTIS archive. NTIS may now be receiving only about one-half of relevant agency documents.

This conclusion is qualitatively consistent with the results of the GAO survey of Federal agencies. Of the 72 civilian departmental agency components disseminating scientific and technical information, only one-half of the agencies responding use NTIS. Agencies appear to rely primarily on themselves for dissemination, secondarily on GPO, NTIS, and the Depository Library Program (DLP), and to an even lesser extent on the private sector. The results are presented in Table 5-10.

With respect to customer awareness of NTIS, NTIS has an ongoing series of activities to inform potential customers of NTIS services. However, the results of the GAO survey of

Table 5-9.—Trend in New Titles Received by NTIS, Fiscal Years 1983-87

Fiscal year	Titles received		Estimated percent of all relevant agency titles ^a
	Number	Percent change	
1983	79,471		67.0
1984	71,587		60.4
1985	70,211		59.3
1986	69,760		58.9
1987	62,856		53.0
Net change (1983-87)	-16,615	-20.9	-14.0

^aAssumes number of relevant agency titles remains constant at 119,000 per year.
SOURCE: National Technical Information Service and Office of Technology Assessment, 1988.

Table 5-10.—Federal Civilian Agency Dissemination of Scientific and Technical Information

Dissemination channel	Percent of agencies ^a
Own agency	93.1
Government Printing Office	52.7
National Technical Information Service	50.0
Depository libraries	50.0
Private sector vendors/contractors	36.1
Consumer Information Center	4.2

^aExpressed as percentage of agencies that disseminate STI that use each channel.

SOURCE: GAO Survey of Federal Agencies, 1987 and Office of Technology Assessment, 1988.

Federal information users suggest that, overall, NTIS plays a rather limited role relative to other direct and indirect sources of Federal information. Among other groups, GAO surveyed a random sample of scientific and technical associations. Based on the responses of 133 associations (out of 250 sampled), NTIS is used by about one-third. Individual Federal agencies are used occasionally to very often, as are newspapers, news magazines, newsletters, and trade, professional, and scientific journals. Compared to other governmentwide information dissemination mechanisms, NTIS is used more often than the Consumer Information Center (CIC) or DLP, but less often than GPO mail/telephone orders. While associations are perhaps not the best indicator of NTIS customer awareness, science, environment, and technology were the most frequently cited categories of Federal information used by the respondents. The relative ranking of Federal information sources for these associations is shown in Table 5-11.

The relatively low use of NTIS may reflect a combination of low demand for NTIS products, low awareness of NTIS products, and/or, as mentioned earlier, high cost of NTIS products. In addition, OTA's independent consultant on university use of scientific and technical information concluded that NTIS is not viewed as a source of state-of-the-art information, due to the time delays between the existence of a document and its availability via NTIS. On the other hand, the role of NTIS as a secondary source of scientific and technical

Table 5.11.—Scientific and Technical Association Use of Federal Information Sources, Rank Order

Source of Federal information	Percent of associations responding that the source is used ^b
1. Trade, professional, or scientific journals	88.9
2. Newsletters	82.9
3. Newspapers	71.9
4. News magazines	68.9
5. <i>Individual Federal Agencies</i>	64.1
6. Radio/television	53.8
7. <i>Congressional agency</i> (LOC, GAO, OTA, CBO, CRS)	50.8
8. College/university library	45.8
9. <i>GPO mail/telephone orders</i>	44.4
10. <i>Office of U.S. Senator or Representative</i>	43.2
11. State or local government agency	42.6
12. Inhouse library or information center	39.5
13. Commercial bookstore	38.7
14. <i>Congressional committee</i>	37.7
15. Local public library	37.5
16. Commercial mail/telephone orders	35.8
17. <i>NTIS</i>	30.6
18. <i>Federal agency library</i>	25.2
19. Commercial online database vendor	24.8
20. <i>GPO bookstore</i>	23.7
21. <i>GPO depository library</i>	19.8
22. Commercial information brokers	15.4
23. <i>Consumer Information Center</i>	12.1
24. State agency library	11.2
25. State government library	7.8
26. Local school (Grades 1-12) library	1.7

^aFederal sources are italicized.

