

## Chapter 4

# Alternative Futures for the Government Printing Office



Clockwise from top left: a hot type scene at GPO, circa 1940s; GPO operator using electronic photocomposition equipment; GPO operators using keyboard input terminals; and the Congressional/ Record coming off the press (photo credit: U.S. Government Printing Office).

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# Alternative Futures for the Government Printing Office

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## SUMMARY

This chapter along with chapter 5 examines in detail selected alternatives for the future of the U.S. Government Printing Office (GPO) and National Technical Information Service (NTIS). Chapter 4 focuses on GPO, and chapter 5 on NTIS and NTIS/Superintendent of Documents (SupDocs) cooperation. The intent is to gain a full understanding of the strategic outlook for both GPO and NTIS as an input to congressional decisions on their future direction. This strategic outlook should be relevant to congressional consideration of any alternatives for GPO and NTIS, not just the ones explicitly discussed here, and should be read in the context of the trends discussed in chapters 2 and 3 of this report. The results of this strategic analysis are highlighted below. Policy implications are discussed in chapters 11 and 12.

First, General Accounting Office (GAO) surveys of Federal agencies (chapter 2) and Federal information users (this chapter), coupled with a review of agency automation plans and activities, suggest the following overall projections:

- c 1 to 3 years—steady state in demand for paper formats; rapid growth in electronic formats, but still a very small percentage of total demand;
- 3 to 5 years—demand for paper formats may start to decline; demand for electronic formats likely to reach critical thresholds for several types of Federal information;
- 5 to 10 years—demand for paper formats likely to decline markedly in some categories, but would still be significant for traditional government books, reports, and publications; electronic formats likely to dominate for many types of information.

On one hand, near-term (1-3 years) future demand for traditional GPO services is likely to be stable, absent a severe governmentwide fiscal crisis and assuming executive agencies continue to be required to obtain printing from or through GPO. GPO's greatest assets are its traditional ink-on-paper printing facilities and experienced labor force, coupled with a substantially automated prepress capability, including electronic input, photocomposition, and typesetting. GPO has invested heavily over the past decade in upgraded prepress, press, and bindery facilities. Despite the possibly misleading external appearance, the GPO main plant compares favorably with even the largest and best equipped commercial printing plants.

On the other hand, GPO is particularly vulnerable in the medium-term (3-5 years) to changes in demand for paper formats that might reduce executive agency need for GPO procured printing (which accounts for about three-quarters of GPO's total printing work) and for GPO main plant inplant printing (where the bulk of GPO overhead and labor costs are located). The future of GPO printing depends in large measure on the plans and activities of Department of Defense (DoD) agencies, that collectively account for roughly one-third of all GPO billings. The defense agencies are determined to reduce drastically their dependence on paper formats within the next few years. If traditional ink-on-paper defense work was phased out, almost all of the GPO regional and satellite procurement offices would lose at least half and some over 90 percent of their work, and two of the GPO regional printing plants would lose perhaps one-third to one-half of their work. Realistically, the defense conversion from paper to electronic for-

mats could take longer than planned, but warrants careful monitoring due to the highly leveraged effects on the GPO regional work load. The GPO main plant is not dependent on military work, but is vulnerable due to the combination of potential electronic competition for some major product lines (such as the *Congressional Record* and *Federal Register*) and a high overhead cost structure necessitated largely by GPO's current diversified responsibilities.

In the hypothetical case that GPO were to be limited to legislative branch printing (plus some key governmental process work such as the *Federal Register*, passports, and postal cards), the main plant printing operations would switch from a net surplus of several million dollars to a net loss of several tens of millions of dollars, assuming no changes in demand and overhead, cost, and labor force structure (other than those associated with transferring the GPO printing procurement program to an executive agency such as the General Services Administration (GSA)). Restoring GPO to breakeven operations under this scenario could necessitate up to a 40 percent reduction in the main plant labor force and/or a significant increase in rates.

GPO is faced with several challenges and opportunities concerning electronic publishing and dissemination of electronic formats. Federal executive agencies are rapidly increasing their automation activities, and have already invested, collectively, an estimated \$400 million in electronic publishing systems. GAO surveys found dramatic increases in the percentages of both agencies and information users that anticipate use of electronic formats (especially online data bases, electronic mail or bulb tin boards, floppy disks, and compact optical disks) over the next 3 years.

For the executive branch, several roles for GPO are emerging beyond the continued provision of traditional printing services. GPO could:

- continue to improve cost-effectiveness at the input and prepress end of the print-

ing process by encouraging electronic submissions, already at high levels, and dial-up composition services where appropriate;

- encourage adoption of governmentwide structured database standards for electronic (as well as conventional) printing;
- facilitate mechanisms for training and education about electronic publishing;
- establish an electronic publishing laboratory and innovation center, open to agency personnel; and/or
- increase SupDocs dissemination of electronic formats.

Up to now, GPO has participated in only a handful of agency automation programs. From a strategic perspective, GPO would benefit from staying abreast of agency applications and, thereby, be in a much better position to identify opportunities to meet agency needs. In a decentralized and competitive electronic information environment that increasingly characterizes the Federal Government, GPO will have to be innovative in matching its expertise to agency needs that are likely to vary widely and change at an increasingly rapid pace.

For the legislative branch, GPO already has a central role in many traditional publishing activities and several electronic publishing pilot projects. GPO could develop plans for an expanded role for congressional committees and offices, including electronic search, retrieval, and printing-on-demand of congressional documents. Any detailed planning would need to take into account the related roles of the Library of Congress and Congressional Research Service, House Information Systems Office, and Senate Computer Center.

With respect to GPO SupDocs sales of electronic formats, SupDocs would be operating in a more competitive environment than has traditionally been the case with respect to paper formats. For many types of Federal information, individual agencies and/or private vendors might decide to market electronic formats. SupDocs would need to decide which electronic items would be cost-effective and competitive if included in the sales program.

Three policy issues would need resolution.

- First is that significant SupDocs sales of magnetic tapes and floppy disks (and, potentially, CD-ROMs and electronic printing-on-demand) could overlap and duplicate the NTIS sales program, absent a consolidation of or close cooperation between NTIS and SupDocs.
- Second is that SupDocs sales of online databases could overlap and duplicate offerings by individual agencies, agency online gateways (such as the National Library of Medicine), and/or private (or non-profit) online gateways or database providers that include Federal agency databases, absent agency agreements. While multiple government sales outlets for the same tapes and disks may be cost-effective, given the small breakeven volumes, multiple government outlets for sales of online services may be hard to justify, considering the more substantial development, staff, and capital investment requirements.
- Third, sales of electronic formats could involve heavier demands for user support and generate the need for far more sophisticated and extensive customer service—from GPO, agencies, and/or vendors—than is expected for paper (or microfiche) formats.

GPO faces two major challenges with respect to staffing: retaining the necessary skilled labor force to maintain traditional printing services at a level commensurate with demand, and obtaining personnel with the new skills needed to implement GPO's future role in electronic publishing and electronic information dissemination,

however that role may be defined. With respect to capital investment, it would seem prudent for GPO to carefully reevaluate its capital investment plans in light of possible adjustments to traditional printing services and possible new electronic initiatives. Staffing and capital investment decisions are best made within an overall strategic framework for the future of GPO.

The discussion in this chapter focuses on technical, financial, organizational, labor, and demand questions and not on the broad policy issues addressed in chapters 11 and 12. The alternatives presented here assume that Congress would take whatever policy actions were necessary to implement the particular alternative. In other words, this chapter is intended to probe more deeply into several of the possible alternatives for GPO. Also, although the alternatives are framed in terms of GPO, the discussion applies equally regardless of the name, for example, Government Information Office or Government Publications Office.

The alternatives explored in this chapter are:

- Traditional GPO—centralized
- Traditional GPO—legislative branch only
- Electronic GPO—decentralized

Each of these alternatives is defined and discussed below. The order of discussion does not imply an order of preference or priority, but was chosen to facilitate the presentation. Key facts and analyses are incorporated at the first appropriate place and then referenced in subsequent discussion rather than repeated. Discussion relevant to SupDocs is also found in chapter 5, which focuses on an electronic NTIS and NTIS/SupDocs cooperation.

## TRADITIONAL GPO—CENTRALIZED

Under this alternative, GPO would continue to provide centralized conventional printing services (that is, Federal Government ink-on-paper printing would be obtained from or through GPO), disseminate paper formats on a sales basis through SupDocs, and disseminate paper and microfiche formats to the De-

pository Library Program (DLP). GPO would do very little electronic dissemination, as is the situation today. The mission agencies would handle electronic dissemination themselves, including direct distribution to the depository libraries to the extent needed. Note that printing services are defined to include composition,

printing, binding, blank paper sales, and related activities.

#### Demand for Traditional GPO Services

A logical starting point for the analysis is to examine demand for traditional GPO services. The two major components of demand are printing services, and publication sales. In fiscal year 1987, these accounted for 88.7 percent and 8.4 percent of total revenue, respectively. The 10-year trend data for these two items are shown in Table 4-1. Clearly, other than the temporary decline in printing services during fiscal year 1981 and fiscal year 1982 (almost half of which was due to reductions in congressional work), the overall trends show a gradual increase in printing services and a rather steady increase in sales of publications. Even accounting for inflation, there is no historical evidence of weakness in the demand for traditional GPO services.

Looking to the future, most independent projections suggest that overall general demand for paper formats will continue for at least 5 years at a slow growth or, at worst, steady state level—even in the face of rapid growth in electronic formats. This projection should apply to the Federal Government as well, short of a severe fiscal crisis. There is no evidence that agency budgetary restraints in the past few years have translated into a significant reduction in actual printing services obtained from GPO.

**Table 4-1.—GPO Revenues for Printing Services and Publications Sales, Fiscal Years 1978-87**  
(in millions of dollars)

Fiscal year	Printing services	Sales of Duplications
1978 .....	\$499	\$44.4
1979 .....	606	44.4
1980 .....	672	47.6
1981 .....	644	51.3
1982 .....	608	55.0
1983 .....	637	57.1
1984 .....	739	59.4
1985 .....	771	59.3
1986 .....	737	62.9
1987 .....	773	73.5

SOURCE: U S Government Printing Office, 1988

However, in the longer term, significant reductions in paper formats could occur. OTA'S independent printing consultant reviewed GPO'S current product line and, using several different methodologies, concluded that about 60 percent of GPO'S current products could potentially be suited for electronic formats, although realistically perhaps only one-half of this amount (or 30 percent) would be suited for electronic dissemination and even this would not automatically mean that paper dissemination would be eliminated.<sup>1</sup> Any actual switch from paper to electronic formats would most likely take place gradually, since electronic dissemination requires that the recipient (user) as well as the sender have the necessary equipment and knowhow. On the other hand, results of the GAO survey of Federal information users, highlighted later in this chapter, indicate that many users desire to increase dramatically their use of electronic formats within the next 3 years. These findings, coupled with the ambitious automation plans and activities of many Federal agencies, suggest the following projections:

- 1 to 3 years—steady state in demand for paper formats; rapid growth in electronic formats, but still a very small percentage of total demand;
- 3 to 5 years—demand for paper formats may start to decline; demand for electronic formats are likely to reach critical thresholds for several types of Federal information;
- 5 to 10 years—demand for Paper formats are likely to decline markedly in some categories but would still be significant for traditional government books, reports, and publications; electronic formats are likely to dominate for many types of information.

However, even though there is not likely to be a precipitous near-term decline in overall demand for paper formats, GPO is particularly vulnerable to changes in demand for products

<sup>1</sup>Frank Romano, "Decision Analysis Framework for GPO Strategic Alternatives," contractor report prepared for OTA, January 1988.

that are printed at the main GPO plant in Washington, DC. This is because the bulk of GPO overhead and labor are located at the main plant, and also because about three-quarters of GPO's total printing work is contracted out (known as procured printing). These figures are highlighted in Table 4-2 for fiscal year 1987.

In addition to the 3,500 personnel allocated in Table 4-2 to procured, main plant, and regional printing, there are 692 administrative and support personnel located primarily at the main plant and 930 personnel assigned to the SupDocs office. The SupDocs personnel are supported through sales revenues, appropriations (for DLP and by law dissemination), and agency reimbursements (for reimbursable dissemination), and are not counted as part of GPO overhead. However, the administrative and support personnel, plus main plant maintenance, utilities, and the like, are included in general overhead, which is allocated across all major GPO activity centers.

Any reduction in the GPO work load would result, at least in the short run, in spreading the general overhead over a smaller base and, thereby, increasing unit costs. Moreover, reductions in the main plant work load would have a magnified impact since the high costs of main plant operations would be allocated over a smaller base of main plant work thus driving up the unit costs even further, all other things being equal.

Main plant operations are particularly vulnerable to changes in the legislative branch work load, which is concentrated at that plant.

