Part II
The Systems Modernization Plan and Its Potential Effects

Chapter 2 describes the Social Security Administration's Systems Modernization Plan, discusses the status of its implementation, and identifies some persistent technical and management problems. It concludes that the plan is rational and defendable, but there are serious unanswered questions about the implementation of the plan. SSA does not appear to recognize the seriousness of some of these implementation problems, or has not been forthright in discussing them with monitors and oversight institutions.

Chapter 3 discusses the implications of systems modernization and further automation for SSA'S relationships with Congress, SSA'S employees and clients. It considers questions about the future status of SSA, including proposals to make it an independent agency, and to privatize some of its functions. Other public policy issues, such as the privacy and security of personal data processed by SSA, are discussed in relation to the SMP.

Chapter 4 highlights the increased need for comprehensive long-range planning within SSA, to define goals and priorities and thus provide a context and rationale for technological systems planning.

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The Status of Systems Modernization at SSA, 1986'

INTRODUCTION

Commissioner John Svahn, newly appointed,[1] began in 1981 to work out a strategic plan to develop modern information systems for the Social Security Administration's (SSA) data processing. A planning group was formed under his direct control, to guide the planning and its presentation to Congress.

The Systems Modernization Plan, hereafter referred to as SMP, was to be an integrated long-range plan for thoroughly upgrading SSA'S data-handling operations, with new or improved software, hardware, and telecommunication systems and increased computer capacity. Unlike previous SSA systems development efforts, SMP would be an agencywide plan emphasizing integrated service to all programs and offices. In the recent past, work on improving systems had been done in specific SSA program areas, with little consideration for the fact that the district offices had to serve all of the programs.

SSA had always tended to automate on a project-by-project or program-by-program basis, which resulted in poor integration at the service delivery level. This had been institutionalized by the previous commissioner, who had adopted a "partitioning strategy" that segmented the several programmatic areas, redesigned them, and procured hardware for them separately. SMP explicitly rejected this approach.

The SMP also differed in other ways from earlier SSA practices. It was designed as a dynamic 5-year plan that would be reconceptualized yearly to account for new developments in technology. (The published 1982 plan, however, did not say explicitly that it would continue beyond the initial 5 years.) The plan provided explicitly for help from external expert consultants and contractors. The solicitation of vendors for a telecommunications upgrade (later won by Paradyne) was already underway; it was assumed that this would fit into the SMP to develop a "data communications utilit y, that is, an efficient conduit for transmission of data between headquarters and field offices or other points on an SSA network.

The 1982 SMP was focused almost entirely on delivery of services; internal administrative systems got little attention, and no provision was made for developing management information systems. These features were added to the plan later.

The material in this chapter (not otherwise attributed) is drawn from the 1982, 1984, 1985, and 1986 System Modernization Plan, and accompanying documents, provided by SSA; several briefings by top-level SSA officials in the Office of Systems and the Office of Operations; and written and oral response by SSA officials to OTA drafts or inquiries. This material was augmented by or compared with information gleaned from more than 65 interviews conducted by OTA and its contractors, with knowledgeable people both within and outside of SSA; congressional hearings and reports; reports of the General Accounting Office (GAO); and the transcript of an OTA workshop in which both SSA officials and advisors to OTA participated. The OTA contractor for this case study was The Educational Fund for Individual I.iberties, New York City (Alan Westin and Kenneth I,audon, Principal Investigators).

[1] Commissioner Svahn was a former insurance company executive. From 1976 to 1979 he had, however, been employed by the firm of Deloitte Haskins & Sells (later a major subcontractor on SMP).

SMP's PRINCIPLES AND STRATEGY

At a cost of nearly $500 million (which by 1986 nearly doubled, to $990 million) SMP was one of the most expensive single civilian information systems projects ever undertaken. The plan set out 'governing principles, " which in reality are generalized aspirations: immediate improvement to avoid disruption of service; improved client service; assured accountability and auditability; improved timeliness of service; improved productivity and management control; and closing of the technology gap (i.e., modern systems). Nine principles were to be followed—these are important elements or descriptors of the systems modernization strategy for purposes of evaluation:

1. improvements would be "incremental and evolutionary
2. systems modernization would be kept separate from operation and maintenance of existing systems;
3. a systems integration contractor would assure project continuity;
4. "proven state-of-the-art technology" would be used;
5. the effort would "build on existing systems" to salvage past investments and minimize risks;
6. design changes would be limited to "critical, user-defined needs";
7. system architecture would be reconfigured to take "full advantage of advanced technology'
8. acquisitions would be planned to permit technology upgrading within a "code compatible architecture"; and
9. a single group would plan, manage, and operate the modernization program.

This was a conservative strategy, following well-established systems engineering practice, and designed to satisfy SSA'S critics in Congress and elsewhere, while not disturbing its supporters. SSA'S Office of Advanced Systems, before it was abolished in 1979, had argued for starting fresh, with all new procedures and systems, but SMP rejected this approach.

The plan calls for salvaging prior investments by building on existing systems. This means that SSA will look for immediate short-term solutions that are compatible with long-range goals. SSA has been criticized in the past *both* for patchwork fixes to problems rather than system redesign, and for redesigns that failed to take into account the critical prerequisites for an orderly transition.

In the past, the same personnel had responsibilities for both systems development and operations, and there was seldom time for modernization planning. A single organizational unit, separate from operations, would now be responsible for planning, management, and control of the modernization program.

A system integration contractor (Electronic Data Systems of Dallas [EDS]) was hired to provide continuity throughout the duration of the plan, and to coordinate across SMP program areas. Redirection of development efforts in midstream and frequent turnover at the top had hampered past efforts.

SSA would not be able to work with manufacturers to develop innovative systems designed to meet its needs, as it could do in its first decades (see ch. 5). SMP called for proven state-of-the-art systems from industry. This meant that no "unproven technology" would be used. This strategy was reinforced after SSA suffered from its experience with a telecommunications system upgrade procurement (the Paradyne contract, to be described inch. 6). The phrase "state of the art, " on the other hand, was a signal that SSA would use contemporary software development technology, and structure and document software in accordance with modern standards.

The plan limited design changes to "critical, user-defined needs, but said that systems architecture would be reconfigured to take full advantage of advanced technology. SSA'S assumption was that with relatively simple reconfiguration of existing computer systems

'U.S. Department of Health and Human Services, Social Security Administration, Office of Systems, *Systems Modernization Plan: From Survival to* State *of the ,Art*, Publication No. 41-002, 1982, p. 1-19. Hereafter cited as SMP 1982.

and some purchases of new equipment in the first phase of its modernization, a large amount of labor-intensive operations could be eliminated and performance immediately improved.

Upgrading technology in such a way as to be compatible with SSA'S old computer codes would be difficult, since the agency had to avoid both demanding an architecture and software that was compatible with only one kind of equipment (IBM), as required by the Brooks Act; and massive reconversions of software.

SMP began in 1982, although it incorporated some improvement projects that were already underway. In the discussion below, some rough indications are provided about the allocation of resources among and between SMP program areas, to indicate something about the relative importance of tasks and objectives. However, this gives only a very poor indication of the distribution of effort and resources; some objectives have been shifted from one program to another between 1982 and 1986. Even the overall SMP expenditures indicated by SMP publications are only approximate, since some projects have been included under SMPin 1 or 2 years and not included in other years, for reasons that are not clear. This is one problem that complicates any external evaluation of progress in implementing the SMP.

Combined with strong governmentwide emphasis on budget-trimming and work force reduction, the announcement of the systems modernization effort in 1982 caused SSA employees considerable anxiety. As in any organization acquiring new technology, many workers were concerned about their ability to learn to use it. At the same time, most employees were eager to have technology that could help them overcome the constantly increasing backlogs and recurring crises, and the union was not opposed to more automation. SSA however failed to keep its employees well informed. In early documents there was no mention of the touchy subject of effects on the level of employment. In a brochure published sometime in 1984,[4] SSA states that "an overriding consideration" was that "all current SSA employees must be assured of job security, but the promise is not part of the formal documentation of SMP. Only in 1985 did SSA announce an" aggressive' plan to inform employees about SMP, and in January 1986 it distributed to field operations employees a simplified "Field Edition" of the plan. Questions about job security were still not addressed directly.