^bAgencies reporting that a source of Federal information is used occasionally, often, or very often.

SOURCE: GAO Survey of Federal Information Users 1988.

documents is appreciated, especially in the library community and among university researchers.^a

^aMark P. Haselkorn, Philip L. Bereano, Carolyn Plumb, and Patricia Tetlin, "Perspectives on Federal Dissemination of Scientific and Technical Information", OTA contractor report prepared by the program in Scientific and Technical Communication, School of Engineering, University of Washington, Seattle, February 1988. Also see Charles R. McClure, Peter Herson, and Gary R. Purcell, *Linking the U.S. National Technical Information Service With Academic and Public Libraries*, (Norwood, NJ: Ablex Publishing, 1986); and Peter Herson and Charles R. McClure, *Federal Information Policies in the 1980s: Conflicts and Issues*, (Norwood, NJ, Ablex Publishing, 1987).

Possible New Initiatives

The nature of demand for NTIS documents makes NTIS highly suitable for application of electronic publishing and printing-on-demand systems. As noted earlier, the average demand for NTIS documents is 10 copies, and perhaps one-quarter of the documents never sell a single copy. As an illustration, for all documents archived by NTIS in calendar year 1986, there was no demand for 43 percent, only 5 percent sold more than 10 copies, and only 1 percent sold more than 50 copies. The detailed demand distribution is shown in Table 5-12.

In addition to very low total demand for most NTIS documents, demand for a given document can be spread over many years. For example, of the average sales of 10 copies per document, only 3 copies might be sold in the first year after announcement, 2 copies in the second year, 4 copies spread over the third through tenth years after announcement, and the last copy might be sold 11 to 15 years or more after being made available. This phenomenon is known as the demand decay curve, and is illustrated in Table 5-13 for NTIS documents sold during calendar year 1986.

This highlights the NTIS dilemma: low sales volume spread over many years, but a document that sells only a single copy could contribute to significant innovations. While NTIS is able to identify documents that are relevant to current technical issues and research and development priorities, it is difficult to predict which documents will have high demand and virtually impossible to predict which documents will con-

Table 5.12.—Demand for NTIS Documents Announced in Calendar Year 1986

Level of demand (total annual)	Number of documents (per demand level)	Percent of total documents announced
No demand	28,364	43
1 copy	10,906	17
2-5 copies	16,853	26
6-10	5,597	9
11-20	2,228	3
21-50	967	1
51 +	379	1
Totals	65,294	100

SOURCE National Technical Information Service, 1986

Table 5-13.—Age of NTIS Documents Sold in Calendar Year 1986

Date of document	Copies sold	Percent of total
1968 and prior.	7,730	1.9
1969	1,412	0.3
1970	1,931	0.5
1971	2,489	0.6
1972	3,744	0.9
1973	4,346	1.1
1974	4,278	1.0
1975	4,942	1.2
1976	7,282	1.8
1977	8,117	2.0
1978	8,660	2.1
1979	9,571	2.3
1980	10,446	2.5
1981	14,799	3.6
1982	15,615	3.8
1983	24,318	5.9
1984	30,448	7.4
1985	72,149	17.6
1986	138,431	33.7
Pre-announcement demand ^a	2,854	0.7
Announcement date unknown ^b	37,423	9.1
Total	410,985	100.0

^aPre-announcement demand Announcement date of 1987, orders were received in FY 1986 due to source pre-announcement, etc., and NTIS was able to fill the request.

^bAnnouncement Date Unknown Announcement date is not included in NTIS inventory file

SOURCE National Technical Information Service, 1988

tribute to a major scientific or technical breakthrough. This is the primary rationale for the NTIS archive, and underpins the need to maintain NTIS documents on file indefinitely.