**Table 4-2.—GPO Billings and Labor Force Breakdown, Fiscal Year 1987**

	Procured printing	Main plant printing	Regional plant printing
Billings (\$ millions) . . . . .	\$576	\$180	\$14
(Percent of total) . . . . .	74.8% <sup>0</sup>	23.40% <sup>0</sup>	1.80% <sup>0</sup>
Labor force assigned (persons) . . . . .	637	2,619 <sup>a</sup>	244
(Percent of total) . . . . .	18.2% <sup>0</sup>	74.80% <sup>0</sup>	7.0% <sup>0</sup>

<sup>a</sup>Excludes 692 administrative and support personnel and 930 SupDocs personnel  
SOURCE: U.S. Government Printing Office, 1988

As shown in Table 4-3, about 80 percent of all legislative branch work is done inplant, while about 85 percent of all executive branch work is contracted out. Of the 20 percent (or \$23 million worth) of legislative branch printing that is procured, only about \$1 million is for Congress itself, with the remainder for legislative branch agencies and extra copies of agency documents for SupDocs and DLP. Also, about 45 percent of inplant work is legislative, while about 95 percent of contracted work is for the executive branch. Judicial branch work is split about 50-50 between inplant and procured printing, but represents only a fractional percentage of total GPO work compared to about 15 percent for the legislative branch and 85 percent for the executive branch. Also, over 90 percent of inplant work is done at the main plant, with the remainder at GPO regional plants. Complete fiscal year 1987 workload data are presented in Table 4-3. Again, note that the term "printing" is defined to include composition, layout, printing, binding, blank paper sales, and other associated services in addition to printing.

An analysis of fiscal year 1987 billing data for the GPO main plant indicates that a significant portion could be suitable for electronic dissemination or could be vulnerable to competition from electronic formats. The major items are listed in Table 4-4 with fiscal year 1987 billing amounts indicated. Other significant main plant billing items which are judged as not suitable for electronic formats include such things as envelopes, books, letter head stationery, note pads, passports, and postal cards. Some main plant billings are for personnel services only (e.g., *Congressional Record*

**Table 4-3.—GPO Workload Distribution, Fiscal Year 1987 (in millions of dollars)**

	Procured printing	Main plant printing	Regional plant printing	Totals
Legislative branch . . . . .	23	90	—	113
Judicial branch . . . . .	1	1	—	2
Executive branch . . . . .	552	90	14	656
Totals . . . . .	\$576	\$181	\$14	\$771

SOURCE: U.S. Government Printing Office, 1988

**Table 4=4.—Electronic Potential for Main Plant Products**

Major product	Fiscal year 1987 billings (in \$ millions)	Electronic potential
U.S. Code . . . . .	1.4	Online and CD-ROM distribution could reduce demand for paper format.
Forms . . . . .	5.8	Electronic filing and electronic printing-on-demand could reduce demand for paper formats in medium to long-term.
Pamphlets . . . . .	11.5	Online, CD-ROM, diskette, and electronic mail/bulletin board distribution along with electronic printing-on-demand could reduce demand for paper formats in medium-term.
Bills, resolutions, amendments . . . . .	11.0	Online authoring, editing, publishing, and status systems along with online and CD-ROM distribution could significantly reduce demand for paper formats.
Calendars . . . . .	2.0	Online systems could reduce demand for paper formats.
Code of Federal regulations . . . . .	8.6	Online and CD-ROM distribution could reduce demand for paper formats.
Committee prints . . . . .	3.5	Online, CD-ROM, and diskette distribution along with electronic printing-on-demand could reduce demand for paper formats.
Committee reports . . . . .	4.2	
Congressional Record- Daily . . . . .	13.0	Online and CD-ROM distribution could sharply reduce demand for paper formats.
Federal Register . . . . .	17.7	Online and CD-ROM distribution could sharply reduce demand for paper formats.
Hearings . . . . .	17.6	CD-ROM distribution could reduce demand for paper formats,
Total . . . . .	<b>96.3</b>	

SOURCE Billings from GPO: Electronic Potential from OTA, 1988

indexers at \$0.75M, details to congressional committees at \$6 M).

Overall, just over half of the main plant work could be affected by electronic formats. The vulnerable congressional work is particularly significant and amounts to about 45 percent of main plant billings if the *Federal Register* and *Code of Federal Regulations (CFR)* are included. In principle, reductions in inplant work could be offset by shifting some procured work to in-plant printing. However, the congressional work is quite unique and specialized, with little work of a similar nature currently being procured, unlike forms and pamphlets where work could be rather easily shifted from procured to in-plant printing. Also, once initial press runs reached small enough levels, certainly in the few hundreds of copies and possibly in the few thousands, fully electronic composition and printing would likely be cost-effective. In other words, primary dissemination could shift from paper (or paper and microfiche) to electronic with a small initial press

run (e.g., a few thousand copies) of paper copies and possibly some microfiche copies (on a transitional basis). Any subsequent dissemination of paper copies could be on a printing-on-demand basis for complete copies or, probably more common, printing of selected pages.

#### Impacts of Medium-Term Reductions in Traditional Demand

Realistically, any significant transition from paper to electronic formats would take place over several years, so GPO would have time to adjust. Basically, GPO could make up for any shortfall by transferring a portion of procured printing (primarily executive branch work) to the main plant or reducing main plant operating costs or some combination of the two. The major drawback of transferring more work in-house is that the main plant work costs significantly more than procured work. Thus, either the executive agency customers would pay considerably more than they do now, or



GPO would have to charge considerably less than full cost to offer a competitive price.

#### GPO Cost and Labor Force Structure

The cost of GPO work for 20 sample printing jobs is shown in Table 4-5 in cost per 100 pages and total cost, averaged over all 20 jobs. For these 20 sample jobs, the average main plant regular rate cost was more than double the procured cost. While these 20 jobs do not constitute a statistically valid sample of all GPO work, the sample jobs were selected by GPO as being reasonably representative. (See ch. 11 for further details.)

In recent years, GPO has been offering a special rate for some executive branch printing jobs done at the main plant. The rate is based on the tenth lowest bid for comparable procured work plus ten percent. For the 20 sample jobs, the average main plant cost using the special rate was about 45 percent higher than the procured cost. The special rate is intended to recover variable costs and make some contribution to general overhead. This would appear to be the case, since the special rate for the 20 sample jobs averaged about 68 percent of the regular rate that presumably covers full costs. According to GPO, the average direct labor rate is about 30 percent of full costs. So the special rate does appear to more than cover direct labor. If one assumes direct labor to be a fixed cost, at least in the short-term, the special rate appears to easily cover the cost of expendable (e.g., paper, ink) PLUS make a Contribution to overhead. Of course, on the other hand, the greater the use of the special rate, the greater the overhead rate will be for the balance of the work, all other things being equal.

**Table 4-5.—Cost of GPO Work, 20 Sample Jobs**

	Main plant procured <sup>a</sup>	Main plant regular rate <sup>b</sup>	Main plant special rate <sup>c</sup>
Total cost,	\$100,017	\$213,281	\$144,881

<sup>a</sup>Procured estimates based on general usage contracts using the average price of the first 5 lowest bidders

<sup>b</sup>Main plant regular rate estimates based on the GPO Price scale as of Dec 1 1987

<sup>c</sup>Main plant special rate estimates based on the 10th lowest bid plus 10%.

SOURCE U S Government Printing Office 1988

There are several reasons for the higher main plant costs. First and foremost, GPO is a unique printing facility in terms of product mix, schedule requirements, and customer base. GPO produces a much more diversified set of printing products than any single private sector printing facility. As a consequence, GPO operates and maintains a much wider range of equipment than do private printing companies. Most private firms specialize in a small number of products, to keep overhead down and maximize economies of scale. Second, to provide quick turnaround of congressional work and overnight printing of the daily *Congressional Record* and *Federal Register*, GPO operates on a three shift basis. This results in significantly higher costs for staffing, supervision, maintenance, and general overhead. The overnight operations are so important that, in 1987, GPO designated an Assistant Public Printer to provide overall on-site management of the night operations. Third, as a government agency, GPO provides such services as employee and congressional relations, public affairs, inspector general, equal employment, labor relations, safety and health, and the like, many of which contribute to higher general overhead than in private companies.

Overall, GPO is a labor intensive organization. After deducting the cost of procured printing and sales of publications and the surplus (net profit), about two-thirds of the remaining costs are for labor, about one-fifth for supplies and materials, and one-tenth for utilities and the like. The GPO cost structure, based on fiscal year 1987 data, is shown in Table 4-6. Data for main plant costs shown in Table 4-7 confirm the general cost structure noted above.

With respect to the total GPO labor force, a significant downsizing has already taken place. Over the past 12 years, total GPO employment has declined by about 3,500 persons or 40 percent (from 8,632 in fiscal year 1975 to 5,122 in fiscal year 1987). As shown in Table 4-8, the reductions have been spread across several GPO activities, but with the highest absolute and percentage reductions occurring

**Table 4-6.—GPO Cost Structure, Fiscal Year 1987**

Cost element	Percent of	
	fiscal year 1987 revenue dollar	
Procured printing . . . . .	61.5	
Sales of publications . . . . .	2.3	
Surplus . . . . .	2.6	
Subtotal . . . . .	66.4	
Labor . . . . .	22.4	
Supplies and materials . . . . .	6.1	
Rents, communications, and utilities . . . . .	3.3	
Capital expenditures . . . . .	0.8	
Other . . . . .	1.0	
Subtotal . . . . .	33.6	
	Percent of fiscal year 1987 revenue dollar less cost of procured printing and sales plus surplus	
Labor . . . . .	66.6	
Supplies and materials . . . . .	18.2	
Rents, communications, and utilities . . . . .	9.8	
Capital expenditures . . . . .	2.4	
Other . . . . .	3.0	
Total . . . . .	100.0	

SOURCE: US Government Printing Office and Office of Technology Assessment—1988

**Table 4.7.—GPO Main Plant Cost Structure, Fiscal Years 1984 and 1985**

Cost element	Percent of total costs	
	Fiscal year 1984	Fiscal year 1985
Labor . . . . .	65.0	66.8
Supplies and materials . . . . .	26.2	25.0
Rents, communications, and utilities . . . . .	4.3	4.4
Depreciation . . . . .	3.3	2.6
Other . . . . .	1.2	1.2
	100.0	100.0

SOURCE: US Government Printing Office and Office of Technology Assessment, 1988

in the composition, printing, binding, procurement, personnel management, and documents sales/distribution areas. Most of these labor force reductions resulted from advances in printing technology and improvements in management efficiency. The reduction in personnel management in part reflects the reassignment of apprentices from personnel to the appropriate operating units.

#### Medium-Term Outlook

To sum up, near-term demand for traditional GPO services appears to be stable, absent a

severe fiscal crisis on the part of the customer agencies or some other circumstance that would precipitate a rapid decrease in conventional printing activity, and assuming the executive agencies continue to be required to obtain printing from or through GPO.

On the other hand, the GPO main plant appears to be vulnerable in the medium-term (3-5 years) and beyond due to the combination of electronic competition for some major product lines (such as the *Congressional Record* and *Federal Register*), and a high overhead cost structure necessitated largely by GPO's current responsibilities. Additional executive agency work could be shifted from private printing companies to the GPO main plant, but this would likely increase the cost to the agencies. GPO could charge a special, lower rate for most agency work, but this would mean some portion of overhead would be uncovered and have to be paid out of direct appropriations or, possibly, reimbursed from net revenues on sales of publications. These latter alternatives would appear to require amendment of the relevant provisions of Title 44 of the U.S. Code. On the other hand, it is possible that cost reductions resulting from the provision of electronic alternatives to the *Record* and *Register* (among other publications) could offset any cost increases that might result by shifting more executive agency work from procured to inhouse printing.

GPO could attempt to further reduce operating costs, but this may be difficult given the already substantial labor force reductions obtained since the mid 1970s, absent a basic restructuring of GPO responsibilities and operations. Some additional labor cost reductions are likely to occur as agencies assume greater responsibility for composition and other prepress functions, as a consequence of desktop and high-end electronic publishing capabilities. However, in other production areas, such as press and binding, projected retirements could create an actual labor shortage, according to GPO. OTA'S independent labor consultant concluded that GPO workforce is relatively old (average age of 45.2 years) and that 13 percent of the work force (687 persons) is eligible

Table 4-8.—Major Changes in GPO Labor Force, Fiscal Years 1975-87

Selected labor force categories <sup>a</sup>	Fiscal year 1975	Fiscal year 1987	Net change	
			Number	Percent
Document sales/distribution . . . . .	1,833	930	-903	-49.3
Composition . . . . .	1,632	616	-1,016	-62.3
Binding . . . . .	1,166	630	-536	-46.0
Press (includes prepress) . . . . .	1,006	701	-305	-30.3
Printing procurement (excludes regional) . . . . .	718	432	-286	-39.8
Engineering and facilities . . . . .	490	359	-131	-26.7
Personnel (includes apprentices in fiscal year 1975, but not in fiscal year 1987) . . . . .	332	104	-228	-68.7
Financial . . . . .	367	250	-117	-31.1
Materials . . . . .	269	205	-64	-23.8
Security . . . . .	124	79	-45	-36.3

<sup>a</sup>Labor force categories selected and defined to permit FY75-87 comparison; may not correspond exactly with current labor force categories

<sup>b</sup>As of Aug 5, 1987

SOURCE US Government Printing Office and Office of Technology Assessment 1988

to retire immediately. About 35 percent of the GPO work force has over 20 years of service.' There is also the possibility of reducing GPO's overhead costs, discussed later.