[4]U.S. Department of Health and Human Services, Social Security Administration, *S.vstems Modernization Program–An Overview,* no date.

SMP PROJECTS AND PROGRAMS

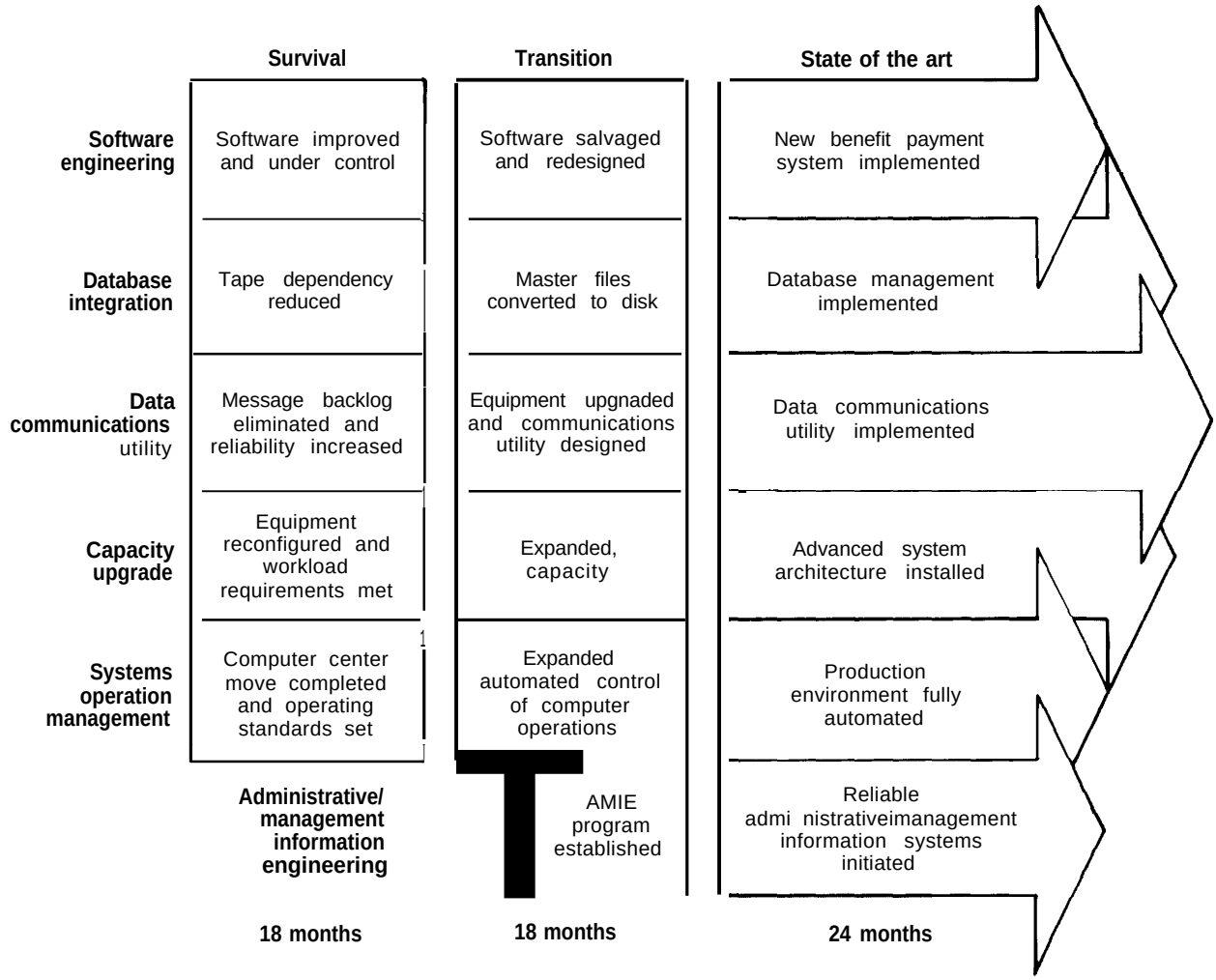
The 1982 SMP called for four program areas: software engineering, database integration, data communications utility, and capacity upgrade. The three chronological phases of the program were labeled survival, transition, and state of the art (see figure 2). The survival phase consisted of actions to survive the immediate crisis, which is described in chapter 6. The transition phase would bring SSA up to a "contemporary data processing capability. " These phases were each to take 18 months, and to be completed by 1985. The state of the art phase, the final 2 years, would develop the new software, new databases, new communications utility, distributed processing, and the final hardware configuration to achieve final integration, and the testing and certifying of the redesigned system. By 1988, with this achieved, SMP would evolve into a continuing 5-year planning and enhancement cycle.

One important objective of the SMP is modernization of the claims process, which is perhaps the primary point of interface between SSA and its individual clients.

The Claims Modernization Project (CMP)

This project is in effect a plan, or a depiction of the major desired outcomes of the SMP, and it is therefore described first. CMP is

Figure 2.—An Overview of the Social Security Administration's Systems Modernization Plan



aNot Included In original SMp

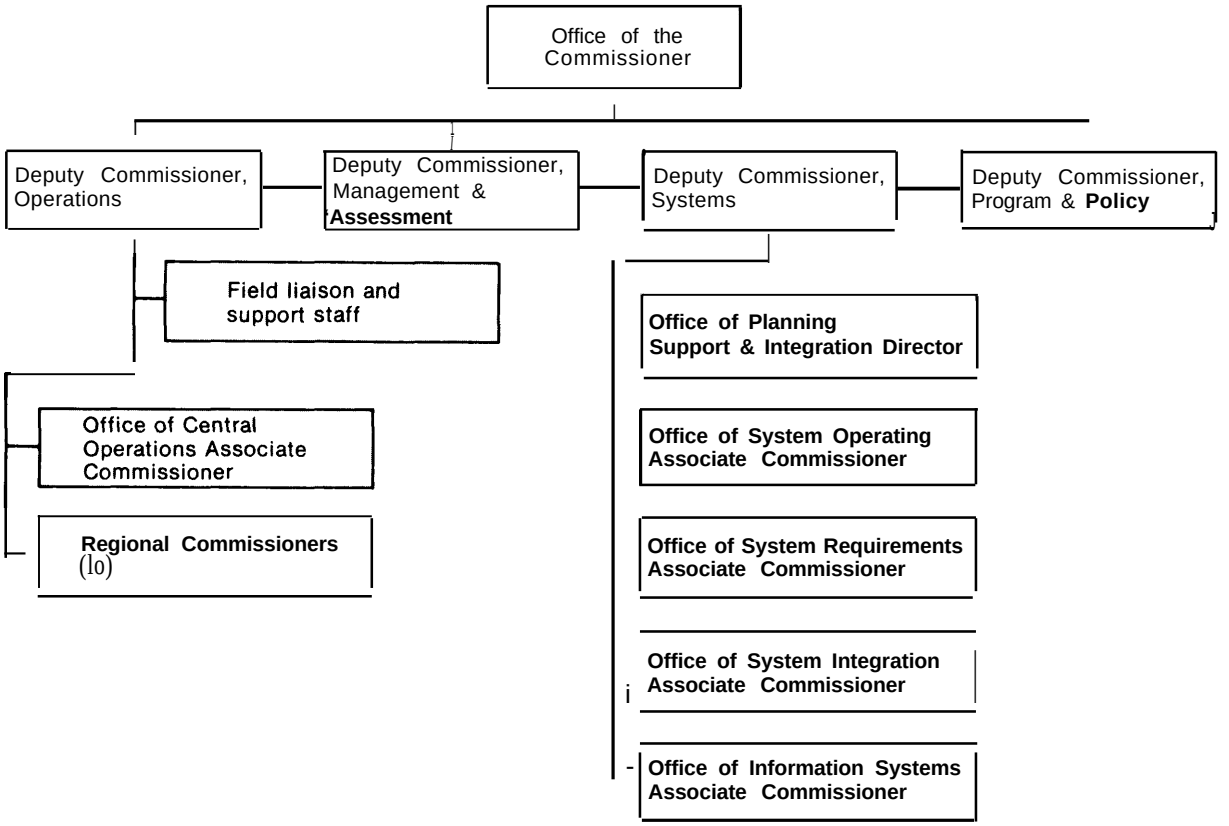
SOURCE U S Department of Health and Human Servtces, Soctal Security Admlnlstratton, ***SSA Systems A40dem/zatKm P/an*** 7985 ***Update,*** Publlcatlon No 40-004, January 1985

SSA's closest claim to a vision of how it wants to do business, SSA'S version of "the office of the future." Since SMP is a 5-year plan, this is, however, a near-term future.