Fortunately, technological advances have created several possibilities that appear to be ideally suited to the nature of NTIS demand. First, most federally-sponsored or conducted scientific and technical reports are created on word processing or microcomputer-based systems. Thus, the keystrokes are captured electronically. The electronic versions of these reports are typically converted to paper (or microfiche) format by the originating agency (or the agency contractor) and submitted to NTIS as paper (or microfiche) copies. NTIS then disseminates copies in paper (or microfiche) in response to requests. About 80 percent of the NTIS reports are disseminated in paper format and the remaining 20 percent in microfiche. Because demand is low, and typically for

one copy at a time, the per unit costs are high—averaging \$25-30 per paper copy.

If NTIS could receive agency reports in electronic format, using compatible document description standards, then NTIS could apply electronic publishing and printing-on-demand technology where appropriate. For example, NTIS could develop and implement a version of the Electronic Document System similar to that being developed by DTIC. Documents could enter NTIS either indirect electronic format (by magnetic computer tape, floppy disk, or electronic transmission, similar to GPO receipt of publications material) or by scanning paper copies. DTIC envisions the use of high-speed, high-resolution optical scanning equipment that will compete favorably with the current microfiche system used by DTIC. However, direct electronic input should be less expensive than scanning for new input, at least for NTIS purposes. Scanning may, however, be the only option for converting old material. DTIC also envisions using high capacity, low cost per bit digital storage systems such as those using laser optical disks. High capacity WORM (Write Once, Read Manytimes) optical disk juke boxes should be applicable to both DTIC and NTIS. The 12-inch disks can store about one gigabyte of information per side, or roughly 400,000 to 500,000 pages of double-spaced typed material per side. This means that, assuming straight digitized text only and an average length of 200 double-spaced pages per document, the roughly 70,000 new documents received by NTIS each year could be stored on about 14 doublesided WORM optical disks.~j

For output, DTIC plans to use high-speed, high resolution electronic printing equipment for producing paper documents on demand. Documents will be printed double-sided using plain bond paper to reduce paper and mailing costs. The reproduction cost should drop by an order of magnitude. The fully developed Electronic Document System permits the re-

^{70K documents x 200 pages per document = 14 million pages divided by 1 million pages per double-sided 12-inch WORM disk.}

production of full copies, and facilitates printing-on-demand of selected pages, since the text of documents stored on the system could be made available for electronic display at remote terminals. DTIC plans to use a standard structured database approach known as Standardized General Markup Language (SGML) to facilitate electronic document reproduction on a fast turnaround basis.

DTIC intends to continue its present microfiche-based production system in parallel with the Electronic Document System. However, as new documents are added in electronic format, the use of microfiche is expected to decline substantially. DTIC estimates that the electronic system will fill about 40 to 45 percent of paper copy requests after one year of operation, and about 60 to 70 percent of such requests after 3 years of operation. Should NTIS implement a similar system, NTIS could expect comparable results, with an estimated 35 percent of requests handled with electronic printing on demand after the first year, 60 percent of requests after 3 years, and perhaps 75 percent of requests after 5 years. These estimates assume that the NTIS backfiles (archival documents entered in earlier years) would be retained in microfiche, since demand is so low and the cost of conversion may not be justified.

Should NTIS implement its version of an Electronic Document System, NTIS would be positioned to offer search and retrieval capability, directly and/or via private vendors or other government agencies. Such software could build on the results, as they become available, of DTIC'S Artificial Intelligence/Decision Support Laboratory. Another prototype is "Grateful Meal," bibliographic search software developed by the National Library of Medicine for users of the MEDLARS database.

An NTIS Electronic Document System, if properly interfaced with the source agencies, should be able to substantially reduce the time lag between the existence of a document and its availability via NTIS. The time lag could be further reduced if interagency procedures are strengthened so that agencies are required

to make more timely submissions to NTIS. Strengthening of such procedures could also address the question of how to increase the completeness of the NTIS archive. As noted earlier, perhaps one half of the scientific and technical reports generated by or for Federal agencies are not submitted to NTIS. While all the fugitive documents may not be relevant, it is likely that a significant portion of these are. Agencies could be required to provide more complete submissions and/or follow a specified set of procedures for determining what items should be submitted.