### GPO Plant and Equipment

Other areas of possible cost savings include the purchase or construction of a new main plant building, and the upgrading of conventional prepress, press, and binding technology. A 1982GAO study identified numerous inefficiencies in GPO's facilities-including materials handling, storage, and production flow problems at the main plant. OTA'S independent printing consultant examined all of these areas and concluded, first, that there is no compelling need for a new plant. The present building was specifically built to handle the load factors of the printing process, whereas very few commercial printing facilities were originally designed for printing. Most new plants are on one floor, rather than a multi-floor facility such as GPO's, and do offer some production efficiencies not currently available to GPO. However, continued renovation and upgrading of the main plant elevators should help compensate. Also, a single level building

would require much more acreage and would probably have to be located much further away from GPO's customer base in Congress and the executive agencies. Overall, OTA'S printing consultant concluded that the GPO main plant is equal to most commercial printing facilities handling a comparable volume of work. However, if viable options become available to GPO, a detailed evaluation would be warranted, taking into account all the factors mentioned above and others, especially any strategic decisions on GPO's future role in conventional printing and electronic publishing and dissemination. One GPO building option currently under consideration involves a plan to transfer GPO's main plant to GSA in exchange for the construction of a new plant on property in the Washington Navy Yard, and to relocate SupDocs to a site in Suitland, Maryland. As noted in the 1982 GAO report, cost-benefit analyses of all serious alternatives are warranted, including continued renovation of the existing main plant building, as well as construction of a new building. Cost-benefit studies would appropriately include consideration of the impacts on the cost, quality, and timeliness of GPO main plant services, productivity of GPO main plant operations, and, to the extent possible, GPO's general morale, sense of direction, and strategic outlook.

With respect to printing technology, OTA'S printing consultant concluded that GPO technology at the main plant was generally on a par

<sup>c</sup>Gregory Giebel, "Technological Changes at the Government Printing Office," contractor report prepared for OTA, January 1988.

<sup>d</sup>U. S. General Accounting Office, Report to the Chairman, Joint Committee on Printing, *GPO Needs to Analyze Alternatives to Overcome Limitations in Government Printing Operations*, PLRD-82-20, Jan. 4, 1982.

with or exceeded the top fifth of the commercial printing industry. GPO was found to be on a par with the top 5 percent of private firms with respect to composition technology, the top 11 percent for press technology, and substantially ahead for bindery technology (a more exact estimate here was not possible given the differences between the GPO product mix and that of typical commercial firms). GPO has stayed abreast of the private sector with respect to conventional technology as a result of gradual, but continuous equipment upgrades. As long as GPO provides a substantial volume of inplant printing services, periodic equipment upgrades are likely to be cost-effective.

Perhaps the best example of GPO's performance in adopting new technology is the now fully completed transition from hot type composition to electronic photocomposition at the main plant. This transition took place largely during the 1970s. In fiscal year 1968, only 40,000 pages were phototypeset. This increased to over 700,000 pages in fiscal year

1972, over 1 million pages in fiscal year 1976, and over 2.75 million in fiscal year 1980. As of fiscal year 1986, about 3.7 million pages per year were being phototypeset. Another example is the rapid increase in electronic input to the GPO printing process over the past several years. As of fiscal year 1987, about three quarters of material phototypeset at the GPO main plant was received in electronic form.

With respect to conventional press and bindery equipment, GPO has nearly completed a major equipment upgrade stretching over the past decade. Selected major equipment acquisitions are listed in Table 4-9 along with the acquisition date and cost for each item. Since 1977, GPO has invested almost \$15 million in major press equipment, and over \$10 million in bindery equipment. Actual totals are higher than shown, since a large number of small equipment items plus furniture, vehicles, and extensive renovations are not listed here.

Based on all of the above, OTA has concluded that, despite the possibly misleading

**Table 4-9.—Selected Major Equipment, Acquisitions, GPO Press and Bindery, Since 1977, as of September 1987**

Item	Acquisition year	Acquisition cost in dol tars	Item	Acquisition year	Acquisition cost "in dol lars
<b>Press Division</b>			Shredder . . . . .	1987	19,272
Letter Press-Envelope . . . . .	1986	48,500	Perforator (2 units). . . . .	1984	15,600
Letter Press-Auto Feed Dryer . . . . .	1987	98,303	Nipping Machine . . . . .	1985	13,900
Offset Press-Harris . . . . .	1986	40,663	Paper Cutter . . . . .	1986	47,139
Offset Press (5 units) . . . . .	1979	2,025,000	Trim Paper Collection . . . . .	1987	39,495
Offset Press 35x50 (2 units). . . . .	1981	6,264,000	Waste Paper System . . . . .	1986	40,582
Copier-Xerox 9200 II . . . . .	1979	62,530	Perforator (2 units). . . . .	1982	17,200
Offset Press-Miehle 43x60 (7 units) . . . . .	1977	1,918,000	Passport Machine . . . . .	1987	1,213,650
Offset Press-Harris (2 units). . . . .	1980	66,000	Nipping Machine . . . . .	1983	12,300
Offset Press-Web (3 units) . . . . .	1979	2,136,000	Sewing Machine-Smyth No. 12. . . . .	1980	17,355
Offset Press-5 Color Postal Card . . . . .	1986	1,104,674	Cutter Spacer-Lawson . . . . .	1984	70,000
Cut-Pack System-Postal Card . . . . .	1987	970,084	Eyelet Attacher Machine . . . . .	1978	5,045
Total Press Division . . . . .		14,733,754	Wrapping Package Machine. . . . .	1979	37,972
<b>Binding Division</b>			Casemaking Machine-Smyth	1979	25,138
Paper Cutter-71 inch . . . . .	1986	75,237	Strapping Machine (4 units) . . . . .	1982	20,000
Strapping Machine. . . . .	1987	2,623	Strapping Machine-Signode (3 units) . . . . .	1984	63,000
Machine Wrap-Stretch Plastic (2 units) . . . . .	1979	23,000	Folding Endsheets Machine . . . . .	1983	4,950
Insertor-Stitcher Complete . . . . .	1987	326,400	Casing-In Machine- Versamatic . . . . .	1983	23,100
Trimmer-3 Knife (2 units) . . . . .	1981	243,000	Copier-Xerox 9500 VR . . . . .	1986	12,564
Folding Machine (6 units). . . . .	1985	420,000	Adhesive Binder (2 units) . . . . .	1983	6,343,347
Labeler Machine. . . . .	1986	4,311	Adhesive Mailer (2 units) . . . . .	1983	977,498
			Total Binding Division. . . . .		10,113,678

SOURCE U S Government Printing Off Ice, 1988

external appearance, the GPO main plant is, overall, essentially up-to-date with respect to conventional printing technology and already makes very extensive use of electronic input and photocomposition. There will, of course, be opportunities for future technology upgrades as the need arises. Overall, however, GPO is well positioned technologically to carry on its traditional printing responsibilities. The strategic challenge arises with respect to how

GPO can remain competitive and maintain or improve cost-effectiveness in the face of possible future reductions in the demand for paper formats (and especially demand for major products produced at the main plant), increases in demand for electronic formats, and rapid progress in agency automation (including use of desktop and high-end electronic publishing). These possibilities are discussed later in this chapter.

## TRADITIONAL GPO—LEGISLATIVE BRANCH ONLY

Under this alternative, GPO would continue to provide centralized conventional printing services, but only for the legislative branch. The printing procurement program would either be transferred to the executive branch (e.g., to GSA) or dispersed among individual agencies. Responsibility for the DLP could be retained at GPO, as could the sale of paper formats by the SupDocs, or these functions could also be transferred to the executive branch. GPO would do little electronic dissemination.

Analysis of this alternative is illustrative of one extreme on the spectrum of alternatives available and provides further insights into the functioning of GPO. The discussion here emphasizes financial and labor impacts (see ch. 11 and 12 for other implications).

To keep this in perspective, it is important to note that GPO was originally established in 1860 primarily to serve the printing needs of Congress and to eliminate the corruption in printing procurement that had become widespread. Over the following decades, executive branch printing needs grew much faster to the point where, for fiscal year 1987, 85 percent of GPO work is for the executive branch.

### Financial Impacts

Using fiscal year 1987 data, the restriction of GPO to conventional printing for the legislative branch would have the following first order impacts, all other things being equal:

- c the total workload of GPO would decrease

from about \$771 million to about \$113 million or an 85 percent reduction;

- the total workload at the GPO main plant would decrease from about \$180 million to \$113 million (\$90 million main plant work plus \$23 million previously procured) or a 37 percent reduction (this assumes the \$23 million in procured printing for the legislative branch would be shifted to the main plant);
- the total labor force of GPO would decline by about 881 persons or about 17 percent (637 printing procurement staff and 244 regional printing plant staff, all presumably transferred to GSA or elsewhere);
- the net income of GPO would decrease by about \$4.6 million due to transfer of the printing procurement program which has operated at a net surplus for the past several years (presumably this net income would accrue to GSA, assuming the procurement program was kept intact and retained its effectiveness);
- the net income of GPO would increase by about \$1 million due to transfer of the regional printing plants (which have operated at a net loss for the last several years), all other things being equal; and
- the net income less expenses at the GPO main plant would change from a surplus of several million dollars to a potential loss of several tens of millions.

These figures highlight how the GPO main plant operation is dependent on executive branch work to help spread the costs of gear-

ing up to meet the quick turnaround and diverse needs of the legislative branch (and some executive branch work, such as the *Federal Register*). The executive branch work helps fill in the valleys between the peaks of the congressional work load and utilizes labor and plant capacity that would otherwise be underutilized. Both in-plant and procured executive branch work help cover GPO overhead expenses and are sources of net income.

The role of executive branch work can be illustrated using the assumptions about the main plant cost structure presented earlier. Starting with \$180 million in main plant gross revenues and assuming a 2 percent profit or surplus, the total GPO main plant expenses would be \$176.4 million. The cost breakout for the main plant would be as in Table 4-10. Now if gross revenues drop by 37 percent to \$113 million due to the exclusion of executive branch work, total expenses would decrease by only 13 percent to about \$154 million, if materials and supplies are assumed to be variable costs but labor, rent, and depreciation are assumed to be almost entirely (95 percent) fixed costs in the short run. The result is a swing from a net surplus of about \$4 million to a net loss on main plant operations of about \$4.1 million. If printing procurement were transferred out, there would be no net surplus from procurement to even partially offset this loss.

## Labor Force Impacts

In order to return GPO to break even operations, it would be necessary, using this hypothetical calculation, to cut costs and/or increase revenues by a total of \$37 million. Any significant cost reductions would probably necessitate labor force reductions, since further cuts in the other, much smaller cost categories would have marginal effects at most.

Recovering the entire hypothetical deficit would necessitate roughly a one-third reduction in the main plant labor force, assuming that this could be accomplished without jeopardizing the main plant's capacity to do the \$113 million in legislative branch work. Reorganization of the production processes might be necessary—for example, scaling back or eliminating the night shift. Alternatively, some or all of the hypothetical deficit could be offset through increased appropriations and/or user fees.

If the hypothetical deficit was to be recovered through labor force reductions, a total reduction in force of about 1,100 employees would be needed, assuming a total main plant work force of 3,311, calculated as shown in Table 4-11. The main plant labor force of 3,311 persons is estimated by deducting the Sup-Docs staff (which operates on a breakeven ba-

Table 4.10.—Hypothetical Calculation of Financial Impact of Legislative Branch GPO

	Main plant Executive and legislative work		Main plant Legislative work only	
Gross revenue		\$180.0 million		\$113.0 million
Less net surplus (assumed 2%)		-3.6		
Total expenses		176.4 million		
	Assumed cost structure (as percent of total expense)		Assumed cost reduction	
Labor	67%	\$118.2 million	-50%	\$112.3 million
Materials and supplies	25%	44.1	-37%	27.8
Rent, communications, and utilities	4.40%	7.8	-50%	7.4
Depreciation and other	3.60%	6.3	-50%	6.0
		\$176.4 million		\$153.5 million
Net income or (loss)		\$ 3.6 million		(\$ 40.5 million)

SOURCE Office of Technology Assessment, 1988

**Table 4-11.—Hypothetical Main Plant Total Labor Force Reductions**

Fiscal year 1987 total GPO labor force . . . . .	5,122
Less SUPDOCS staff . . . . .	- 930
	4,192
Less regional printing staff . . . . .	-244
	3,948
Less printing procurement staff . . . . .	-637
Current main plant labor force . . . . .	3,311
Less 1/3 reduction in force . . . . .	1,100
Reduced main plant labor force . . . . .	2,211

SOURCE: Office of Technology Assessment 1988

sis, financially separate from the main plant) and the regional printing and printing procurement staffs (which would, in this hypothetical example, be transferred to GSA). The hypothetical one-third labor force reduction is calculated by dividing the net loss (\$37.3 million) into the main plant labor costs (\$110.0 million).

GPO has previously estimated that about 78 percent of the employees in the main plant Photocomposition, Press, and Binding Divisions would be required to perform the legislative branch work (GPO defines this as congressional work plus the *Federal Register*, postal cards, passports, *CFR*, and OMB and Presidential documents). This means that the fiscal year 1987 staffing level of 1,947 persons for these divisions could be reduced by only 428 persons (22 percent) in order to maintain the necessary capacity. The remaining reduction of 672 persons (to provide a total of 1,100) would have to come from the Executive Office, Operations, and Production Divisions. These divisions had a fiscal year 1987 combined staffing level of 1,364 persons, which would translate into a roughly 50 percent staff cut (672 out of 1,364) for these areas. The calculations are shown in Table 4-12.