At headquarters, the four major programs (old-age insurance, survivors insurance, disability insurance, and supplementary security income) are fragmented and spread over 10 functional offices under four deputy commissioners (see figure 3). They come together in the district offices, where SSA meets its clients. These district offices are now largely paper-based operations, with cases represented by file folders. Clients must wait for service representatives to send messages to headquarters and receive information back about the client records by way of the one or two SSA Data and Retrieval System (SSADARS) terminals, manned by a data technician, in the back office. CMP will make the field offices into modern, automated offices in which representatives use on-line, interactive systems for both the initial claims interview and later for case control. There are prototypes in two field offices,[5] where research is being conducted on

[5] York, PA, and Baltimore, MD.

Figure 3.–Organizational Chart of Social Security Administration as of Apr. 4, 1986 Focusing on Systems Implementation



SOURCE Social Security Administration, 1986

its impact on the labor force. By 1988 SSA expects the system to be in place nationwide.

A claims representative will interview the client, asking questions prompted by a desktop computer screen. The results will be transmitted directly to Baltimore and will go through a communications processor located in one of the six program service centers where the claim is further processed for earnings information. The results of the interview will also be printed out locally for the client and for use in case control.

This will eliminate the need for the claims representative to queue up for the one or two office SSADARS terminals as she or he now does. It will also eliminate most of the Data Review Technicians, the people who now key data into SSADARS. (Some will be retrained as service representatives.)

This office of the future is still an objective, not an accomplishment, but by January 1987, the first phase of implementation will begin. There is a prototype model office at headquarters, and there are pilot sites in SSA regions. Two pilot sites are already working with borrowed GSA terminals, of the kind the U.S. Senate is now retiring from Senators' offices. In large service organizations of the the private sector, CMP would not be regarded as an "office of the future' at best it would seem moderately up to date.

Eventually, SSA'S batch-processing based claims system will be fully redesigned and automated, as will postentitlement control and audit functions. The first phase of the project, however, deals with initiating claims. In the first z years, at least, the interactive terminals will be used chiefly for tasks related to initial

claims filing. Software for postentitlement procedures will not be ready; the postentitlement process has yet to be redesigned. SSA'S plan is to procure all of the interactive terminals at once (in 1987) so that CMP provides a model for and a basis of automating other operations. An alternative would be to procure terminals now only for some pilot sites, with automation and modernization of all 13,000 field offices to be phased in after 1990, or when software development is complete. The advantages of automating at least a portion of the work immediately, providing improved service in all rather than a few communities, giving employees experience in using the equipment, (and for SSA, locking in the allocation of no-year funding) must be weighed against the costs for temporarily underused capacity, and the uncertainty of relying on software that is not yet developed. SSA insists that immediate procurement is necessary for smooth progress in SMP implementation.

In August 1986, GAO recommended that SSA not proceed with the full procurement until there is a full evaluation of the complete system, although GAO did not clearly specify how this was to be accomplished.[G] GAO's recommendation was based on the grounds that the agency has extricated itself from the 1982 crisis and 'these procurements are not supported by documented deficiencies in current ADP operations. GAO also said that there were deficiencies in specifying functional requirements for system components, and in SSA'S cost-benefit analysis for the procurement. The GAO report did not, however, place this recommendation in the context of SMP as a whole, or SSA'S related management problems.

The decision about the procurement should, however, be made in the context of SMP as a whole. To argue that because the 1982 crisis was surmounted (i.e., Phase I of SMP succeeded), the second phase of SMP is not necessary, amounts to rejecting the goal of systems modernization that both the Administration and Congress accepted in 1982. The analysis of the costs and benefits of this procurement (or rather, the timing of this procurement) should include the effects of its timing on other aspects of SMP implementation. The risk of proceeding with the procurement is basically the risk of incurring the cost of unused telecommunications and computer capacity while software is developed for automating additional field office services. Delaying the procurement indefinitely may involve other costs, including foregoing possible productivity gains in claims processing, plus the risk that reductions in staff may cause a deterioration in services to claimants. The August GAO reort did not address these broader considerations. Strong corrective actions by SSA, DHHS, OMB, and Congress may be necessary to resolve persistent SMP implementation problems, but they should not be driven by this procurement in isolation from the broader and more important issues. The option of a cautious go-ahead for the procurement, with intensified monitoring and oversight, should be considered.

The Software Engineering Program (SEP)

Software engineering is a new discipline that aims to improve software through providing better tools, concepts, and methods for software development and testing, and insisting on their consistent and systematic use. SSA'S software engineering program however was de signed to retain (so far as possible) and upgrade existing software so that an entirely new code would not be necessary. It would also develop requirements for new software and new applications, and reconfigure the database architecture so as to take advantage of new technology. Finally, it would develop standards and productivity tools for software development. Special emphasis was to be put on modern program documentation, standardization of programs, and conversion to high-level languages where possible.

SSA developed a software engineering technology manual between 1983 and 1985, but it was found to be incomplete and lacking in necessary provisions for quality assurance and

[G] U.S. Congress, General Accounting Office, *ADP Acquisitions: SSA Should Limit ADP Procurements Until Further Testing is Performed,* report to the Chairman, Committee on Government Operations, U.S. House of Representatives, IMTEC-86-31, August 1986.

compliance, according to GAO; work in this area is continuing.

There were in 1982 some 12 million lines of poorly written and undocumented program code. There were about 6,000 COBOL* programs, 1,500 assembly language code programs, and another 1,000 miscellaneous programs. Over the years SSA had translated old manual procedures into software using now outdated programming languages, and then, converted them line by line to COBOL, preserving the inefficiencies of the older technology. The old code is being cleaned up and rewritten as it is needed, according to SSA.

The software engineering program has fallen far behind schedule. However, SSA claims to have accomplished the systematic definition of its information requirements, for the first time in SSA history. This was done using top-down Business Systems Planning, a technique for analyzing an organization's "business functions' and defining the needs for software applications. A second technique, Critical Success Factors Identification, was also used. Establishing the information requirements was a critical first step to help the agency conceptualize the uses of data in its procedures, and to lay out a general plan for a systems architecture (the hardware and software that would be used to modernize and automate these procedures). Thirty-five SSA analysts then interviewed over 200 managers and workers throughout SSA to get a detailed picture of the agency's business and information requirements and an evaluation of existing software, which was inventoried for the first time. More than 180 systems-related problems and needs were identified. This work is continuing, with groups of users from the field office periodically brought into headquarters to work with the Strategic Planning and Integration staff.

There is, nevertheless, considerable doubt among many SSA systems developers and expert observers as to the adequacy or qualit y of the functional requirements, as defined, in some areas; some are still not developed at a level of detail that can effectively guide systems redesign and development. Internal reviews of specific functional requirements repeatedly speak of incomplete functional decomposition, improperly partitioned and poorly named data categories, ambiguities and contradictions between data flow diagrams, and many other technical flaws.

A baseline Software Engineering Technology manual has been prepared. An interim Debt Management System and a pilot of a Modernized Claim System are in operation. A software improvement process has begun. Over the next 5 years the program will design and develop Logical Application Groups, described as methods and systems for enhancing security controls and auditing capability.

The redesign of the batch-oriented claims system to a contemporary interactive system aims at allowing immediate eligibility and entitlement determinations, automated computations of benefits, and enhanced control and audit functions. SSA has established in its central office a model district office and a test processing module to evaluate software for district offices. Data-entry screens have been designed for district offices and the processing center. A project is underway to obtain at least 22,000 interactive terminals for district offices (the claims modernization project, as described above.) Field offices are now pilot testing some interactive systems. These projects will be further discussed below.

The annual wage reporting system was also to be redesigned, and employers were to be encouraged to report wages on magnetic media rather than paper. However, this project became unnecessary when new Internal Revenue Service regulations required that all organizations with more than 500 employees file reports on magnetic media by 1986, and those with over 250 employees do so by 1987.