An electronic NTIS with a more complete and up-to-date archive would open up a wide range of possibilities for marketing and dissemination of scientific and technical information. The following illustrative activities could be implemented by NTIS, individual Federal science agencies, and/or private vendor:

- CD-ROM distribution of NTIS bibliographic database on selected subjects;
- CD-ROM distribution of NTIS documents on selected subjects;
- Floppy disk distribution of individual NTIS reports;
- Online distribution of selected NTIS documents with printing-on-demand of the entire document or selected pages at NTIS or remote locations;
- Electronic bulletin board announcement of selected new NTIS documents of general interest; and
- Electronic bulletin board announcement of NTIS documents on subject matter matched to the bulletin board participants.

In essence, an electronic NTIS would have the capability to produce multi-format output—paper, microfiche, offline electronic, or online electronic as appropriate, depending on the type of product and user needs. As noted earlier, the GAO survey results highlighted the significant anticipated increase over the next three years in demand for scientific and technical information in electronic formats on the part of libraries and scientific and technical

associations. Demand for paper and microfiche is anticipated to decrease moderately over the next three years.

Overall, an electronic NTIS should be able to greatly increase the diversity and timeliness of NTIS (and related private vendor) offerings, increase the ability of NTIS (and private vendors) to match information products with potential users, and reduce the cost of NTIS (and private vendor) products. An electronic NTIS also should be better able to serve, especially, small and medium businesses and individual researchers who tend to be penalized by the present paper-based system that assigns a premium to economies of scale. Understandably, NTIS directs much of its marketing efforts at its largest customers who generate the most sales, but who also are typically well staffed with information specialists. An electronic NTIS would increase the incentives and available options to reach smaller market segments from whence many innovations ultimately originate. It is certainly conceivable that NTIS could eventually be used by the individual researcher and entrepreneur who depend heavily on informal and collegial networks for the sharing of scientific and technical information. Also, NTIS would be a logical key participant in the development of a governmentwide information index, for which respondents to the GAO survey of Federal information users indicated strong interest. Such an index would also help improve the ability of researchers and entrepreneurs to know of potentially relevant information. Finally, as a complement to the electronic document system and improved indexing, increased agency participation in the NTIS clearinghouse may need to be mandated. The declining trend in the percentage of agency scientific and technical documents submitted is cause for concern. While including 100 percent of agency documents in NTIS is unrealistic, some steps could be taken to broaden the coverage and increase the timeliness of agency submissions. This could be accomplished through inter-agency agreements, OMB circulars, and/or, if necessary, legislation.

NTIS/SUPDOCS COOPERATION

The consolidation of NTIS with GPO's SupDocs has been proposed by the Public Printer and as part of legislation introduced in the past two Congresses that would establish a Government Information Office. However, this section focuses on opportunities for improved cooperation between NTIS and SupDocs, irrespective of the formal institutional structure, since the need for improvements in NTIS/SupDocs marketing, product line analyses, and coordination will exist regardless of the institutional structure. (See chs. 11 and 12 for further discussion of institutional alternatives.)

The major reasons advanced for improved NTIS/SupDocs cooperation (whether or not through formal consolidation) are: efficiencies in management and operations, improved coordination of Federal information dissemination, enhanced opportunities for use of new technology, strengthened joint marketing programs, reduced overlap and duplication in government dissemination activities, and improved overall public access to Federal information. Possible drawbacks of or barriers to improved cooperation include: some differences in current missions of the NTIS and SupDocs and resultant potential problems in more closely coordinating these functions, difficulties inherent in cooperative activities of agencies from different branches of government, and reluctance on the part of some Federal agencies to cooperate with NTIS and/or SupDocs, regardless of the institutional structure.