Options available to GPO for handling these hypothetical reductions would depend on how fast they had to be made. Overall, GPO has a relatively old labor force with about 13 percent of its employees eligible for retirement, and about 35 percent having 21 or more years of service. Some craft units have even higher

**Table 4-12.—Hypothetical Main Plant Divisional Labor Force Reduction**

	Persons
Electronic Photocomposition Division . . . . .	616
Press Division . . . . .	701
Binding Division . . . . .	+630
Current FY87 labor force . . . . .	1,947
	x .78
Reduced labor force . . . . .	1,519
Staff reductions . . . . .	428
Executive Office . . . . .	693
Operations Division . . . . .	359
Production Division . . . . .	313
Current FY87 labor force . . . . .	1,364
	x .50
Reduced labor force . . . . .	682
Staff reductions . . . . .	682
Total staff reductions . . . . .	1,110
Total remaining labor force . . . . .	2,201

SOURCE: Office of Technology Assessment 1988

percentages. For example, of the 547 compositors (International Typographical Union, Local No. 101), 176 (or 32 percent) are eligible for retirement and 326 (or 60 percent) have 21 or more years of service, as shown in detail in Table 4-13.

If three years were available to make the transition to a legislative branch GPO, the 22 percent reduction in the photocomposition, press, and binding labor force probably could be made mostly through natural attrition (averaging 5-10 percent per year at the main plant). However, the 50 percent reduction in the executive office, operations, and production labor force probably could not be made over this period of time through natural attrition, and some early retirement buyouts might be necessary. Of course, the hypothetical transition would be easier if more time were available.

#### Other Vulnerabilities

As a final note, the "traditional GPO-legislative branch only" alternative would be especially vulnerable to any significant future reductions in the demand for paper formats. Prior GPO analyses have, indeed, documented

**Table 4-13.—GPO Main Plant Composers, Years of Service and Retirement Eligibility, Fiscal Year 1987**

	Number of employees
<b>Years of service</b>	
0-5 . . . . .	19
6-10 . . . . .	1
11-15 . . . . .	40
16-20 . . . . .	161
21-25 . . . . .	193
26-30 . . . . .	94
31-35 . . . . .	33
36-40 . . . . .	6
41+ . . . . .	0
Total . . . . .	547
<b>Retirement eligibility</b>	
Age 55/30 years service . . . . .	32
Age 60/20 years service . . . . .	85
Age 62/5 years service . . . . .	59
Total . . . . .	176

SOURCE US Government Printing Office, 1988

significant reductions over the 1975-1984 period.

The combined totals for eight principal main plant products (daily *Congressional Record*; *Federal Register*; bills, resolutions, and amendments; committee hearings; committee reports; committee prints; calendars; and the *Code of Federal Regulations*) showed declines of 64 percent in total number of copies printed. However, this reflected primarily a 55 percent reduction in the number of titles, which is a function of a lower overall level of congressional activity rather than an indication of lower demand. The number of pages declined by only 16 percent, which means that the average number of pages per title must have increased significantly over this period of time (for example, fewer but longer reports and bills). Indeed, as shown, the average number of pages per copy almost doubled, from 36 to 64 pages. Nonetheless, over the 1975-1984 period, the total number of pages printed at the GPO main plant for these eight products declined by about 36 percent. The statistical results are shown in Table 4-14.

This volume reduction would be expected to increase drastically per unit costs, all other things being equal. However, all other things

**Table 4-14.—Changes in GPO Main Plant Volume for Eight Principal Products<sup>a</sup>, 1975<sup>b</sup>-1984**

	1975 number	1984 number	Percent change
Titles . . . . .	28,893	13,854	-55
Original pages (in millions) . . . . .	1.048	0.886	-16
Copies (in millions) . . . . .	134.6	48.7	-64
Pages per copy (average) . . . . .	36	64	+78
Printed pages (in trillions) . . . . .	4.85	3.12	-36

<sup>a</sup>Daily *Congressional Record*, *Federal Register*; bills, resolutions, and amendments, committee hearings, committee reports, committee prints, calendars, and *Code of Federal Regulations*

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

were not equal. During this period, the GPO labor force decreased by about 34 percent, and more productive, less labor-intensive equipment was deployed. Some of the difference was also made up in price increases. However, as the trend data indicate (Table 4-15), billings for key congressional printing and binding items remained remarkably stable, increasing by only 1.4 percent through fiscal year 1983 and by about 17 percent through fiscal year 1984.

Trend data for the entire fiscal year 1975-1987 period show only minor changes in GPO billings for hearings, committee prints and reports, and calendars. As indicated in Table 4-16, billings for bills, resolutions, and amendments were up significantly, although this may reflect a fiscal year 1987 anomaly since fiscal year 1986 billings were \$8.41 million, up only marginally from the \$7.97 million expended in fiscal year 1975. The only dramatic changes were for bills, resolutions, and amendments (up 35 percent), the *Congressional Record* (up 71 percent) and the *Federal Register* (up 128 percent), as shown below. These latter two items are: among the biggest work orders at the main plant, very labor intensive, the primary reason (along with congressional bills and reports) for overnight operations at the main plant, and among the more vulnerable main plant products with respect to competition from electronic formats. As mentioned elsewhere in this chapter, the *Record* and *Register* are both highly suited to online and CD-ROM electronic formats.



**Table 4-15.—Congressional Printing and Binding Billings Selected Items, Fiscal Years 1975, 1983, and 1984**

Item	Fiscal year	Fiscal year	Fiscal year
	1975	1983	1984
	(in thousands of dollars)		
Hearings . . . . .	\$17,746	\$16,684	\$22,304
Miscellaneous printing and binding . . . . .	9,776	8,720	10,042
Bills, resolutions, and amendments . . . . .	7,965	7,552	6,827
Miscellaneous publications . . . . .	3,680	4,130	<b>4,585</b>
<b>Committee prints.</b> . . . .	<b>4,372</b>	<b>2,956</b>	<b>3,065</b>
House and Senate calendars. . . . .	1,720	1,256	2,138
Documents . . . . .	466	1,571	958
Committee reports . . . . .	2,644	2,827	3,048
Franked envelopes . . . . .	815	759	1,111
<i>Congressional Record</i> (daily) . . . . .	8,287	11,794	13,352
Totals. . . . .	\$57,471	\$58,249	\$67,430

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

**Table 4.16.—Congressional Printing and Binding Billings, Selected Items, Fiscal Years 1975 and 1987**

Item	Fiscal year	Fiscal year	Percent change
	1975	1987	
	(in thousands of dollars)		
Hearings . . . . .	\$17,746	\$16,835	-5.1 %
Bills, resolutions, and amendments . . . . .	7,965	10,830	+ 36.0
Committee prints and reports . . . . .	7,016	7,247	+3.3
House and Senate calendars. . . . .	1,720	1,543	- 10.0
<i>Congressional/ Record</i> (daily) . . . . .	8,287	11,173	+ 35.0
<i>Federal Register</i> (daily). . . . .	7,776 <sup>a</sup>	17,697	+ 128.0

alin-cludes billings for Congressional copies only and thus understates total billin9s

SOURCE U S Government Printing Off Ice and Off Ice of Technology Assessment, 1988

## ELECTRONIC GPO-DECENTRALIZED

Under this alternative, the GPO would continue to provide centralized conventional printing services (that is, Federal Government ink-on-paper printing would be obtained from or through GPO), expand the range of electronic publishing services available to agencies, disseminate selected electronic formats on a sales basis through SupDocs as well as traditional paper formats, and disseminate selected electronic as well as paper and microfiche formats to the DPL. However, government dissemination of electronic formats would not be centralized solely via GPO. Mission agencies could, at their discretion, disseminate their own electronic formats, or they could opt to utilize SupDocs, or both. SupDocs could, at its discretion, select those electronic formats judged to be suitable for inclusion in the sales program. Fur-

thermore, electronic formats selected for inclusion in the DLP would be distributed to the depository libraries either directly by the agencies or via GPO. Also, this alternative assumes that GPO would develop and maintain a governmentwide information index in cooperation with NTIS and would actively participate in governmentwide standards-setting and innovation activities concerning electronic printing, publishing, and information dissemination.

This alternative, labelled for convenience "Electronic GPO-Decentralized," most closely aligns with the current development path of GPO. GPO is conducting a number of relevant pilot projects, and is experimenting with and occasionally implementing precursor electronic

applications. This alternative is conceptually viable, and, therefore, warrants careful consideration, due to the convergence of several key trends in electronic technology and demand for Federal information in electronic formats.

## Trends in Technology and Demand

### Technology Trends

One key technology trend is the rapid increase in agency automation, which means that most agencies already are creating their original information products in electronic form, and many are also converting this material to a camera-ready format. OTA'S independent printing consultant estimated that about 25 percent of the original material is being provided by Federal agencies to GPO in camera-ready format. For these pages, no typesetting or page composition by GPO is required. Almost all (98 percent) of this camera-ready material is estimated to originate from executive branch agencies. The other 75 percent of

the original material is being provided to GPO in a variety of formats, primarily electronic, as shown in Table 4-17.

The overall picture that emerges is as follows. Almost all executive agency material is being provided to GPO in camera-ready or electronic formats, with very little material requiring GPO keyboarding. Almost all agency electronic input is via magnetic tape. On the other hand, roughly one half of all legislative branch material requires GPO keyboarding, roughly 10 percent is scanned, and the remaining 40 percent of electronic input is split between magnetic tape and fiber optic cable transmission. The distribution of origination formats is shown in Table 4-18 for camera-ready, manuscript, scanned, and electronic input as a percentage of total input and total by branch of government.

The executive branch agencies are able to capture their own electronic keystrokes and, increasingly, do their own electronic composi-

**Table 4-17.—Origination Formats<sup>a</sup> for Material Submitted to GPO, as Percent of Total**

Format	Executive branch	Legislative branch	Totals
Manuscript Copy <sup>b</sup> . . . . .	2.6 <sup>00</sup>	23.4 <sup>00</sup>	260/0
Scanned entry . . . . .	0.5	4.5	5
Magnetic tape . . . . .	41.6	10.4	52
Floppy disk . . . . .	1.96	0.04	2
Fiber optic cable. . . . .	0	10.0	10
Other electronic transmission . . . . .	4.25	0.75	5
			100 <sup>Y</sup>

<sup>a</sup>excluding camera-ready copy.

<sup>b</sup>requiring keyboarding.

SOURCE U S Government Printing Office, F R.Romano, and Office of Technology Assessment, 1988

**Table 4-18.—Origination Formats, Including Camera. Ready, as Percent of Total and by Branch of Government**

Format	Percent of all Government totals			Percent of all branch totals	
	Executive branch	Legislative branch	Totals	Executive branch	Legislative branch
Camera-ready. . . . .	24.5	0.5	25	39.1	1.3
Manuscript . . . . .	1.95	17.55	19.5	3.1	47.0
Scanned entry . . . . .	0.375	3.375	3.75	0.6	9.0
Electronic input . . . . .	35.86	15.89	51.75	57.2	42.6
Totals . . . . .			100	100	99.9

SOURCE: U S. Government Printing Office, F R. Romano, and Office of Technology Assessment, 1988

tion, largely because of the widespread penetration of computer and word processing technologies and, recently, the rapid increase in the use of desktop and high-end electronic publishing. As noted in chapter 2, the GAO survey of 114 civilian departmental agency components indicated that many are using and/or testing relevant technologies, as summarized in Table 4-19.

The GAO survey did not ask for estimates of the absolute number of these technologies in use. However, these estimates can be developed from other relevant indicators, including the use of page makeup and page description software. OTA'S independent printing consultant has estimated that, as of year end 1987, there were already over 20,000 units of page makeup software in use in the Federal Government, and over 125,000 units of page description software. The detailed breakout is in Table 4-20.

OTA'S printing consultant estimates that, in addition, there are 200-350 high-end electronic printers (Xerox 9700 class) in use in the Federal Government. Just these three items alone account for over \$200 million in installed base of electronic publishing technology (21K units page makeup at \$600/unit + 127K units page description at \$750/unit + 275 high-end electronic printers at 400 K/unit = \$12.6M + \$95.3M + \$110M = \$217.9 M). This does not include high-end workstations and low-end laser printers, among other relevant technologies. Rough estimates for the latter are shown in Table 4-21.

These technologies represent, conservatively, roughly another \$160 million in installed

**Table 4.20.—Estimated Use of Electronic Publishing Software, Calendar Year 1987**

Software/Vendor	Total units in United States	Estimated units in U.S. Government
<b>Page makeup software</b>		
Aldus Pagemaker . . . . .	115,000	6,000
Xerox Ventura . . . . .	85,000	12,000
All others ... , ... , . . . . .	66,000	3,000
Totals . . . . .	226,000	21,000
<b>Page description software</b>		
Hewlett. Packard PCL . . . . .	210,000	29,000
Postscript . . . . .	420,000	14,000
Proprietary for printer . . . . .	790,000	67,000
Typesetter . . . . .	125,000	8,700
Other laser printer . . . . .	45,000	11,000
Totals . . . . .	1,590,000	129,700

SOURCE: TypeWorld, F. J. Romano, 19S8

**Table 4-21.—Estimated Use of Other Electronic Publishing Technologies, Estimated, Calendar Year 1987**

Technology	Estimated units in U.S. Government	Estimated cost per unit
High-end electronic publishing software . . . . . (e.g., Interleaf)	loos	\$40K
High-end workstation . . . . . (e.g., Sun)	1,000s	\$20K
Low-end laser printers . . . . . (e.g., HP Laserjet)	10,000s	\$ 3K

SOURCE: Office of Technology Assessment, 1988

equipment (assuming 300 units high-end software at \$40 K/unit + 3000 units highend workstations at \$20 K/unit + 30,000 units low-end laser printers at \$3 K/unit = \$12M + \$60M + \$90M = \$162 M). These estimates suggest that the Federal Government, and primarily the executive agencies, have already invested about \$350-\$400 million in electronic publish-

**Table 4-19.—Civilian Department Agency Use of selected Electronic Technologies (percent of agencies responding)**

Technology	Currently in operational use	Currently prototyping or pilot testing	Totals
Computer-aided page makeup . . . . .	50.0	8.8	58.8
Computer graphics . . . . .	65.8	7.9	73.7
Electronic photocomposition . . . . .	43.9	7.9	51.8
Laser and other non-impact printing . . . . .	64.0	1.8	65.8
Desktop publishing system . . . . .	34.2	14.9	49.1
Electronic publishing system . . . . .	21.1	10.5	31.6

SOURCE: U S Government Printing Office, F R Romano, and Office of Technology Assessment, 19S8

ing and related technologies, with no end to agency procurements in sight. Also, these figures do not include any allocation of the over 25,000 mainframe computers and the estimated 500,000 microcomputers in the Federal Government that are used in part for electronic publishing applications. Finally, these figures do not reflect the rapidly growing agency pilot tests and operational applications for direct electronic dissemination via bulletin boards, electronic mail, CD-ROM, and the like.