In 1981, SSA had $2 billion in outstanding debts owed by people who received over-payments. A new Interim Billing and Follow-up System was put in place in 1984 as a first step in improved debt management. This is supposed to be replaced by the new Debt Man-

*Common Business-oriented Language.

agement System by the end of 1986, which should further reduce the average age of receivables and maintain better accountability over all debt collections. The new system will provide on-line access to information about overpayments, bills and notices that have been sent, and resolution agreements. It may not be usable in all program areas by the end of 1986, however. There are problems in completing the design for, and implementing, the new National Debt Management System, because it must interface with postentitlement systems and procedures which are still to be redesigned and automated; thus the functional requirements for the debt management system are incomplete.

The automated enumerations screening process, begun in November 1984, gives SSA the capability to process requests for social security numbers in 1 day; currently only 3 percent of requests require any clerical intervention.

The 1982 SMP called for existing software to be "made maintainable and transferable" and to be fully documented by 1985. This has not been accomplished. All future development of software is to use software engineering technology -e.g., strict rules, procedures, and criteria to make sure that it can be fully understood, added to, improved, and corrected when needed. The software engineering technology was supposed to be ready for full "institutionalization" by 1986. It is not complete, and what has been introduced is not always strictly enforced. However, SSA is installing modern techniques to measure compliance, which should then improve.

The software engineering program was estimated in the 1982 program to cost $103 million, or 21 percent of the total SMP 5-year cost. In the first 3 years, 28 percent of SMP expenditures went to this program. Its total cost according to the 1986 SMP will be about $200 million through 1990, still about 21 percent of the projected total

On August 30, 1985, GAO released a report to the Senate Committee on Appropriations concerned with SSA'S ability to meet congressional needs expressed in new legislation.[7] GAO cited delays in the SMP database management program, and software efforts. It said that SSA had failed to document existing code (over 10 million lines) as originally promised in the SMP and instead had chosen to ignore this problem while developing entirely new systems in the absence of software standards and enforcement. While praising SSA for its hardware acquisition program, GAO concluded that SSA had made little progress "in improving its ability to respond to legislative changes that require software modifications to existing systems. "

Within the executive branch, SMP'S software program has also come under criticism. In the Department of Health and Human Services (D HHS), the Assistant Inspector General for Audit, Felix J. Majka, conducted a review of the claims modernization project from late 1983 through May 1984, and found numerous deficiencies. The HHS Inspector General, Richard Kusserow, issued reports in February 1985 and again in June 1985, criticizing SSA for wasting over $1 million in the procurement of useless software. Kusserow criticized SSA for "poor planning and management of a software replacement effort. " He pointed to the Claims Automated Processing System upgrade, saying that software purchased from a vendor was unusable. A similar result occurred with an upgrade of the Manual Adjustment Credit and Award Process (MADCAP), and the conversion of earnings program software.

Critics inside and outside SSA point to the software program as most behind schedule and suffering from poor management. In interviews conducted by OTA, critics said:

> Senior management has seriously underestimated the difficulty of examining, documenting, and rewriting 10 million lines of code found in SSA'S major problems.
>
> Standards developed to control software development are not being enforced.

[7] U.S. Congress, General Accounting Office, *Social Security Administration's Progress in Modernizing Its Computer Operations,* IMTEC 85-15, Aug. 30, 1985.

> The functional (detailed) requirements of SSA'S major systems have not been produced on schedule. We are about 18 months behind here.
>
> The Business Systems Plan was a nice exercise, but it did not lead to redesigning major SSA processes.

These criticisms, and those of GAO and the Inspector General in 1985, may be too severe in 1986, since SSA says much progress has been made in the past year. This claim, however, is difficult to document and relies on SSA assertions. SSA has discovered, as have many business organizations, that software engineering is not a scientific formula but a set of tools for better programming. Installing these tools does not guarantee that they will be used or that good code will in fact be produced. Some private sector studies indicate that even intense application of the tools brings only modest gains in productivity; other experts argue that it can double productivity. Getting SSA programmers with 20 years' experience to use new tools is indeed a major problem in itself, but SSA is now improving its monitoring of how much of the new code is produced in accordance with software engineering standards.

The promise, implied or explicit, to document 10 million lines of old code was probably misguided in the first place, and the "failure" to pursue this objective rigorously is probably wise. New operational procedures related to the claims modernization process will avoid the need for cleaning up some of the old code, and the rest can be done as needed.

SSA has made considerable progress in improving its software, but just as clearly this is the area in which SMP is most behind, and may be seriously floundering. A critical problem seems to be the need for more expert personnel in this area.

The Database Integration (DBI) Program

The DBI program has achieved its first and second phase objectives, essentially on schedule. One objective was to improve the management of over 1 trillion bytes of data per year, a volume which increases by billions of bytes each year. In 1982, SSA had limited access to its most important systems and production files, which were on magnetic tape. Use of over 500,000 reels of tape required extensive scheduling and a large clerical staff just to file and move the tapes. Over 30,000 production operations each month required 150,000 tapes to be handled several times, causing human errors that were estimated to consume each month about a quarter of available computer hours.

It was very difficult to determine the number of data elements maintained on the various databases. There was no single formal data dictionary with standard definitions of all the data elements.

One purpose of the DBI program was to reduce the use of magnetic tape through the use of shared Direct Access Storage Devices and to establish a data administration function (i.e., a data dictionary) for logical definition of data elements and files. This would make it possible to use available hardware and software technology to create a modern integrated database.

In its first phase, the DBI program placed the Master Beneficiary Record and Supplemental Security Record master data files onto disk storage, and provided on-line access to this data for field offices, through the one or two Paradyne data communications terminals that each office already had. SSA says that this project is on schedule. The number of tapes in active use has been reduced from 500,000 to 250,000. More than 360 disk drive units have been installed.

A file management and file access system—the Master Data Access Method, or MADAM—was developed to handle more than 500,000 queries a day. Data has been separated from applications programs, so that it can be used and updated independently; this is essential for modern data management. For the user, MADAM appears to be a modern database management system; the user asks for data, and gets it, without knowing how to use various separate software programs. In fact, however, MADAM extracts the data from a variety of separate files rather than from one integrated database. The other new software

program that performs in this way is the critical payment system. The ability to update all files at once, automatically, must await a more modern database management system.

The earnings systems, enumeration systems, and postentitlement claims systems update the major master files, now on disks, using batched sequential access. SSA is still working toward modern data administration, with a completely integrated database.

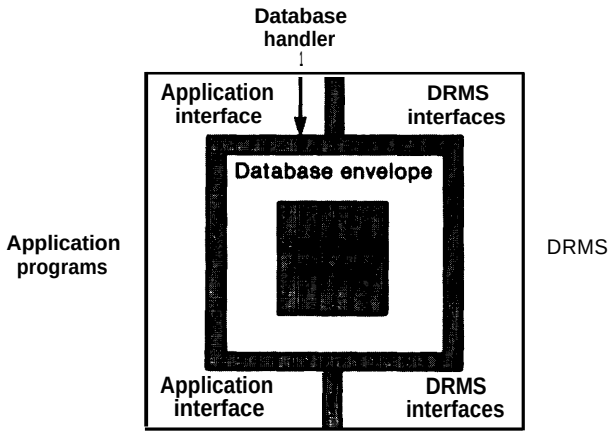
SSA'S recently developed data dictionary describes over 50,000 data elements. A data dictionary, one of the first steps in data administration, defines the data elements—that is, the pieces of information—that should go into a database and dictates the form they will be uniformly given and their labels, or the terms used to call them up, so that retrieval and processing is easier. Although the new data dictionary is widely cited by SSA as a major accomplishment, it is valuable only if it is rigorously used. This may not be the case; OTA was told by some people at SSA that the dictionary was often not adhered to in writing programs and "new uses and new data definitions are popping up all over the place."

The data dictionary, even if rigorously used, does not solve SSA'S problem. The agency already has about 80 million records on RSI rolls and 10 million on SS1 rolls, accumulated over 50 years, with data categories defined in many different ways over the years. The attempt to purify or clean up SSA'S data is staggering; one master file run through a data cleaning program reportedly "produced 3 billion lines of print and 120 million invalid values."