Differences and Similarities

The major differences between NTIS and SupDocs are that:

- NTIS is in the executive branch while SupDocs is in the legislative branch;
- NTIS maintains a permanent archive of scientific and technical documents totalling close to 2 million items, while GPO maintains documents in inventory only

while in stock or if reprinted (usually due to strong demand);

- NTIS has 2 million document titles for sale whereas the average SupDocs sales inventory is about 20,000 or about one percent of the NTIS inventory;
- the average NTIS sales volume is about 10 copies per title whereas the SupDocS average is on the order of 2,000 copies per title;
- NTIS retains all titles received in the NTIS archive and available for sale, while SUPDocS for the most part includes only the titles judged to have significant sales potential;
- the NTIS annual sales volume is in the few millions range whereas the SupIXxx volume is in the few tens of millions range; and,
- NTIS is considerably smaller than SupDocs—at yearend fiscal year 1987, NTIS had 344 employees compared to 930 for SupDocs, NTIS had total revenues of about \$22 million in fiscal year 1987 compared to about \$100 million for SupDocs (figures include reimbursed services and services funded through appropriations).

At first glance, these differences could appear as, collectively, a significant barrier to improved cooperation. However these differences could become complementary aspects of a combined strateg~ for institutional sur~iva] and growth.

There are significant similarities between NTIS and SupDocs:

- Both must operate their sales programs on a breakeven basis, that is, there are no appropriations to subsidize the cost of sales.
- Both must compete with private vendors, who can always reprint and resell government documents since these materials cannot be copyrighted.
- Both must compete to some extent with

Federal mission agencies, who frequently distribute significant numbers of copies of documents free of charge to agency clients, contractors, and interest groups.

Both NTIS and SupDocs carry out marketing activities in support of their sales programs, although the programs have relative strengths and weaknesses:

- NTIS produces a variety of specialized subject matter searches that have no direct parallel at SupDocs.
- SupDocs makes growing use of radio and television public service announcements and is revitalizing the GPO bookstores as sales outlets, marketing tools not used by NTIS.

NTIS and SupDocs perform reimbursable services for other agencies:

- In fiscal year 1987, NTIS performed about \$2.5 million worth of services for other agencies (accounting for roughly 10 percent of total revenues).
- In fiscal year 1987, SupDocs performed about \$5 million in reimbursable services, primarily for operating the CIC for GSA (accounting for about 5 percent of total SupDocs revenues).
- If the DLP, also operated by SupDocs, is counted as a reimbursable service funded through appropriations, then reimbursable services would be about 25 percent of total SupDocs revenues.

The similarities go on. Both NTIS and SupDocs prepare indices or catalogs to government documents. NTIS publishes a weekly and annual *Government Reports Announcement and Index Journal* (known as GRA&I) that includes summaries of government conducted or sponsored research reports. The summaries are indexed by subject, author, institution, and contract number (if applicable). NTIS also prepares the NTIS Bibliographic Database that includes all items in the NTIS archive. In addition to government conducted or sponsored reports, the NTIS Database includes federally-generated machine readable data files and software, U.S. Government inventions available

for licensing, and foreign government reports exchanged with Federal agencies and any federally-generated translations thereof. The NTIS database is updated biweekly and, is available online through commercial vendors.

SupDocs prepares:

- the *Monthly Catalog of United States Government Publications* (which indexes publications by author, title, subject, series/report number, contract number, stock number, and title keyword);
- the 3 times a year *Consumer Information Catalog* (which lists consumer publications from about 30 Federal agencies that are available free or at minimal charge from CIC);
- the quarterly *Government Peri&"cals and Subscription Serw"ces* (which lists over 500 subscriptions to periodicals and recurring reports published by more than 40 Federal agencies and sold by SupDocs);
- the 3 times a year *U.S. Government Books* (which catalogs about 1,000 of SupDocs best-selling publications); and
- the bimonthly *New Books* (which lists new SupDocs wd-es items).

Information on SupDocs sales items, bibliographies, and catalogs is available from private vendors, in both online and CD-ROM formats. For example, the GPO Sales Publications Reference File, which lists all GPO titles currently for sale, is available online to the public via the commercial DIALOG information retrieval service and includes an online ordering capability.