#### Trends in Demand

This high level of agency activity reflects, in part, opportunities presented by advancing technology and the overall drive to automate agency functions. However, agency activities also reflect growing demand on the part of Federal information users to receive information in electronic formats.

The results of the GAO survey of Federal information users document this demand. For example, the depository library community, which heavily reflects university, research, and

Federal libraries, indicated a strong preference to obtain increasing percentages of Federal information in electronic form and declining percentages in paper and microfiche. The results for 318 depository libraries responding out of a sample of 450 (34 out of 50 regional depository libraries and 284 out of 400 selective depository libraries) are highlighted in Table 4-22. Only the most significant changes are included here. These results show that the library community desires or anticipates decreases in use of paper and microfiche formats, significant increases in electronic mail or bulletin boards and floppy disks, and substantial increases in online databases and compact optical disks.

Trends for other segments of the Federal information user community are not so dramatic but show a similar pattern. The results for 109 scientific and technical associations responding to the GAO survey (out of a sample of 250) are highlighted in Table 4-23.

The GAO survey of Federal agencies indicates that agency use of electronic dissemina-

**Table 4-22.—Depository Library Demand for Federal Information, by Type and Format**

Type of information	Format	Number of libraries using		
		Now	Next 3 years	Percent change
Congressional record/hearing/reports/bills	paper . . . . .	271	234	- 13.7
	microfiche . . . . .	274	225	- 17.9
	online database . . . . .	59	132	+ 124.0
	floppy disk . . . . .	0	27	large increase
	compact optical disk . . . . .	3	112	+ 3,633.0
Scientific and technical reports/information	paper . . . . .	244	172	- 17.2
	microfiche . . . . .	212	159	-21.7
	online database . . . . .	76	95	+25.0
	floppy disk . . . . .	1	27	+ 2,600.0
	compact optical disk . . . . .	9	78	+ 767.0
Press releases/bulletins	paper . . . . .	246	183	-25.6
	microfiche . . . . .	39	35	-10.3
	electronic mail or bulletin board . . . . .	9	51	+467.0
	online database . . . . .	24	50	+ 108.0
	compact optical disk . . . . .	1	18	+ 1,700.0
Statistical data	paper . . . . .	309	270	- 12.6
	microfiche . . . . .	241	134	-44.4
	electronic mail or bulletin board . . . . .	12	27	+ 125.0
	online database . . . . .	103	158	+ 53.4
	magnetic tape/disk . . . . .	11	25	+ 127.0
	floppy disk . . . . .	12	65	+442.0
	videodisk . . . . .	0	12	large increase
	compact optical disk . . . . .	15	140	+833.0

SOURCE: GAO Survey of Federal Information Users, 1988.

Table 4-23.—Scientific and Technical Association Demand for Federal Information, by Type and Format

Type of information	Format	Number of associations using		
		Now	Next 3 years	Percent change
Congressional record/hearings/ reports/bills	paper . . . . .	61	57	-6.6
	electronic mail or bulletin board . . . .	1	18	+ 1,700.0
	online database . . . . .	4	22	+ 450.0
	floppy disk . . . . .	0	13	large increase
Scientific and technical information	paper . . . . .	89	75	- 15.7
	microfiche . . . . .	8	5	- 37.5
	electronic mail or bulletin board . . . . .	6	24	+ 300.0
	online database . . . . .	9	30	+ 233.0
	floppy disk . . . . .	6	20	+ 233.0
	compact optical disk . . . . .	1	3	+ 200.0
Press releases/bulletins	paper . . . . .	77	60	- 22.1
	electronic mail or bulletin board . . . . .	3	26	+ 767.0
	online database . . . . .	5	16	+ 220.0
	floppy disk . . . . .	1	10	+ 900.0
Statistical data	paper . . . . .	60	49	-18.3
	electronic mail or bulletin board . . . . .	1	11	+1,000.0
	online database . . . . .	6	23	+283.0
	floppy disk . . . . .	5	23	+360.0
	compact optical disk . . . . .	1	5	+400.0

SOURCE: GAO Survey of Federal Information Users 1988

tion is already significant for some types of information and is projected to expand considerably over the next 3 years. For the 114 civilian departmental agency components responding, some key trends are indicated in Table 4-24.

While generalizations are difficult, the survey data suggest that, for several major types of Federal information, especially statistical data, scientific and technical reports/information, administrative reports, and press releases, about one-fifth to one-third of the executive branch agencies expect to have electronic dissemination available within 3 years. The dominant electronic formats vary by type of information. Probably one-tenth to one-eighth of the agencies expect to have electronic dissemination of other types of Federal information (e.g., pamphlets, manuals, regulations, directories). Overall, however, the survey data suggest that despite dramatic increases in electronic formats, paper will still be the dominant format for the near- to medium-term.

#### Opportunities and Challenges

These trends in technology, user demand, and agency activities present GPO with a num-

ber of challenges and opportunities. Principal among these are: electronic input, structured database standards, electronic publishing support, dissemination of electronic formats, staffing, and capital investment.

#### Electronic Input

As noted earlier, most Federal agencies already have the technology needed to originate materials in electronic form and capture the key strokes needed to initially enter the data and make subsequent revisions. Once the material is ready for composition and layout, and assuming the originating agency is not performing these functions, it is generally more cost-effective to transmit the data in electronic form to GPO so as to minimize any necessary rekeyboarding. The cost savings can be substantial. GPO estimates that rekeyboarding costs on average \$35 to \$50 per page, whereas electronic input costs \$1 to \$15 per page, depending on how much recoding and reformatting are needed. For electronic input materials using the GPO structured database standards, the average cost is \$1 to \$2 per page, since no rekeyboarding and minimal recoding or reformatting are needed.

**Table 4-24.—Agency Activities and Plans for Electronic Information Dissemination, by Type and Format**

Type of information	Format	Percent of agencies using		
		Now	Next 3 years <sup>a</sup>	Percent change
Administrative reports	Electronic mail . . . . .	14.0	28.1	+87.90/0
	Electronic bulletin board . . . . .	0.9	8.8	+ 878.0
	Electronic data transfer . . . . .	12.3	21.1	+71.5
	Magnetic tape/disk . . . . .	6.1	11.4	+82.0
	Floppy disk . . . . .	7.9	16.7	+111.4
	Compact optical disk . . . . .	—	2.6	+
Scientific and technical reports/ information	Electronic mail . . . . .	6.1	15.8	+ 159.0
	Electronic bulletin board . . . . .	6.1	10.5	+72.1
	Electronic data transfer . . . . .	14.9	18.4	+23.5
	Magnetic tape/disk . . . . .	14.0	16.7	+ 19.3
	Floppy disk . . . . .	8.8	16.7	+ 90.0
	Compact optical disk . . . . .	—	8.8	+
Press releases	Electronic mail . . . . .	13.2	28.1	+ 112.9
	Electronic bulletin board . . . . .	5.3	12.3	+ 132.1
	Electronic data transfer . . . . .	7.0	13.2	+ 88.5
	Floppy disk . . . . .	3.5	7.0	+ 100.0
	Video tape . . . . .	6.1	8.8	+44.3
Pamphlets/bulletins	Electronic mail . . . . .	8.8	18.4	+ 109.0
	Electronic bulletin board . . . . .	3.5	10.5	+ 200.0
	Electronic data transfer . . . . .	4.4	13.2	+200.0
	Floppy disk . . . . .	1.8	9.6	+433.3
Manuals	Electronic mail . . . . .	0.9	9.6	+ 966.6
	Electronic bulletin board . . . . .	0.9	5.3	+488.9
	Electronic data transfer . . . . .	3.5	11.4	+225.7
	Floppy disk . . . . .	5.3	14.0	+ 164.2
	Compact optical disk . . . . .	—	3.5	+
Decisions/opinions	Electronic mail . . . . .	2.6	10.5	+303.9
	Electronic bulletin board . . . . .	—	5.3	+
	Electronic data transfer . . . . .	2.6	9.6	+269.2
	Magnetic tape/disk . . . . .	0.9	4.4	+ 388.9
	Floppy disk . . . . .	2.6	6.1	+ 134.6
Rules, regulations, directives, circulars	Electronic mail . . . . .	8.8	18.4	+ 109.1
	Electronic bulletin board . . . . .	0.9	6.1	+577.8
	Electronic data transfer . . . . .	2.6	10.5	+ 303.9
	Floppy disk . . . . .	6.1	12.3	+ 101.6
Directories/catalogs/bibliographies	Electronic mail . . . . .	0.9	11.4	+ 1,167.0
	Electronic bulletin board . . . . .	1.8	7.9	+ 339.0
	Electronic data transfer . . . . .	8.8	18.4	+ 109.1
	Magnetic tape/disk . . . . .	8.8	11.4	+29.5
	Floppy disk . . . . .	5.3	14.9	+ 181.1
	Videodisk . . . . .	0.9	3.5	+288.9
	Compact optical disk . . . . .	—	7.9	+
Statistical data	Electronic mail . . . . .	7.9	20.2	+ 155.7
	Electronic bulletin board . . . . .	3.5	12.3	+251.4
	Electronic data transfer . . . . .	17.5	25.6	+46.3
	Magnetic tape/disk . . . . .	31.6	34.2	+8.2
	Floppy disk . . . . .	19.3	31.6	+63.7
	Compact optical disk . . . . .	—	2.6	+

<sup>a</sup>Calculated by adding the percentage of agencies now using the format indicated to the number of agencies who expect to use the format within the next 3 years. Assumes that agencies currently using a format will continue to do so.

SOURCE: GAO Survey of Federal agencies, 1987.

GPO already provides multiple options for electronic input, as noted earlier, including scanned input, floppy disks, magnetic tapes, dial-up telephone lines, and fiber optic lines. Some of these options could be refined and/or expanded.

GPO has scanners that can read most of the popular typewriter and word processor fonts and convert the material from alphanumeric characters to electronic form. However, the scanned copy must be very clear and legible in order to obtain a low error rate and, in any

event, must be coded as well as scanned in order to produce a database for input to the GPO composition system. As a result, the cost of scanned input is higher than other purely electronic input modes but, when properly selected, can be much lower than rekeyboarding.

Scannable material is still a small percentage (about one-fifth) of all material in manuscript form received by GPO. As long as manuscript copy is submitted, the more that is scannable, the lower the costs. GPO could intensify efforts to advise agency customers of the scanner option and the typeface and format requirements. GPO could also aggressively evaluate state-of-the-art scanner technology in order to increase the range of typefaces and fonts that can be scanned, and to simplify recoding to the extent feasible. Also, agencies which have their own scanners could be encouraged to do the scanning themselves and submit materials to GPO in floppy disk or other direct electronic format. However, in the final analysis, scanners are much slower and more error-prone than direct electronic formats.

GPO has a floppy disk reader that is capable of reading over 100 different disk formats from a wide range of word processing systems. Agencies can submit their material on floppy disks, and the word processing codes for typeface and format used on these disks can be converted to GPO's structured database codes. Very few agencies currently make use of this option. GPO could encourage greater agency use of floppy disk input, especially as a substitute for manuscript submission, which requires complete rekeyboarding. GPO could also survey the Federal agencies to ascertain the types and distribution of word processing systems being used, and could add capability to existing GPO equipment to convert other kinds of disk formats used by agencies. Floppy disk conversion does require quality control on the part of the agencies to insure consistently error-free coding. Floppy disk input is generally best suited for shorter documents, cheaper than scanned input, but more expensive than magnetic tape input.

Magnetic tape input is the dominant mode used by executive agencies, and is used to a lesser, but still significant, extent by legisla-

tive branch agencies. Magnetic tape represents a high speed, high volume, low cost per page way to transmit material from originating agencies to GPO for composition, typesetting, and printing. Magnetic tapes can be provided to GPO in any of three formats: database tapes, direct drive tapes, and data tapes.