The DBI program has defined a "target database architecture"–that is, the general kinds of structure, software and hardware, that are needed for organizing its databases, but it has not yet worked out what that architecture will be (see figure 4). When the new database architecture is decided on and implemented, it should have tools to assure that all databases can be updated in synchrony; that has not yet been accomptished.

GAO contended, in a report to the Senate Appropriations Committee in August 1985,

Figure 4.—The SSA Characterization of the Database Architecture To Be Used in SMP



SOURCE: U S Department of Health and Human Services, Social Security Administration, *SSA Systems Modernizatton Plan 1986 Long-Range Stategic Plan,* Publicatlon No 40-004, October 1985

that SMP is behind schedule in developing an integrated database because of delays in procurement.[8] In late 1984, a $9.8 million request for proposals for database architecture development was issued, but only six vendors bid, and those were judged technically incompetent. The procurement was withdrawn and canceled in May 1985. The major vendors did not bid, reportedly, because the venture was too risky and SSA allowed only 4 weeks to write a proposal. Some potential vendors said that SSA asked for an "overly ambitious architecture, "[8] and complained that the Request for Proposals was vague and confusing. SSA throughout 1985 said that it had moved ahead with developing an architecture on its own, and had made up the time lost on the failed procurement.

Yet in 1986 SSA was still struggling to develop a database architecture. In April 1986 SSA told OTA that it had "re-examined" a database management system produced by Cullinet, IDMS/R (Integrated Database Management System/Revised), which is already in use in HHS, and decided that it would adapt the SSA database architecture to use this soft-

[8]U.S. Congress, General Accounting Office, IMTEC 85-15, op. cit.

[8]U.S. Congress, General Accounting Office, *Social Security Administration's Computer Systems Modernization Effort May Not Achieve Planned Objectives,* IMTEC-85-16, Sept. *30, 1985.*

ware package, which according to SSA is compatible with its existing software, including MADAM. Whether or not this could solve SSA'S architecture dilemma is far from certain. IDMS/R is not one of the newest database management systems available, but it is widely regarded as a good system, and it has replaced IBM database management system in many large corporations. But some information indicates that SSA is not, in fact, structuring an architecture that can use IDMS/R but merely "layering" IDMS/R over MADAM—that is, using information retrieval and data management systems to obscure the fact that it still has no firm plan for database integration. These changing and conflicting reports provide an excellent example of the near impossibility, for those not inside an agency with hands-on access to its systems, of distinguishing what is being done in implementing information technology plans from what an agency reports it is doing.

Failure to settle on a database architecture in the near future could have severe consequences in terms of lost productivity. Fourth generation languages operating in a modern database could save thousands of hours of programmer time. Many applications could be written in more efficient advanced languages. However, existing programs, those already written, will be compatible with the proposed database architecture. It is in the area of lost productivity that SSA would pay a price for failure to develop a database architecture.

The most controversial accomplishment of the data integration effort is perhaps the Master Data Access Method, or MADAM, the file management system that SSA developed when it converted from tape to disk storage. Many experts thought that SSA should have sought or adopted off-the-shelf software for this purpose, which would be maintained by vendors, rather than developing its own, which it must maintain (that is, improve, modify, and update). MADAM may well be incompatible with future mainframe operating systems, database management systems, and fourth generation languages. Thus SSA incurs future risks of incompatibility and long-term maintenance costs. In the short term, there are also risks and costs. MADAM is apparently a very complicated and poorly documented system, so that only a small group of people are sufficiently knowledgeable to operate it, yet it is the basis of SSA'S data management. This constitutes a peculiar vulnerability to smooth operations if there is any short-term emergency, sudden work force reduction, or drastic reorganization.[10]"

The DBI program was allocated about 14 percent of projected SMP costs in 1982, or $65 million. But according to the 1986 Plan, its total cost will be less than $3o million (3 percent of SMP) although SMP costs as a whole have doubled. This revision occurred after the failed request for proposals for a contractor to develop a database architecture, when SSA decided it would be done in-house; presumably it represents the estimated difference between in-house and contractor efforts. When the 1985 SMP Update was published, 3% years into the plan, this program had expended about $7.8 million, or 4 percent of total expenditures.

The Data Communications Utility (DCU) Program

The DCU program is to reengineer the three major telecommunication networks to constitute a data communications utility; that is, a conduit for transmission of data between and among processing points. With the existing SSADAR system, there are only one or two communications terminals in each office, operated by a data technician, and service representatives have long waits for sending and receiving messages. In its first 7 years, the SSADAR system failed frequently, and was

[10] As one internal critic said, "If these people get sick, die, leave, or just get mad, then all of SSA's on-line operations could go down." Another official charged that "the people who built MADAM . . . refuse to give management the schematic diagrams and documentation on how MADAM works. All they give us is the commands and a users manual." Several SS.4 officials concurred in the conclusion that a few people have used their exclusive knowledge of MA DAM to resist efforts to develop a database architecture without MADAM, and that MADAM will have to "be built around" in designing the architecture. I n short, MADAM has become a focus of internal tension and dispute as well as external criticism.

sometimes inoperable for long periods. During the first half of 1981, it was 'down' about 11 percent of the time, or about 1 hour of each working day, on the average. The most immediate objective was to increase the reliability of communications ("the mean time to failure") by 20 to 30 percent, and to reduce the amount of "downtime."

Communications software improvement began within the first year of SMP. The objectives were: 1) to eliminate the daily return message backlogs; 2) to achieve an acceptable response time, even if the 1982 volume of daily transactions doubled; and 3) to be able to serve the needs of all SSA users (including those using the new interactive terminals).

The two host computers (IBM 370/ 168s) were replaced in 1983, trunk lines were added, and telecommunication monitors upgraded. These immediate improvements significantly reduced or eliminated long communications backlogs.

The 1982 plan was that by the end of 1985, communications software would be improved to make it "maintainable and transferable, " replacement concentratorsll and processors would be installed, the concentrators' software would be converted, local intelligence would be installed at district offices, and specifications would be completed for the final data communications utility (i.e., communications lines, etc.).

The general design of the communications utility has been completed, and in 1987, three very high-capacity machines will increase teleprocessing capacity by seven times over. This will be essential as the on-line claims modernization project, already described, comes to fruition.

The DCU program is essentially on time. It is expected that contracts for procurement of the 22,000 to 39,0001 interactive terminals will be let by late summer of 1986, and that installation will begin in the fall of 1986.[1s] But critics have raised serious questions about whether this program should proceed as planned. There are in fact two separate controversies surrounding the program: whether the basic strategy is sound, and whether SSA'S pacing of its implementation is reasonable. In regard to the basic strategy, two questions are often raised:

1. Should SSA be planning to decentralize its processing rather than to rely on interactive communication between field offices and processing computers at headquarters?
2. Can SSA be sure that the traffic between district offices and field offices can be handled?

The 1982 SMP strategy is basically one of creating a highly centralized system. This runs counter to a strong trend for large organizations to decentralize their operations as much as practical, in both the private sector and the public sector; for example, the State of Utah began to move toward distributed processing for government operations in 1979, well before the SMP was formulated.

Distributed data processing was in fact a part of the SMP strategy as first announced in 1982. How the SMP strategy came to be one of complete centralization of processing is somewhat mysterious. The 1982 SMP included "installing] local intelligence at all District Office terminals. " This was a response to GAO criticism in 1979 of SSA'S planned procurement of Paradyne (dumb) terminals, which predated the SMP. In order to satisfy GAO's criticism and still proceed with that procurement, SSA agreed, in 1980, that the Paradyne terminals would be enhanced in memory capacity at some time after they were installed, to allow distributed processing. Be-

[11]Concentrators are the minicomputers which receive data and query messages from field office terminals, through modems; and then condense, edit, and reformat the messages and send them on to two main host computers. The concentrators also send response messages to the proper field office terminal.

"The procurement is to be for 22,000 terminals with an option for an additional 17,000; with peripherals, etc., about 60,000 devices will be procured.