Both NTIS and SupDocs primarily use paper and microfiche formats for dissemination, although NTIS sales of computer tapes, floppy disks, and software have been growing, as have GPO sales of computer tapes. Both NTIS and SupDocs have international exchange programs to encourage the two-way flow of information between the U.S. and other countries. Finally, it bears emphasis that, except for the type of bibliographic and index products mentioned earlier, both NTIS and SupDocs depend on the Federal mission agencies as the primary

source of documents. The agencies (including Congress for SupDocs purposes) create the documents and in many cases handle primary distribution; NTIS and SupDocs as government-wide information dissemination mechanisms are responsible for, in effect, secondary distribution through their sales programs (and through the DLP and CIC in the case of SupDocs). Private vendors also serve as secondary distributors of selected agency documents.

Disadvantages and Advantages

The possible disadvantages of improved NTIS/SupDocs cooperation are erosion of the NTIS archive function and aggravation of separation of powers concerns. Representatives of the scientific and technical community as well as the Federal science agencies believe that the NTIS archive or something equivalent is essential to the U.S. research and development effort and to basic science and technical innovation. From this perspective, cooperative initiatives would have to be designed so as to ensure continuity of the archive. If the DLP is viewed as part of SupDocs, then SupDocs does already have an archive function, since the regional depository libraries maintain a complete archive of all government publications distributed to them, 60 percent of which in recent years are in microfiche format. Also, either microfiche masters or camera ready copy existed at some previous point in time for most of these materials. However, retention of these originals is incomplete, and neither the originals nor the regional depository library archives are available as part of a coordinated sales program. The SupDoc's Library Programs Service does maintain a collection of microfiche masters procured for the DLP, and plans to eventually transfer this collection to the National Archives and Records Administration (NARA). Copies of some of these items are available for sale on demand. It also should be noted that NTIS has submitted to NARA a plan that provides for transferring NTIS master microforms to NARA when records are 10 years old.

The actual current overlap between the NTIS archive and the SupDocs sales program is

thought to be small; the overlap between the NTIS archive and the regional library archives is unknown (as the libraries do receive some NTIS publications).

Another possible disadvantage is aggravation of separation of powers concerns, since NTIS is in the executive branch and SupDocs in the legislative. Some Federal executive branch agencies do not like the current roles of GPO and the Joint Committee on Printing (JCP) (as authorized by Title 44 of the U.S. Code) with respect to agency printing and publishing activities, view those roles as inappropriate and/or unconstitutional (see ch. 11), and oppose any greater role for them. Regardless of the merits or demerits of these concerns, the role of SupDocs has not been the primary focus of attention or challenge. In fact, some NTIS officials believe that NTIS is handicapped because, while Federal agencies are required to participate in the SupDocs sales program, agency participation in the NTIS archive is voluntary and not required by statute. SupDocs seems to be able to work effectively with many executive branch agencies, even though SupDocs is in the legislative branch. Nonetheless, improved NTIS/SupDocs cooperation and especially a consolidation is viewed by some Commerce Department and OMB officials as possibly aggravating conflicts over separation of powers, but more importantly, from their perspective, further distancing the creators of the information (the executive agencies) from the disseminators. In this view, the decentralizing tendencies of electronic technologies should be encouraged by placing information dissemination as close as possible to the ultimate users of the information. The strengthening of centralized dissemination mechanisms (whether SupDocs, NTIS, or even governmentwide indices) seems to be feared and resisted, even if centralized dissemination would not preempt agency dissemination.

It seems plausible that strengthened NTIS-SupDocs cooperation would lead to improvements in indexing, marketing, and international exchange. Perhaps most important, however, is the potential improvement in overall

strategic posture that could result from improved cooperation. As presented earlier in detail, NTIS is in a very vulnerable situation. In contrast, SupDocs has maintained better than breakeven operations in recent years, with net income of \$11.4 million in fiscal year 1987 and \$5.5 million in fiscal year 1986. However, while in a strong position compared to NTIS, SupDocs has some emerging areas of vulnerability that could become significant in a rather short period of time.