Database tapes are produced by the originating agency (or an agency contractor) using GPO's structured database specifications. These tapes require no code conversion and serve as input to the GPO composition system. GPO has been processing database tapes for nearly twenty years. The preparation of camera ready copy at GPO from database tapes is inexpensive, priced at \$1.85 per page. The preparation of film negatives from data tapes costs \$3.15 per page. Direct drive tapes are produced by the originating agency (or an agency contractor) using not only GPO's structured database specifications, but also GPO'S electronic composition codes (with type face and page format already specified). Direct drive tapes provide direct input to GPO's phototypesetters, producing camera ready copy or film negatives. The preparation of camera ready copy or film negatives from direct drive tapes is \$0.30 cheaper per page than from database tapes, at \$1.55 and \$2.85 per page respectively, and is a low-cost way of providing materials to GPO. The use of both database and direct drive tapes has increased in recent years, as indicated in Table 4-25.

These two forms of magnetic tape input are likely to continue at or above present levels for the foreseeable future, so long as traditional ink-on-paper output formats are needed and GPO traditional printing services remain competitive. Some agencies have the capability to produce magnetic tapes, but do not have the

**Table 4-25.—GPO Pages Produced from Database and Direct Drive Magnetic Tapes, Fiscal Years 1983-87**

Fiscal year	Database tapes total pages	Direct drive tapes total pages
1983 .....	392,162	350,723
1984 .....	654,606	859,497
1985 .....	769,791	781,398
1986 .....	926,445	724,889
1987 .....	807,507	838,545

SOURCE U S Government Printing Off Ice, 1988

expertise or desire to code the tapes to GPO specifications. In these cases, GPO does not have to rekeyboard the substantive material, but does have to convert from agency codes to GPO's structured database standards and insert composition codes. These tapes are handled on a case-by-case basis similar to the floppy disks.

A final means of input to be discussed here is electronic transmission via dial-up telephone lines, fiber optic lines, satellite private lines, and the like. Conceptually, the originating agency keyboards the data on its own micro-computer or other terminal, electronically transmits the data via a telecommunications link to GPO for composition, and electronically receives the proof pages back from GPO via the telecommunications link for printout on a laser printer. Corrections can be made on the proof copy and electronically transmitted (or mailed) back to GPO, where the final pages are produced on GPO's phototypesetters. As of January 15, 1988, the organizations listed in Table 4-26 were using dial-up transmission for input and proofing of various publications.

While electronic transmission represents, at present, a small portion of total input to GPO, this use for electronic input is likely to grow significantly, especially if proven to be cost effective. The experience with the fiber optic transmission between the Senate Office of Legislative Counsel and GPO is illustrative. The Legislative Counsel uses a fiber optic link to transmit draft bills to GPO, where they are typeset and transmitted back to the Legislative Counsel's Office and proof copies are pMted out on laser printers. During fiscal year 1987, 163,893 pages were transmitted in this fashion at a total GPO billable cost of \$75,350, or about \$0.46 per page. This appears to be a competitive price, although it presumably does not reflect any capital costs (such as the fiber optic link or laser printers) and does not include the GPO cost of printing copies of the bills in final form. Also, bills are very straight forward in format. While not strictly comparable, the average GPO per page composition cost for the U.S. Code using magnetic tape input was about \$7.40 per page in fiscal year 1986

**Table 4-26.—GPO Dial-Up Electronic Transmission Customers, January ,388**

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**Executive branch**

Department of Commerce  
 Department of Housing and Urban Development  
 Department of Transportation, Federal Aviation Administration  
 Department of the Treasury, Customs Bureau  
 Veterans Administration  
 Office of Management and Budget  
 Office of the Federal Register, Code of Federal Regulations

**Legislative branch**

GPO—Daily Congressional Record, Record Index, Bills  
 Library of Congress

**House of Representatives**

Committee on Banking, Hearing  
 Committee on the Budget, Hearing  
 Committee on Energy and Commerce, Hearing,  
 Committee Print  
 Committee on Foreign Affairs, Committee Prints  
 Committee on the Judiciary, Hearings  
 Committee on Small Business, Hearings  
 Committee on Veterans Affairs, Committee Print,  
 Hearings, Report, Title 38 (U.S. Code)  
 Sergeant At Arms, Notice  
 Office of Legislative Counsel  
 Office of the Clerk, Calendars, Lists, Stationary,  
 Directory

**U.S. Senate**

Committee on Veterans Affairs, Hearing  
 Office of the Secretary, Document, Book, Senate  
 Journal  
 Office of Legislative Counsel

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SOURCE: U.S. Government Printing Office, 1988.

(6,158 pages at a total cost of \$45,592). The U.S. Code is more complex and contains more characters per page than a bill, and bills usually go through several revisions. If one assumes three revision cycles for bills, with 4 bill pages equivalent to one *U.S. Code* page, the costs are similar.

**Structured Database Standard**

As mentioned in chapter 3, a structured database standard is a key aspect of overall standards development for electronic publishing and dissemination. GPO has developed and implemented what it calls a logically structured full-text database standard or specification, or simply a structured database standard for short. All this really means is that the database (containing textual, tabular, and/or numerical information) contains no coding unique to a specific word processing or typesetting system.



Data elements are tagged with an identifier that can be used to control the format of a particular document. Users who agree on and implement a common set of structured database standards are able to change the database easily and cost-effectively from one location to another, one format to another, and one revision to a later revision or edition.

GPO uses its own structured database standard for the vast majority of materials composed and produced at the GPO main plant. However, the GPO standard is not, at present, generally accepted by private industry and significant parts of the Federal Government. For example, DoD is committed to the Standard Generalized Markup Language (SGML) approach, which is similar to GPO's approach, but still a distinctly different standard. Many of the desktop and high-end electronic publishing systems located in Federal agencies use display oriented standards (what you see on the screen is what you get in the document) and/or structured database approaches different from GPO'S.

GPO indicates that software could be written to convert SGML (or presumably any other markup language) automatically into GPO's logically structured full text database approach. Also, GPO is prototyping a desktop microcomputer-based version of its structured database software.

In sum, as noted in Table 4-27 there is significant use of GPO's database standard. But this percentage of use is only a small fraction of all government publications. This suggests a significant, unrealized opportunity to apply GPO's or some other approach as a broadly accepted and acceptable government wide database standard.

#### Electronic Publishing Support

Under the electronic GPO-decentralized alternative, GPO would need to develop an overall *electronic* publishing strategy that leverages GPO strengths to meet changing needs of the Federal agencies. This strategy is likely to differ for the executive and legislative branches of government. As presented in de-

**Table 4-27.—Departmental Applications of GPO Structured Full Text Database Standard, as of November 1987**

Department	Number of publications or publication series using GPO standard
Agriculture . . . . .	12
Air Force . . . . .	4
Army . . . . .	11
Commerce . . . . .	38
Defense (other) . . . . .	13
Energy . . . . .	2
HHS <sup>a</sup> . . . . .	23
Interior . . . . .	7
Justice . . . . .	3
Labor . . . . .	8
Navy . . . . .	15
Transportation . . . . .	11
Treasury . . . . .	10
State . . . . .	6
Total . . . . .	163

<sup>a</sup>Health and Human Services

SOURCE: U.S. Government Printing Office, 1988

tail earlier, the executive branch has made and continues to make a major investment in electronic publishing and related technologies, typically as part of agency automation programs. While implementation varies widely, electronic publishing is conceptually viewed as part of agency information resources management (IRM), and staffing, budgeting, and the like are evolving within the IRM framework. Many agencies are committed to a transition from paper to electronic-based operations, although the transition is likely to take many years.

For the executive branch, several roles for GPO are emerging. First, GPO can continue to provide traditional printing services either at the well-equipped main plant or via outside procurement. Second, GPO can continue to improve cost-effectiveness at the input and prepress end of the printing process by encouraging electronic submissions, already at very high levels, and dial-up composition services, where appropriate. Third, GPO can encourage adoption of governmentwide structured database standards as discussed above. Fourth, GPO can provide or facilitate mechanisms for training and education about electronic publishing.

On the one hand, GPO's greatest assets are its traditional printing facilities and labor force, coupled with a substantially automated prepress capability, including electronic photocomposition and typesetting. GPO is well suited for agency work requiring typeset quality ink-on-paper output, for large documents and long press runs, and for a variety of specialty jobs. GPO's structured database standard, or some variation thereof, is well suited to provide cost-effective linkages between document origination, revision, and multi-format dissemination, regardless of who is doing the disseminating. On the other hand, many of the executive agencies are committed to acquiring and implementing their own electronic publishing and dissemination capability, largely as part of agency automation programs in which GPO has little or no involvement. Some agencies, and especially the defense and regulatory agencies, are determined to reduce their dependence on paper drastically within the next few years.

The plans and activities of defense agencies are particularly important, since, as shown in Table 4-28, the Army, Navy, and Air Force together account for about \$250 million in GPO billings or roughly one-third of total GPO billings. The Navy, for example, has established the "paperless ship" as a prime directive. All military services are hoping to place most

**Table 4-28.—Ten Largest GPO Printing Customers, Fiscal Year 1986**

Customer	Fiscal year 1986 billings	
	Dollars in millions	Percent of fiscal year 1986 total <sup>a</sup>
Army . . . . .	134.7	18.3
Navy . . . . .	74.6	10.1
Congress . . . . .	68.0	9.2
Treasury . . . . .	65.6	8.9
Postal Service . . . . .	53.0	
HHS <sup>b</sup> . . . . .	49.8	:::
Air Force . . . . .	48.0	6.5
GSA . . . . .	23.0	3.1
Agriculture . . . . .	21.8	3.0
Energy . . . . .	19.3	2.6

<sup>a</sup>Percent of fiscal year 1986 GPO total revenues of \$737 million of publications sales, appropriations, and reimbursements.

<sup>b</sup>Health and Human Services.

SOURCE: U.S. Government Printing Office, 1988

manuals, directives, and technical documentation on electronic media for filing, revising, updating, and disseminating.

GPO's high dependence on printing for defense customers is concentrated at several of the regional procurement and printing facilities, as shown in Table 4-29. In the extreme case that most traditional ink-on-paper defense work was phased out (over a period of several to many years), only the GPO main printing plant, rapid response center, Chicago, Denver, New York, and San Francisco regional printing plants, and Denver and Seattle regional procurement offices would be substantially unaffected. All other offices could lose between

**Table 4.29.—Distribution of GPO Defense Customers by Procurement and Printing Offices, Fiscal Year 1986**

	Total Defense Agency billings, fiscal year 1986 <sup>a</sup>	
	Dollars in millions	Percent of office total <sup>b</sup>
<b>Procurement offices</b>		
Boston Regional . . . . .	3.3	69.9
Philadelphia Regional . . . . .	27.0	84.8
New York Regional . . . . .	7.3	58.2
Hampton Regional . . . . .	19.5	89.7
Atlanta Regional . . . . .	23.7	71.1
Chicago Regional . . . . .	21.8	73.6
Columbus Regional . . . . .	8.3	68.3
St. Louis Regional . . . . .	12.0	70.4
Dallas Regional . . . . .	13.7	61.4
Denver Regional . . . . .	3.5	23.7
Los Angeles Regional . . . . .	7.1	77.0
San Francisco Regional . . . . .	7.1	52.7
Seattle Regional . . . . .	2.7	26.4
San Antonio Satellite . . . . .	2.6	95.6
Charleston Satellite . . . . .	1.1	85.2
San Diego Satellite . . . . .	0.2	99.4
Oklahoma City Satellite . . . . .	0.07	100.0
Rapid Response Center . . . . .	1.2	9.7
<b>Printing Offices</b>		
Chicago Regional . . . . .	0.02	1.0
Denver Regional . . . . .	0.1	4.8
New York Regional . . . . .	0.5	34.3
San Francisco Regional . . . . .	0.1	16.8
Seattle Regional . . . . .	0.2	59.6
Rapid Response Center . . . . .	1.4	15.5
<b>Main Plant</b>		
Procurement . . . . .	63.6	19.3
Printing . . . . .	17.2	9.3

<sup>a</sup>F., Army, Navy, Air Force, Defense Logistics Agency, and Other Defense Agencies

<sup>b</sup>Defense agency billings calculated as a percentage of total billings for each Office

SOURCE: U. S. Government Printing Office, 1988

half and over 90 percent of current billings, all other things being equal.

Clearly, then, an important part of GPO's electronic publishing strategy would logically be a very careful analysis of how defense automation activities are likely to affect the demand for traditional GPO printing services over what time frame, and what are the leveraged opportunities for GPO with respect to the emerging defense electronic information infrastructure.

Such an analysis would require, first, that GPO obtain basic information about defense agency automation plans. Up to now, GPO has directly participated in only a handful of defense automation programs, including the Army Programs 600-S (terminated before contract award) and 400-S (contract awarded in 1984) and the Air Force Program 50-S (contract awarded in 1988). However, these three electronic publishing programs represent only a fraction of all relevant DoD activities. For example, GPO did not participate in the Navy's "Printing on Demand System" designed to produce 15,000 15-page documents per day on an electronic printing-on-demand basis.

In addition to keeping more fully informed on agency automation activities (both military and civilian), GPO could establish an electronic publishing laboratory and innovation center for both GPO and agency personnel. GPO already has taken some action along these lines with respect to establishment of the "dial-up composition service" now available. This service permits agencies to originate material from agency microcomputers, transmit the material over telephone or fiber optic lines to GPO for typesetting, and receive the typeset material via transmission back to the agency for printing of proof copies on agency laser printers. This dial-up service uses GPO's logically-structured database, and GPO provides both a demonstration room and a training program.