[13]The schedu]e calls for award of a contract in August 1986 (competition closed in January 1986), installation of a test site in the National Computer Center in September, and beginning of installation at 20 pilot sites (claims field offices) in October. All terminals must operate without fault for at least 30 full days out of 90. On acceptance, 500 will be installed the first month, 1,000 the second month, and 1,500 each month thereafter.

cause of persistent problems with the Paradyne terminals the vague plan to upgrade the terminals was dropped. (This situation is described in ch. 7.)

After 1982, mention of distributed processing was quietly dropped out of SMP descriptions. Strangely, this decision—or nondecision—seems almost to have gone unnoticed. At late as January 1985, the HHS Inspector General, in a memorandum to Acting SSA Commissioner McSteen, said:

> We also found [in a review ending May 1984] that SSA had decided to centralize computer processing even though the original SMP called for local processing (decentralized). Documentation to support this decision, however, was not available . . . SSA said that the basis for deciding to process centrally was documented, however, we have not been able to obtain this documentation.[14]

SSA officials now say somewhat vaguely that they are studying the distributed processing option and will 'move in this direction' in future planning. They claim, however, that to add 'local intelligence' would cost approximately $25,000 per field office, or about $40 million, and that both technically and economically their strategy is the more defensible choice. The agency has, to this point, held to a belief that centralized control is necessary to protect the integrity and security of its data. SSA systems planners argue also that distributed data processing would force them to choose between:

1. maintaining seven or more compete databases in regional centers, with the difficulty of assuring that they are simultaneously updated and rigorously consistent; or
2. dividing the beneficiary files between regions, with the difficulty that beneficiaries are highly mobile and may turn up at unexpected locations for service.

Neither of these are insurmountable difficulties, given modern data-processing and telecommunication capabilities. However, this does not necessarily mean that SSA'S choice of centralized data processing is wrong or unreasonable. It is true that there are limits to the efficiency of enormously large databases dependent on a few central computers. Centralization increases the vulnerability of nationwide operations to a breakdown at the hub, while decentralization would provide some redundancy and limit the effects of regional interruptions or failures. On the other hand, centralization allows for more management controls, better security, and greater redundancy, or better backup systems. Most large financial corporations, in fact, are not decentralizing their data-processing operations. This is one of the many points on which experts disagree, and SSA'S decision does not fly in the face of accepted professional practice.

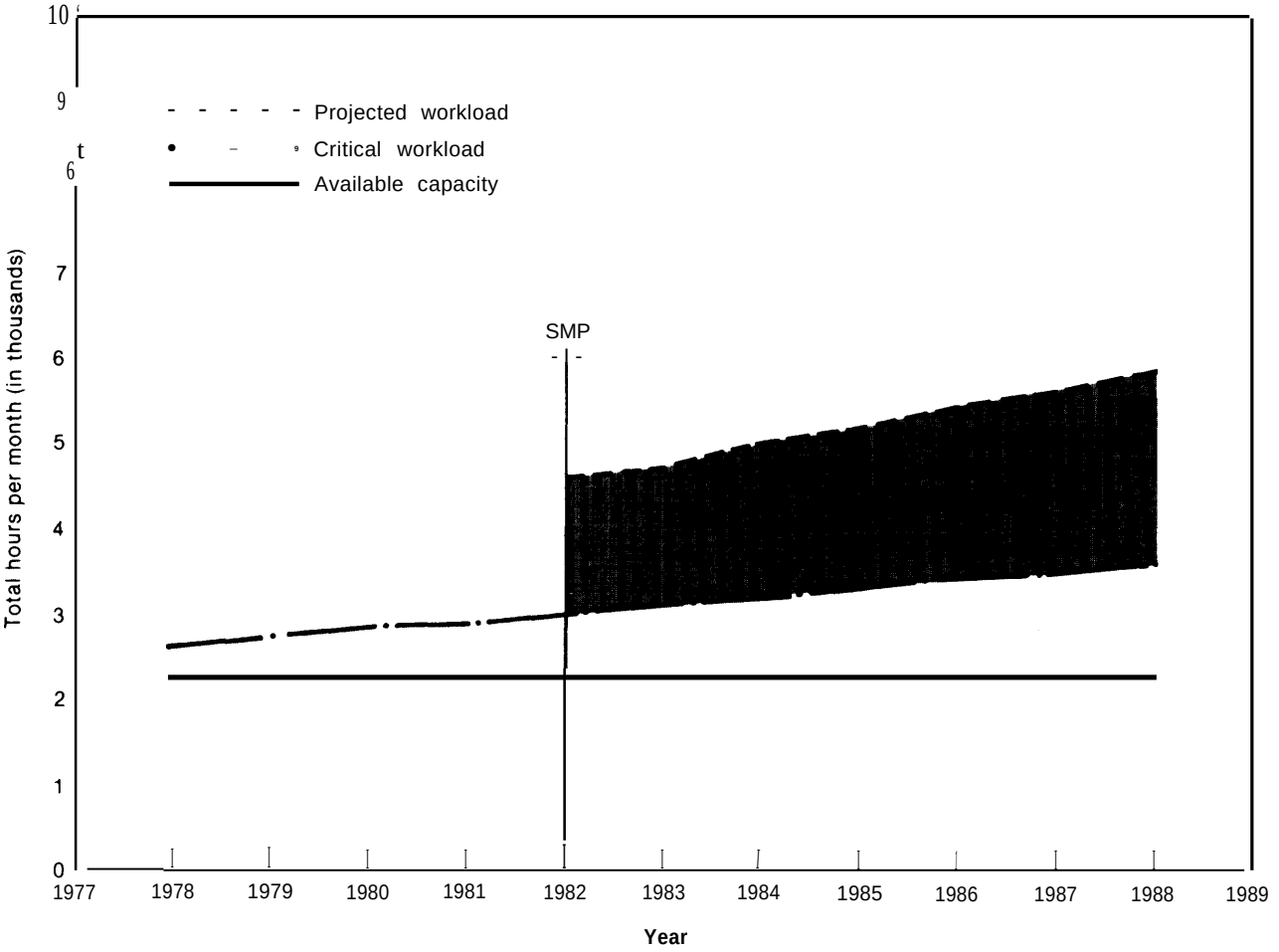
For the present, field offices will by means of communicating terminals be given the same functions, capabilities, and access that they would have with distributed logic, according to SSA. The communications network will be be capable of accommodating processing at any of the communications node, and so will not be a hindrance to any future decentralization of processing capability.

As to the manageability of traffic under SSA'S plan, some critics point out that the SSADAR system was designed in 1974 to handle 20,000 messages and 80,000 data transactions per day, and that within 1 year the host computer capacity was saturated, while since then the transaction loads have increased over 500 percent. They argue that the system could again become overloaded as the traffic from up to 39,000 terminals is phased in. Just as highway improvement often encourages additional traffic and ultimately results in more, rather than less, congestion, the use of the communications network could exceed expectations.

SSA is confident that it has adequately projected and modeled traffic on the system for the foreseeable future. Basically, it has determined the maximum number of transactions

[14] U.S. Department of Health and Human Services, Office of Inspector General, Memorandum to Martha A. McSteen, Acting Commissioner of Social Security, ACN 15-52654: Audit Report– SSA Redesign of the Claims Processing System Under the Systems Modernization Plan (SMP), Jan. 30, 1985.

Figure 5.—Available Computer Capacity and Projected Workload Requirements of SSA'S Computer System, as Projected in 1982



SOURCE U S. Department of Health and Human Services, Social Security Administration System Modernization plan from *From* Survival *State of the Art,* Publication No 41-004, February 1982

that a service representative can complete per hour, and planned a system that would accommodate all field office personnel making maximum use of the system at the same time (which assumes that the number of field offices and service personnel will not be increased).

The second controversy about the program has already been discussed above, under the claims modernization project; it concerns the timing of the procurement of the interactive terminals.

The DCU program was originally estimated at $160.5 million or one-third of total SMP costs. By September 1985, it had expended $12.9 million, or 7 percent of SMP expenditures. Big investments are scheduled for fiscal years 1987 and 1988 ($184 million). By 1990, this program is projected to cost $273 million, about 28 percent of total SMP costs.