Like NTIS, SupDocs could be vulnerable to electronic competition. For example, one of SupDocs largest revenue sources is the *Commerce Business Daily (CBD)*, with subscriptions generating more than \$9 million in SupDocs revenue, or about 12 percent of total sales revenue in fiscal year 1987. However, the results of private sector marketing of the CBD online or on CD-ROM suggests that electronic formats may be preferable for many C13D customers. If the demand for paper copies declined dramatically over the next few years, it is conceivable that the Department of Commerce might stop funding the set-up charges for printing paper copies. While SupDocs presumably could continue to print the CBD itself, the cost would increase significantly, since SupDocs now pays only the marginal printing cost, but would have to pay the full printing cost if the Department of Commerce ceased participation. This could put SupDocs in the position of raising prices for paper copies of a product (the C13D) that clearly is well suited to electronic formats, especially online. If the NTIS experience is any guide, higher prices could further reduce sales and encourage more

users to switch to electronic formats, which in turn could lead to yet another price increase for paper copies to cover fixed costs with a smaller sales volume. According to GPO, under current law, if the Department of Commerce stopped printing the *CBD*, there would be no printing requisition for SupDocs to “ride” (order extra copies) and thus no “additional copies” for SupDocs to sell.

Other SupDocs best sellers that might be vulnerable include (with fiscal year 1987 revenues indicated): the *Code of Federal Regulations* (\$2 million), *Federal Acquisition Regulations* (\$1.9 million), *Tariff Schedules Annotated* (\$0.9 million), and *DoD FAR Supplement* (\$0.9 million).

At the moment, SupDocs sales volume and total distribution appear to be holding reasonably steady. Most indicators declined in the early 1980s, but have since been relatively level. Trends for fiscal years 1981-87 are shown in Table 5-14 for SupDocs sales orders, copies sold, CIC free orders, CIC copies distributed, and depository library copies distributed.

A detailed analysis of the SupDocs product line is warranted to determine if significant vulnerability extends beyond items such as the *CBD* and, as discussed in chapter 4, the *Record and Register*, that are well suited to electronic formats. Overall, SupDocs would appear to be in a stronger position than NTIS, since many of the traditional government reports and periodicals sold or distributed by SupDocs are likely to be best suited to paper formats for years to come. Also, SupDocs has potential opportunities in other areas, such as sales of government forms. For example, in fiscal

Table 5-14.—SupDocs Sales and Distribution Activity, Fiscal Years 1981-87

	Millions of orders or copies						
	Fiscal year 1981	Fiscal year 1982	Fiscal year 1983	Fiscal year 1984	Fiscal year 1985	Fiscal year 1986	Fiscal year 1987a
Sales orders ^b	2.0	1.5	1.3	1.5	1.5	1.5	1.6
Free CIC orders	3.9	2.4	2.3	2.2	2.1	2.6	2.2
Copies sold ^b	29.8	25.9	24.5	24.8	26.7	27.1	26.7
Free CIC copies distributed	NA	25.7	23.0	14.7	21.9	19.2	21.5
Depository library copies distributed	28.7	20.7	31.9	37.1	36.1	26.7	22.7

^aEstimates.

^bIncludes CIC sales

SOURCE U.S. Government Printing Office, 1988.

year 1987, SupDocs sold IRS forms to tax practitioners. About 80,000 orders were processed, yielding a gross revenue of \$2.8 million and net revenue of \$1.5 million. Nonetheless, given the strong commitment of many Federal agencies to shift to electronic formats over the next few years, especially for statistical, scientific and technical, and administrative documents, the SupDocs sales and distribution outlook bears continuous scrutiny.

NTIS-SupDocs cooperation could be especially synergistic with regard to low-demand items. At present, the NTIS product sales line is dominated by low demand documents, but NTIS does not have the resources or mechanism to invest in the electronic technology best suited to low demand dissemination. On the other hand, the SupDocs product sales line is almost devoid of low demand items, yet SupDocs does have access to the GPO revolving fund for capital investment in electronic technology (subject, of course, to approval of the Public Printer and JCP and to overall GPO funding constraints). An NTIS-SupDocs cooperative initiative could design an Electronic Document System (similar to the DTIC prototype) that would meet NTIS needs plus a broadening of the SupDocs product line to include selected low demand items.