This concept could be expanded to a much wider range of electronic publishing applications, including high-end and optical disk configurations. From a strategic perspective, GPO

would benefit from staying abreast or, perhaps, ahead of agency applications and thereby be in a much better position to identify opportunities to meet agency needs. In a decentralized and competitive electronic environment which increasingly characterizes the Federal Government, GPO will have to be imovative in matching its expertise with agency needs. Agency needs will vary over a wide spectrum and will change over time at an increasingly rapid pace. Some agencies will look to GPO for a wide range of electronic publishing services, assuming such services are available, while others will be completely independent of GPO, regardless of what GPO offers.

At this point in time, it is not possible to determine with precision the extent of agency needs for GPO electronic publishing services. In 1986, GPO conducted its own survey of agency needs. The results (based on 175 of 850 questionnaires returned—a 20 percent response rate) strongly indicate that almost all agencies will be using electronic publishing within 5 years, especially for reference materials, technical documentation, and periodicals, but the role of GPO is much less clear. Roughly one-fifth to one-quarter of the respondents indicated a near-term preference for GPO automatic composition, computer-aided page makeup, and typeset quality output, increasing to about one-third of the respondents in 5 years. This compares to the roughly two-thirds of the respondents who indicated an overall intent to use these electronic publishing services in 5 years. This suggests that perhaps up to about one-half of these types of agency electronic publishing work might be done by GPO, and the other half by the agencies themselves (or by agency contractors). The results suggest a relatively smaller role for GPO with respect to text input and editing, electronic display, data telecommunicating, and computer generated graphics, although the overall use of these GPO services was still projected to grow significantly.

The response rate to this 1986 survey was low, and both agency and GPO activities—as well as the underlying technologies—have changed markedly since then. Clearly, a new

survey is needed and hopefully with a much higher response rate. Some highlights from the 1986 survey are shown in Table 4-30.

Several of the agency respondents indicated in written comments that use of GPO electronic publishing services would depend in large part on whether such services were cost-effective compared to in-house costs or commercial rates. In essence, GPO is competing for agency electronic publishing business against agency inhouse, contractor, and commercial vendor alternatives. GPO is already moving to provide more electronic publishing options, but the pace is still much slower than the rates of change in technology, agency activities, and user needs.

While GPO training and innovation activities are relevant to all branches of government, the role of GPO with respect to legislative branch electronic publishing could be different in several key ways. First, the legislative branch has not yet made the major capital in-

vestment in the technical infrastructure that makes decentralized executive branch activities a reality. Second, the legislative branch generally does not have a large number of staff already trained in electronic publishing. Third, GPO is in the legislative branch, so separation of powers concerns do not apply. Fourth, GPO already has a central role in many legislative branch publishing activities. And fifth, many of GPO's own pilot projects involve the legislative branch, such as the fiber optic links between GPO and the Senate Office of Legislative Counsel, House Office of Legislative Counsel, and House Information Systems Office (HIS).

For all of these reasons, GPO could develop plans for an expanded role with respect to the legislative branch. These plans could include the GPO provided capability for congressional committees and offices to search, retrieve, and print-on-demand key governmental process documents such as the *Congressional Record*, *Record Index*,

**Table 4-30.—Federal Agency Electronic Publishing Activities and Plans, as of 1986 in Percent of Agencies Responding**

Types of documents for which electronic publishing is/will be used	Currently	In 5 Years	
Reference Materials . . . . .	35/0	57 %/0	
Technical documentation . . . . .	37	56	
Periodicals . . . . .	26	48	
Throwaway . . . . .	21	36	
Catalogs . . . . .	14	31	
Legal documentation . . . . .	10	20	
Electronic publishing services that are/will be used	Currently	Next year	In 5 years
Text input and editing (microcomputers, word processors) . . . . .	75/0	82/0	87%0
Automatic composition (software/systems) . . . . .	25	40	56
Computer generated graphics . . . . .	42	59	77
Computer-aided page makeup, . . . . .	17	34	61
Typeset quality output . . . . .	34	45	57
Electronic display . . . . .	33	43	58
Data telecommunicating . . . . .	43	54	68
GPO electronic publishing services that will be used		Next year	In 5 years
Text input and editing . . . . .		90/0	140/0
Automatic composition . . . . .		19	28
Computer generated graphics . . . . .		14	20
Computer-aided page markup . . . . .		22	30
Typeset quality output . . . . .		29	38
Electronic display . . . . .		11	16
Data telecommunicating . . . . .		13	18

SOURCE U.S. Government Printing Office, 1988.

***Federal Register*** and ***Code of Federal Regulations***, all of which are already in an electronic structured database format. This concept could be extended to include the capability to search, retrieve, and print-on-demand selected committee prints, reports, and hearings, although the degree of difficulty would be considerably greater since little of this material is currently in structured database format. This problem could be gradually eliminated overtime if more committees utilized GPO electronic database and photocomposition capability, either on a dial-up or floppy disk basis. These alternatives will become more widely possible as the penetration of microcomputers on Capitol Hill continues. Any detailed planning along these lines would need to take into account the inevitable increase in desktop publishing (software has decreased to the \$600 per unit range) and the complementary roles of GPO, the Library of Congress, HIS, and the Senate Computer Center.

#### Dissemination of Electronic Formats

Under the "Electronic GPO-Decentralized" alternative, SupDocs would select agency electronic format information products for inclusion in the GPO sales program, presumably based on an evaluation of sales potential. Agencies could sell such products as well, but could also opt, at agency discretion, to use SupDocs as their sales outlet.

At the present time, SupDocs includes only a few dozen magnetic tape products in the sales program. These tapes are sold at the usual cost plus 50 percent (in accordance with Title 44 of the U.S. Code) and include, for example, the *Congressional Record*, *U.S. Code*, *Code of Federal Regulations*, *Federal Register*, *Statistical Abstract of the U. S.*, *Budget of the United States*, *Weekly Compilations of Presidential Documents*, and *U.S. Government Manual*. At the moment, these magnetic tape products are sold primarily to commercial information vendors—such as Mead, WE STLAW, DIALOG, Legi-Slate, Congressional Quarterly, and BRS—which repackage or enhance and resell the information.

GPO planning for an expanded offering of electronic formats would need to take into account questions of demand, economies of scale, cost, private sector competition, and marketing. The results of the GAO surveys of Federal information users clearly indicated a growing demand for electronic formats, as discussed earlier. As part of these surveys, GAO also asked respondents to estimate the usefulness of a variety of online and offline Federal information formats. The depository library community indicated the strongest positive response, with a clear majority of respondents finding the illustrative items to be useful. These results (based on responses from 318 depository libraries, out of a sample of 451) are summarized in Table 4-31 and the number of libraries rating each item as moderately useful, useful, or greatly useful out of the total respondents for that item. The remaining percentages (not shown in Table 4-31) include those libraries rating the item as somewhat useful or having little or no use. The respondents were asked to reply irrespective of how the formats might be provided (e.g., by the Federal Government, commercial vendors, and/or not-for-profit organizations).

The depository library results suggest very strong demand for the *Congressional Record*, calendars and bill status, the *Federal Register*, an index to Federal information, and an integrated database in both online and offline electronic formats. Demand for agency press releases and reports is weaker. In terms of intensity of demand, as measured by the percentage of libraries rating these items as greatly useful, the results indicate the highest rankings for the index and integrated database (online and offline) followed by the *Register* (online and offline), committee calendar and bill status (online), and *Record* (online and offline).

The information needs of depository libraries could, of course, be met to some extent through DLP, as discussed in detail in chapters 6 and 7. However, the depository libraries serve as a good indicator of demand among library and information science professionals and those groups in American society that are the most information-intensive.

Table 4-31.—Depository Library Demand for Federal Information Electronic Formats

Item	Percent of libraries responding moderately to greatly useful	
	Online immediate access	Offline CD-ROM issued monthly
Congressional Record . . . . .	77	74
Committee Calendar and Bill Status . . . . .	70	60
Federal Register . . . . .	86	80
Federal Agency Press Releases . . . . .	46	40
Agency Reports . . . . .	61	62
Comprehensive Index to Federal Information . . . . .	94	90
Integrated Database of Key Federal Statistical Series . . . . .	90	88

SOURCE GAO Survey of Federal Information Users, 1988

GAO also surveyed scientific and technical associations and general associations (trade, professional, consumer, etc.). The results (based on 133 responses from a sample of 250 scientific and technical associations, and 134 out of 350 general associations) are similar to those of the depository libraries, but with a considerably lower level of intensity. In other words, while the relative preferences for various types of electronic information formats were roughly the same, the overall percentages of respondents rating the items as moderately to greatly useful were about half to three-quarters that of the libraries for online access, and about one-third to one-half for offline access. The survey results for the associations are highlighted in Table 4-32.

All categories of respondents indicated that the index and integrated database would be the most useful among the items included in the survey. Unlike the depository libraries, which indicated little difference in usefulness of online versus offline formats, the associations showed a clear preference for online electronic formats. This may reflect, in part, differences in the nature of demand. For example, researchers using libraries may have a less urgent need for some types of Federal information and, therefore, might find monthly CD-ROMS to be adequate. Many associations may be primarily concerned with only the latest, up-to-the-minute information that necessitates online access. It is also probable that the associations are less familiar with CD-ROM technology than the libraries. Indeed, relatively few

associations reported having access to CD-ROM readers compared to the libraries, as indicated in Table 4-33.

Clearly, depository libraries have better access to all categories of technology listed except mainframe computers. Scientific and technical associations have generally better access than the general associations, with the exception of microfiche readers, CD-ROM readers, and videodisk players, where the groups of associations are about equal.

The implications for SupDocs are several. First, there does appear to be an already significant demand for electronic formats, but, second, this demand at the moment is somewhat ahead of the actual technical capability of users, especially with respect to CD-ROM. Taking all survey groups together, online demand ranges from 34 to 94 percent of respondents while microcomputer with modem capability ranges from 54 to 83 percent. Offline CD-ROM demand ranges from 22 to 90 percent, but CD-ROM reader capability ranges from only 6 to 41 percent. However, third, continually declining equipment costs mean that the gap between user demand and technical capability is likely to close rather rapidly. Microcomputers cost \$1,500 or less, modems about \$300, and CD-ROM readers about \$700.

For types of information where a demand has been established, SupDocs would need to determine if including a particular item in the sales program would be cost-effective and competitive relative to any other alternatives that

**Table 4-32.—Scientific, Technical, and General Association Demand for Federal Information Electronic Formats**

Item	Percent of associations responding moderately to greatly useful					
	Scientific and technical associations			General associations		
	Online immediate access	Offline access issued	CD-ROM monthly	Online immediate access	Offline access issued	CD-ROM monthly
<i>Congressional Record</i> . . . . .	34 %/0		220/0	530/0		390/0
Committee Calendar and Bill Status . . . . .	39		23	54		36
<i>Federal Register</i> . . . . .	40		27	55		41
Federal Agency Press Releases . . . . .	52		30	54		36
Agency Reports . . . . .	54		33	53		40
Comprehensive Index to Federal Information . . . . .	71		43	60		43
Integrated Database of Key Federal Statistical Series . . . . .	63		42	63		43

SOURCE: GAO Survey of Federal Information Users, 1988

**Table 4-33.—Library and Association Access to Information Dissemination Technology**

Technology	Percent of libraries or associations responding		
	Depository libraries	Scientific and technical associations	General associations
Microcomputer . . . . .	700/0	640/0	51 %/0
Microcomputer with modem (for online access) . . . . .	83	65	54
Microfiche reader . . . . .	88	24	22
Microfiche reader with printer . . . . .	96	18	12
CD-ROM reader . . . . .	41	6	6
Videodisk player . . . . .	17	11	12
Mainframe computer (for tape/disk access) . . . . .	37	36	27

SOURCE: GAO Survey of Federal Information Users, 1988

may be available to users. For many types of Federal information, individual agencies and private sector vendors might decide to market electronic formats. In other words, SupDocs would be operating in a more competitive environment than has traditionally been the case with respect to paper formats. Thus, for example, at present the Bureau of the Census sells paper formats via the SupDocs sales program, but sells magnetic tapes and floppy disks itself and also offers online electronic bulletin board services. Both the Bureau of the Census and private vendors are developing CD-ROM products, and some Census CD-ROM products will be disseminated as part of DLP.

The approach taken by SupDocs in deciding what to include in the sales program could vary depending on the particular information

product. Some items, such as a government-wide information index, could be developed by SupDocs and/or NTIS, have an apparently broad demand, and could be sold in both online and CD-ROM formats. SupDocs would need to determine if electronic format products could be produced and sold at an acceptable price. For example, most depository library respondents to the GAO survey indicated that they would be willing to pay no more than \$49 per hour online and \$199 per CD-ROM for access to a governmentwide index. However, most of the associations responding indicated that they would be willing to pay no more than \$24 per hour online and \$19 per CD-ROM. OTA has not done a detailed analysis of this data, but \$24 per hour online is in line with non-profit rates for similar information products. And \$19 (or less) per CD-ROM is realistic at production volumes of over 1,000 or so disks. If the index

on CD-ROM were distributed to depository libraries, this would guarantee a base volume of about 1,400 disks. Initial demand for a CD-ROM index product could easily be in the several thousands, based on the GAO survey response. Again, since the index information would not be copyrightable, and assuming the electronic master tape (or the equivalent) would be available for purchase, private companies could put the index up as a file on DIALOG and similar value-added database services, and even could add value and sell an enhanced CD-ROM product.