The Capacity Upgrade (CU) Program

The CU program directly addressed the crisis under which SSA in 1982 could no longer meet the elementary, basic demands of its programs for computing. Figure 5 illustrates the historic growth and projected workload of SSA computers. In 1982 SSA estimated that it needed 5,000 CPU (central processing unit) hours per month to handle its workload plus its backlog, and that its installed capacity pro

vialed only 3,000 CPU hours, which was effectively reduced to 2,000 by "insufficiency of operations staff." The CU program was to reconfigure and consolidate the computing sites distributed around SSA headquarters, to acquire much higher capacity and more modern computers, eliminate magnetic tape files and switch over to direct access devices, develop a local computing network for high-speed data transfers, and enhance the peripheral equipment (such as printers).

The programmatic systems computers have been upgraded and a separate test and development facility was purchased. Computers that averaged only 270 hours "mean-time to failure" (MTF) were replaced with machines that average 19,000 hours MTF. National Advanced Systems telecommunication processors have been installed, as have smaller systems for decision support, development, and management of the larger systems. Additional hardware upgrades are planned in 1987, at which time capacity will be far in excess of workloads anticipated in the SMP.

By 1986 computers at the National Computer Center, used for programmatic, administrative, and test work, had all been replaced and modern disk storage had been largely achieved, although SSA still has an enormous library of tapes in active use. Operating systems software has been modernized, laser printers installed, and several terminals added for software program testing.

The computers in the six Program Service Centers still must be replaced. Four of these are IBM 360/65s that are obsolete by any reasonable criteria. They have smaller capacity than many personal computers, but are still running major program activities, although constantly threatening a breakdown.[15] The 1982 plan called for this replacement to be accomplished by the end of 1985, but a procurement contract award was protested under the Competition in Contracting Activities law, which has delayed the replacement. In general, however, hardware acquisition and capacity upgrading is on schedule.

New hardware and system software must also be acquired for the National Debt Management System, and the Logical Applications Groups. The Test and Time-Sharing Facility must also be upgraded.

The CU program was planned in 1982 to account for 28 percent of SMP, $132.5 million. By September 1985 it had spent $72.7 million, or 41 percent of all expenditures to that time. Other large procurements are planned for 1987. By 1990, $237.8 million will have gone into capacity upgrade, or 24 percent of the expanded SMP budget.

The System Operation and Management Program (SOMP)

The SOMP was not in the original SMP, but was added to develop automated tools and procedures for managing computer operations. It has implemented automated job scheduling at the National Computer Center, as well as computer monitoring, training, and an integrated control facility. The small program is projected to cost $27.6 million by 1990, or less than 3 percent of total SMP costs, is on schedule.

The Administrative/Management Information Engineering (AMIE) Program

AMIE was added to SMP in 1984. The SMP originally focused on data-processing needs to carry out primary program responsibilities, and gave little attention to managing SSA'S resources or providing executives and managers with information needed for decisionmaking and policy. Recognizing that SSA badly needed a management information system,

"The Deputy Commissioner for Systems sa~w wryly that "only SSA and a few Third World Countries still use these computers."

A potential supplier protested because the specifications did not make allowance for reconditioned equipment. SSA was faced with accepting the possibility of using reconditioned equipment which meets its specifications but would put SSA several years behind state-of-the-art technology, or rewriting the specifications to require some newly developed features, which would not only further limit competition but would significantly delay the acquisition. It chose to revise the request for proposals to allow vendors to offer reconditioned equipment.

Acting Commissioner Martha McStean in April 1984, added this program to develop management information systems software, automate and modernize administrative practices, and encourage end-user development of new applications.

An agencywide survey was completed to determine management information needs. An information center was developed to spur microcomputer applications; microcomputers have been piloted in 20 field offices to study their uses. A Financial/Administrative Integrated Management System was installed using fourth generation database language (IDMS/R). This led to the belated recognition that it may be possible to use IDMS/R for SSA'S overall database management, as already discussed.

The AMIE was allocated $311.4 million or over 37 percent of SMP in the 1985 Update of SMP; the 1986 version scaled this back to $197 million or 20 percent. The cost might have been considerably less if management information needs had been integrated into the original plans.

PLANNING AND INTEGRATION

SMP is a rolling 5-year plan, meant to be updated each year. Both the planning and the effort to integrate SMP across programs is the task of the Office of Strategic Planning and Integration, within the Office of Systems. This OSPI has a staff of 100. There are weekly meetings between representatives of the SMP programs described above, with the integration contractor. In addition, efforts are being made to involve operations people in systems planning, since they are the ultimate users of the systems. Some critics, in fact, argue that operations considerations are determining the directions for SMP, and that this guarantees that the emphasis will be on rocking the boat to the least extent possible; that is, minimum change in SSA procedures and customs rather than deriving maximum benefit from advanced technologies. This may, however, be a rational choice for SSA at present.

Other critics, including people within SSA, maintain that little or no integration is occurring, and that the integration contractor is often diverted to other tasks. It should be noted, however, that "integration' is a loose and relative term, and can only be demonstrated by long-term results of SMP implementation.

The integration role contract will be recompleted when it expires in the fall of 1986 and provision has been made for a 3-month overlap with the old contract, so that there will not be a lapse in this function should a new contractor be selected.

EVALUATING THE PROGRESS OF SMP

It is difficult to measure precisely the progress of a very large organization in a near billion-dollar effort over 8 years (1982 to 1990), an effort with multiple goals, strategies, and areas of effort. One measure is increased productivity, or to be more accurate, achievement of work force reduction goals. Other indicators of progress are more qualitative or judgmental. This study relies on inspection or analysis of several hundred documents, supplemented with more than 50 interviews with current and former SSA employees at all levels, with congressional committee staff people; with officials at the General Accounting Office, the General Services Administration, and the Office of Management and Budget; with computer vendors and contractors; and with other well-informed observers.

There were significant differences in assessments of progress to date, between critics of SSA and its defenders, between representatives of various oversight and monitoring groups, and within SSA management. It should be noted that while SSA claims to have made great progress in solving some of its problems, much of that progress appears to have been made within the past 6 to 9 months, while this study was underway. For example, SSA has recently shown signs of moving to improve management procedures and to change its corporate culture; it has initiated new training programs, recruited highly trained new programmers, started new management planning activities, and consulted outside experts. Some of the skeptics may not be well informed about developments during that period. At the same time it should be noted that all of the information about these developments necessarily comes from an interested party, i.e., SSA management.

Staff Reduction

Among Administration goals for SMP (cited earlier in this chapter) was increased productivity, for which work force reduction is often used as an indicator, although it is an input measure and not an output measure. In its 1986 budget request SSA formally announced the plan proposed earlier by OMB to reduce the work force by 17,000 full-time equivalents (FTEs) or 21 percent of its 1984 staff, by 1990. This was to be achieved largely through systems modernization and privatization of some activities.

GAO concluded in March 1986" that the agency was "essentially on target with its planned cumulative FTE reductions. " In part, however, this resulted from the fact that expected increases in agency workload did not materialize (e. g., anticipated inquiries about taxation of benefits); work-year savings from systems and procedural changes were 24 percent less than expected. GAO reported (on the basis of SSA performance data) that claims-processing times and backlogs decreased.

GAO said that "the evidence is inconclusive' as to the effect on service to the public. Union representatives and field office personnel said (both to GAO auditors and to OTA) that service declined; they reported longer waiting times, a "less caring attitude" on the part of employees, and increased error rates. SSA said that service improved, but GAO said that SSA performance data was incomplete. For example, SSA does not collect data on waiting times for clients, or on client satisfaction.

SSA Claims

SSA managers point to the SMP as the first long-range, dynamic plan for meeting SSA'S information-processing needs, and say that the goals and strategy of the plan are now closely integrated into operations. The Acting Commissioner, as early as 1983, claimed significant benefits from the plan, in terms of decreased processing time and other quantifiable output measures.'" In addition, she spoke of "qualitative enhancements, " including a general rationalizing of SSA procedures.

SSA points to a number of surveys of both the general population and beneficiaries, which indicate that the public continues to hold SSA service in high regard, as both courteous and efficient. In a GAO survey, 78 percent of a sample of SSA clients rated service as good or very good, and only 7 percent said it was poor; 51 percent said its performance was somewhat or much better than that of other agencies.