The economics of electronic printing-on-demand for low volume documents are quite simple. Many of the cost elements in conventional printing are essentially fixed, and are not affected by the number of copies printed, as shown in Table 5-15.

Thus most costs are independent of the size of the press run, and reducing the length of the press run increases the per unit printing cost, all other things being equal. Electronic printing eliminates most of the prepress functions, although the cost of toner (e.g., for laser printers) is higher per page than the cost of printing ink. Electronic printing is generally less expensive per page at volumes of tens to a few hundred. In addition, electronic printing facilitates electronic linkages between the document database and user terminals for on-

Table 5-15.—Conventional Printing Functions Affected by Length of Press Run

Function	Affected by length of press run
Composition	No
Camera	No
Platemaking	No
Film	No
Plates	No
Press makeready	No
Press running	Yes
Bindery set-up	No
Bindery running	Yes
Paper	Yes
Ink	Yes

SOURCE F J R;mano, 1988

line searching and printing-on-demand of selected pages.

Electronic printing provides cost-effective multiformat output capability and is especially suited to low-volume, shorter, and simpler documents with straight text or text and tables and a minimum of photographs and complex line art (high-end systems can handle photos and art work, although at higher cost). Best estimates suggest that over half of the documents printed by GPO, and about 90 percent of the documents printed by other agencies, are 100 pages in length or less. Estimates also indicate that about 90 percent of all material is straight text (80 percent) and tables (10 percent). The detailed breakout is shown in Table 5-16.

Table 5-16.—Estimated Page Length and Content of Government Documents

	GPO	Other Government	Overall average
Page length			
10 pages or less	9 ^a /0	13 ^b /0	110/0
~1-50 pages	23	30	26
51-10() pages	25	37	31
101-250 pages	20	10	15
251-499 pages	15		10
500 pages or more	8	:	7
Page content			
Text			79.30/0
Tables			11.8
Line art			4.8
Photographs			4.1

SOURCE GPO and F J Romano 1988

In sum, many government documents are suitable for electronic printing if the demand is low. Clearly many NTIS document sales items meet this criterion. At present, few SupDocs sales items meet this criterion, since average sales volume is about 2,000 copies (and the average GPO press run is 3,000 to 4,000 copies). However, a significant number of government documents not presently included in the GPO sales program may be viable on an electronic printing-on-demand basis. The combined NTIS and SupDocs low-demand sales volume could help justify investment in the necessary equipment. An Electronic Document System could be funded out of the GPO revolving fund and charged back to SupDocs as depreciation, just like any other SupDocs capital investment. NTIS could reimburse SupDocs for a prorated portion of the capital investment, funded out of NTIS retained earnings (if authorized by Congress).

NTIS-SupDocs cooperation could also be synergistic with respect to sales of what NTIS calls computer products. As noted earlier, this has become a significant product line for NTIS, one of the few showing recent sales growth. However, it is likely that only a small fraction of agency computer products are included at the present time. SupDocs has initiated a re-

lated sales program that at present is limited to a few magnetic tapes. An expanded SupDocs program could start to duplicate NTIS. A single coordinated governmentwide sales mechanism presumably would be more efficient and easier for both the participating agencies and the customers. Many agencies would still be likely to distribute some computer products themselves. A coordinated and possibly even consolidated NTIS-SupDocs computer product line could also benefit from appropriate use of GPO bookstores, catalogs, and advertising, and would fit well with the concept of a governmentwide index to Federal information in all formats.

Another potential advantage of NTIS-SupDocs cooperation would be to improve coordination among all four of the governmentwide information dissemination mechanisms (SupDocs, NTIS, DLP, and CIC) and help insure that statutory requirements are fulfilled. It is also possible that improved cooperation would result in reduced total overhead and indirect labor, due to efficiencies in certain management and administrative functions. However, a full analysis would require more detailed information on NTIS and SupDocs cost and labor force structures.