In general, CD-ROM products can be produced at low unit costs at volumes over 500 to 1,000 disks. Thus, there would likely be a growing number of opportunities for SupDocs to "ride" the order for production of agency CD-ROMs, where a sufficient market exists, just as SupDocs now rides the agency orders for printed ink-on-paper products. Presumably, the mastering and duplications of CD-ROMS would be contracted out to the private sector, by either the agency or GPO, at least until such time that inhouse government capability might be more cost-effective.

As for other formats, the market for magnetic tapes is probably not going to be large in the foreseeable future, due to the need to have a mainframe or minicomputer and related peripheral equipment. Major customers are likely to continue to be the value-added vendors and scientific or research organizations. Government experience to date (at GPO and various agencies) is that sales in the hundreds of copies per year are considered good. Similarly, sales of floppy disks to date by NTIS and various agencies have been minimal. Floppy disks can be produced at only \$1 to \$5 dollars per unit, compared to about \$100 to \$200 for magnetic tapes (depending on bit density). Also, floppy disks can run on the increasingly commonplace microcomputers. Thus, the potential market for floppy disks would appear to be large compared to magnetic tapes. However, detailed market analyses are needed to establish reliable estimates.

Perhaps the most difficult format for SupDocs could be online. Whereas SupDocs could ride the agency orders for CD-ROMs, magnetic tapes, and floppy disks, regardless of where and by whom the copies were produced, it is hard to conceptualize riding an online database. It seems unlikely that, as a general rule, agencies and SupDocs would be offering the same online databases. SupDocs could offer agency online databases at agency discretion, or could offer a gateway to agency databases. Also, SupDocs could contract with a private commercial (or non-profit) gateway service. Further, private gateway or value-added database companies could contract directly with individual agencies and/or purchase the magnetic tapes, as some do today.

On the other hand, SupDocs could serve as the primary Federal outlet for online access to key governmental process information items such as the *Congressional Record* and *Federal Register*. These kinds of items are all well suited to online format because the information is frequently time sensitive and of selective interest. That is, many users are not interested in reading these documents cover to cover at their leisure, but, instead, want to quickly search for and retrieve information on selected topics of interest. The GAO survey results suggest that there would be broad demand for these items if priced below \$24 per hour. Since items such as the *Record* and *Register* are bought by vendors in magnetic tape format from SupDocs and then put online and sold at a significant mark-up, it seems plausible that SupDocs could itself offer these items online at a competitive price. SupDocs could, of course, itself contract with a private gateway or database vendor. SupDocs offerings would not necessarily have any significant impact on private services, since the markets served may be quite different. Again, detailed feasibility and marketing studies would be needed.

Overall, the development of a rational and workable plan for SupDocs sales of electronic formats would require close consultation and



coordination with mission agencies and especially those agencies that already have clearinghouse or gateway functions for electronic formats, such as NTIS and NLM. NTIS currently serves as a clearinghouse for some agency floppy disk and magnetic tape products, and NLM currently offers several agency online database services. For paper formats, SupDocs has included in the sales program primarily items judged to have significant demand, given the economics of traditional printing which penalizes small press runs and given the need to spread overhead, processing, and marketing costs over as large a sales volume as possible. However, some electronic formats could be economically viable at much lower sales volumes. To the extent SupDocs might seek to include low demand and perhaps even printing-on-demand items in the sales program, then SupDocs would be taking on NTIS-like functions. This would intensify the need to consider SupDocs-NTIS relationships, as will be discussed in chapter 5 and 12 in more detail.

### Staffing

GPO faces two major challenges with respect to staffing: retaining the necessary skilled labor force to maintain traditional printing services at a level commensurate with demand, and obtaining personnel with the new skills needed to implement GPO's future role in electronic publishing and electronic information dissemination, however that role may be defined.

As noted earlier, GPO has a relatively old labor force, with about thirteen percent of all current employees eligible for retirement (and up to 25+ percent in some key areas). With a natural attrition rate of 5-10 percent (retirements and quits), GPO has considerable flexibility to reshape the labor force to match future needs. About 80 percent of the GPO labor force is unionized and works under collective bargaining agreements. The twenty union bargaining units and the approximate number of employees in each are listed in Table 4-34.

**Table 4-34.—GPO Union Bargaining Units, as of April 1987**

Bargaining unit	Number of employees
American Federation of Government Employees (AFGE) Local 2876/Printing Crafts Joint Council (Main Plant White Collar Workers) . . . . .	1,327
Washington Federal Printing Workers' Union (Member of GCIU see below) Local 713-S (Printing plant workers) . . . . .	1,020
Columbia Typographical Union Local 101 (2 units, Composers and Rapid Response Center) . . . . .	672
Graphic Communications International Union (GCIU) Local 4-B (2 units, Bookbinders and and Journeymen Bindery) . . . . .	247
Washington Printing and Graphic Communications Union (member of GCIU) Local 1-C (2 units, Pressmen and Masonry Workers) . . . . .	232
GCIU Local 285 (Offset Strippers) . . . . .	138
Washington Government Photo Offset Union (member of GCIU) Local 538-C (Offset Platemaker Strippers) . . . . .	69
AFGE Local 3392 (Pueblo Distribution Center) . . . . .	67
International Brotherhood of Electrical Workers (IBEW) Local 121 (Electricians and Sanitary Engineers) . . . . .	65
AFGE Local 2738 (Police) . . . . .	62
AFGE Local 1248 (Denver Printing Plant) . . . . .	42
International Association of Machinists Local 2135 (Machinists) . . . . .	36
AFGE Local 1292 (Chicago Printing Plant) . . . . .	27
Sheetmetal Workers' International Union Local 100 (Sheet Metal Workers and Pipe Fitters) . . . . .	21
United Brotherhood of Carpenters and Joiners of American, Local 2456 (Carpenters) . . . . .	17
AFGE Local 2618 (New York Printing Plant). Brotherhood of Painters and Allied Trades, Local 1632 (Painters) . . . . .	14
	9
Total . . . . .	4,065

<sup>a</sup>Number of employees represented by their Union, not all employees represented are union members

SOURCE U S Government Printing Office, 1988

Collective bargaining has been able to accommodate major changes in the size and job structure of the GPO labor force over the past fifteen years, responding in large part to technological change in composition, prepress, and press tech-

nology. Collective bargaining should be able to accommodate future changes, so long as labor and management work closely together and bargain in good faith.

At the moment, one possible impediment to successful labor-management relations, as pointed out by OTA'S independent labor consultant, is the absence of a clear strategic vision of GPO's future role. The lack of a clear vision not only contributes to employee uncertainty, but makes staffing decisions difficult. It seems likely that, absent major changes in GPO's traditional printing role as discussed earlier, GPO should be able to continue its policy of no involuntary reductions in force (governed by a May 1982 resolution of the Joint Committee on Printing). Any reductions in the traditional labor force should be able to be handled through retirements and reassignments. It also seems likely that, if GPO pursues a significant role in electronic publishing and dissemination, GPO would need to bring in new skills from outside. While some existing personnel undoubtedly could be retrained for new jobs involving electronic processes and formats, as has been done in the past, some new personnel with advanced engineering, technical, and marketing education and experience would be required. The exact skills mix of retrained personnel and new hires cannot be determined in the absence of an overall strategic plan.

#### Capital Investment

Another important element of GPO's overall strategic plan would be capital investment alternatives. Again, a detailed capital investment program would require a well developed strategic plan. Short of that, it would seem prudent for GPO to reevaluate carefully its capital investment plans in light of possible adjustments to traditional printing services and possible new initiatives in electronic publishing and dissemination.

As discussed earlier, GPO has already substantially updated its main plant press and bindery equipment. The major outstanding item is the pending purchase of two new web

offset presses for the printing of the *Congressional Record* and *Federal Register* at an estimated cost of about \$10.5 million for the two units. OTA'S independent printing consultant endorsed this capital investment on the grounds of improved efficiency and productivity. However, GPO's rationale for this investment presumes that traditional printing of the *Record* and *Register* will continue for at least 10 years substantially unchanged from today. As noted earlier, the *Record* and *Register* are well suited to online and offline electronic formats for which there is growing demand. Should Congress decide to make these publications available online and through CD-ROMS issued periodically to the legislative branch and depository libraries and on a sales basis via SupDocs, then it is conceivable that the paper format versions of the *Record* and *Register* could be reduced significantly in a few years. Indeed, the volume of paper copies could be reduced to the point where the large web offset presses would no longer be cost-effective. For example, even if paper copies were still provided to every Member, committee, and office of Congress, every depository library, members of the press, high-level executive officials, and Federal and State archival agencies, the required press run of several thousand copies could be uneconomical for the large presses.

GPO notes that a change of this magnitude would conflict with current provisions of Title 44 that require the printing and distribution of specified numbers of the *Record* and *Register*. However, electronic formats could be provided first as a complement to paper and eventually, after a transition period, as a substitute, and Congress could amend Title 44 if necessary. GPO also notes that any excess capacity on the two new web offset presses could be used to absorb workloads from other, older equipment, and to facilitate a gradual phaseout of some of that equipment. In addition, the new presses would be less labor intensive and would be technologically up-to-date. GPO and Congress need to carefully evaluate whether, even if electronic formats are encouraged or required, the remaining volume of paper copies is sufficient to justify use of the large web off-

set presses or, if not, whether the other advantages noted above would by themselves be compelling.

Future capital investment in the prepress, press, and bindery areas should also reflect any decisions on changing the work load distribution at the GPO main plant. The main plant carries out a much more diverse range of printing work than almost all private printing companies. GPO could consider some greater degree of specialization in order to help reduce indirect labor and overhead costs. (The fiscal year 1986 cost allocation for the main plant production department was about 31 percent direct labor, 34 percent section burden [indirect labor, materials, etc.], 28 percent overhead [general management and staff, utilities, rent, etc.], 2 percent depreciation, and 5 percent other [supplies, maintenance, etc.]). Presumably future capital investments would be made primarily in those areas designated as GPO specialties. Also, the shift to electronic formats for the Record and *Register* could further reduce indirect labor and general overhead since the overnight main plant operations could be scaled back although not eliminated, due to the continuing need for input to and creation of the online databases by the next day.

With respect to composition equipment, OTA'S independent printing consultant concluded that GPO's current equipment is strongly competitive with private industry. GPO uses an ATEX minicomputer-based text editing system and Videocomp and Comp80 phototypesetters. As with press and bindery, the composition equipment has been substantially updated over the past decade, as highlighted in Table 4-35.

One area where GPO is not competitive is high-end electronic publishing equipment. The ATEX system is designed to handle large text files and is not well suited for smaller and specialty jobs involving complex layouts, graphics, and the like. To help meet this need, GPO established an Electronic Job Section equipped with Compugraphic and Bedford electronic publishing systems, among other equipment. The Bedford system, although two years old, is rarely used and is essentially ob-

**Table 4-35.—Selected GPO Electronic Composition Equipment,<sup>a</sup> Fiscal Year 1987**

Equipment	Number of units	Year(s) acquired
Personal computers . . . . .	12	1984-1987
Video display terminals . . . . .	160	1978-1987
Multi processor control system . . . . .	4	1983-1987
PDP 11-44 minicomputer . . . . .	2	1981,1985
Floppy disk reader . . . . .	1	1985
Text editing systems (ATEX) . . . . .	16	1978-1987
Text editing system (Videocomp) . . . . .	1	1986
Photocomposers (Videocomp, Comp 80). . . . .	4	1976-1981

<sup>a</sup>Excludes Electronic Job Section

SOURCE: U. S. Government Printing Office, 1988

solete. The Compugraphic system is used for fully processing about 60 percent of the work done in this section, and is used for partially processing (in conjunction with ATEX or other systems) another 35 percent of the work. While performance of the Compugraphic appears to be satisfactory, the now 3-year old system is obviously not state-of-the-art.

In essence, GPO's capital investment strategy depends in part on whether GPO strives for (or is directed to take) a leadership role in electronic publishing technology. An effective leadership role probably requires a heavier investment in state-of-the-art technology, partly to learn about the technology for GPO's own purposes but, equally important, to also at least stay abreast of the mission agencies, some of which, at this point in time, are well ahead of GPO. For example, GPO has no significant activity underway in optical disk or compact disk technologies and expert information retrieval systems, and is behind the state-of-the-art in high-end electronic publishing work stations and software, all of which are under active testing or actually being implemented by various agencies.

With respect to the provision of online databases, GPO would need to decide whether existing computer capability would be adequate and, if not, whether to purchase or lease additional capability or whether to, at least initially, utilize the services of private sector value-added gateway carriers and database providers. For example, if SupDocs decided to

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sell the *Congressional Record* online, the *Record* could be established as a file on The Source, CompuServe, Easylink, and/or DIALOG. This would minimize GPO's capital investment requirements until experience with actual demand levels and patterns could be analyzed. Alternatively, or in addition, the online *Record* could be set up as a file on NLM's MEDLARS, on the gateway system operated by the Defense Technical Information Center, and/or on the library community's various networks. There are numerous possibilities, especially for key governmental process information such as the *Record* and *Register*. Eventually, SupDocs online information products could be made

available via the FTS-2000, when implemented, and could make use of advanced satellite and fiber optic transmission technologies embedded in FTS-2000 and various commercial telecommunication systems.

In an era of constrained resources, GPO may have to make some difficult choices between investment in traditional versus electronic publishing technology, and between capital investment versus the training and recruitment of personnel to apply the technology. These decisions are best made within an overall strategic framework.