SSA'S top managers argue that SMP is a complex, multifaceted program that is now institutionalized within SSA and has had a pro-

'-U.S. (-on~~ess, General Accounting office, Socia~ *Securit~': .lct ions aJ)d I)lans To Reduce Agenc>' Staff,* briefing report to con~r~'s~ional requesters, II RD-86-76BR, March 1986.

[15]Prepared statement of Acting Commissioner Martha A. McSteen, U.S. Congress, *Social Security: How Well Is It Serving the Public?* Hearing Before the Special Committee on Aging, U.S. Senate, 98th Cong., 1st Sess., Nov. 29, 1983, pp. 8-12.

[16]U.S. Congress, General Accounting Office, *Social Security: Quality of Services Generafly Rated High by Clients Sampled,* HRD-86-8, January 1986. The report also noted, however, that 18 percent found SSA mail difficult to understand, 30 percent found explanations unclear or "somewhat clear, " and 58 percent had some negative comments about SSA service (e.g., long waiting times, many telephone busy signals).

found impact on SSA'S organizational culture. They point to a number of initiatives not described in SMP documents that are vital to its efforts at renewal. Among these efforts are:

- development of a strategic planning function that will drive the development of information technology;
- enlargement of training programs in the systems area to assure that new software tools receive wide acceptance and new standards are actually utilized; and
- development of new ways of handling conflicts between operations and development, disagreements among organizational subunits, and organizational conflict.

Whether these three points represent current determined efforts, aspirations to be tackled at some future time, or merely lip service paid to critics, cannot yet be determined. Privately, some SSA observers say that they depend entirely on the attention and insistence of a few key people and that they began to fade as soon as it was learned, in early 1986, that a change in top leadership and in internal organization is to occur. Whether or not this is accurate, the future strength of these essential conditions will depend in large part on the policies and the capability of the new Commissioner.

Critics of SSA and SMP

Many critics of SSA are convinced that SMP will fail, not because of the technology nor the ambitious objectives, but because of SSA'S "organizational culture, " its long history of mismanagement, interference from outside, po litical pressures, and its sheer size. Those who have generally been critical of SSA in the past are usually skeptical of the possibility of SMP improving agency performance. Past supporters of SSA tend to be optimistic about SMP.

The strong critics include some former managers brought into the agency in the late 1970s and early 1980s, who failed in their efforts to change information processing at SSA; as well as outside observers not associated with the agency directly but familiar with its problems and critical of its behavior. Two other kinds of critics are noteworthy: higher monitoring authorities in the executive branch, officials of OMB and HHS; and Members of Congress and staff concerned with SSA oversight, who have come to distrust its statements over recent years.

Many of the most adamant critics, however, admit that their knowledge of events at SSA is outdated by 12 to 18 months, so that they have no direct knowledge with which to evaluate SSA'S strong claims of recent progress. The critics' positions should be viewed in the context of SSA'S statements, summarized above.

One of the major themes of critics was that SSA as an organizational culture was incapable of bringing about the kinds of change represented by SMP, because of the hostility of SSA management to newcomers and the fact that powerful SSA senior managers are recruited from within, and promoted up the ranks, in long insider careers. While this creates loyalty and dedication, it also creates a strong antipathy to criticism, however well meant, and often an inability to learn from it. Critics felt it also creates a culture that does not value innovation, and as a result, outside consultants and advisors are ignored or avoided, and internal conflicts are resolved in favor of those who resist change.

SSA as an organization is said by the critics to lack a modern, analytical approach to management problems. The early decision in SMP to salvage 65 to 70 percent of the 10 million lines of COBOL code, for instance, never had any analytical support, it "was drawn out of thin air. " An SSA contractor complained of having "our work ignored. They [SSA managers] steer us away from important problems. " Contractors complain of slow decisionmaking, fallback of up to 2 years in the SMP schedule, and sluggishness because of the sheer size of SSA. As one noted, "there isn't a club big enough to beat SSA. Below the level of Commissioners you can't get an answer from anyone. " Many critics describe an alignment of internal interest groups opposed to change.

As a plan of action, SMP is widely perceived to:

- be primarily oriented towards hardware acquisition, and
- fail to provide a vision of how SSP will do business in the future.

A continuing theme of SSA critics is that the in-place systems personnel are a principal impediment to successful implementation of SMP. A former employee notes that "in-place systems workers have impeded efforts to reform systems and have a stranglehold over new projects.

Many SSA employees are critical of the implementation of SMP. For example, the (AFGE union) *Local 1923 Report* has carried a number of stories about the failure of SSA to bring workers into decisions related to SMP, and to require that managers be trained along with workers in the new techniques and procedures necessary with the modernized systems. The union newsletter of March, 1986, commented:

> . . . in the whole SMP, not a dime has been spent on the process of managing the human side of change in (Operations). If the right questions don't get raised, if the necessary dialogue and consideration of reality and quality are not brought into the process, SSA will never have an adequate system for building the data processing system on which so many Americans depend.

Leaders in the Local welcome the new emphasis on training, but are critical of some of the ways it is being carried out. They claim that training opportunities have been determined by generic job type rather than by the individual's needs, that there is little or no opportunity for project teams to be trained together, that there is little or no training in how to manage projects using new technology, and that managers have received, at best, only cursory training about the new technology and that where such opportunities have been offered, managers have been reluctant to attend.

On the other hand, outsiders frequently perceive that SSA is spending too much time and resources on retraining employees rather than hiring new young workers from outside. One vendor notes:

> Imagine what it's like–everyone started out there and ends up there. Bank systems people come and go, insurance and airline systems people switch jobs frequently. But not at SSA. They never get new ideas and procedures carried in on the backs of people.

How Well Has SSA Performed?

SSA'S performance in the first years of SMP looks considerably more promising than many of its critics will allow. There remain major hurdles to be surmounted if success is to be achieved. But the struggles that SSA is having in modernizing its systems are not unique; they are similar to problems that other large organizations in both the public and private sector have had, or are now having.

The history of the Social Security Administration illustrates some general principles of organizational behavior. Organizations do not innovate in areas of strategic importance unless there is some substantial environmental change; they innovate when they are driven to it by serious and persistent problems or by crises. In nearly all organizations, there are substantial forces resisting change, rooted in prevailing values, norms, and interest groups. Organizational innovation must involve more than adopting new technology. To use it effectively requires changes in habits, behavior, values and norms, and power relationships. Technological change nearly always brings fights over who gets, and uses, the technology to what purposes. Effective managers can take advantage of external circumstances to solidify power, disarm internal opposition, and tilt the internal conflict among groups towards successful use of the technology. Ineffective managers may be thwarted by those who quietly but stubbornly refuse to adapt work processes and procedures to make use of new technological capability.

The problems that SSA faced and faces in innovating are particularly difficult. Few private firms have a business environment of com-

parable size, complexity, or operational demands. The few private firms that have achieved the level of software sophistication needed by SSA, or that have successfully integrated all elements of their systems development, deal in much simpler environments. Large organizations operating in complex environments, such as multidivision companies, typically have a hodge-podge of systems developed at different times by different people and using different languages. This is the case, for example, with General Motors, which is trying to pull together its many data processing "baronies" and expects this effort to take a decade to accomplish. Some other large government agencies, such as IRS, have, in undertaking systems modernization, made mistakes or suffered problems that for a time seriously compromised their mission.

It seems clear that SSA has been handicapped in undertaking the SMP by the aftereffects of years of instability or lack of experience in its top layer of leadership, an organizational culture that emphasizes reliability and regularity in daily operations but resists change and innovation, failure to attract and hold new recruits in some critical professional categories, and most importantly by the immense size and complexity of the operations. Because it is a government agency, it had little control over changes in its services or the volume of its operations, and was not free to take risks in technology investments; at the same time, as a government agency, it and its managers are insulated against the full penalties of failures and of unproductive behavior, and some of that behavior is allowed to persist.

About some of the basic decisions and strategies in the plan itself, there is room for considerable doubt and debate among systems experts. However, for the most part these are areas where there are no clear and certain "right answers, and almost any decision would have vigorous critics.

As will be seen in the case history, in Part III, some of the greatest hurdles that systems modernization at SSA face are not deficiencies in the plan but long-ingrained suspicions and hostility between operations components and systems development components, between newcomers and oldtimers, and between career people and political appointees, all of whose efforts will be necessary if modernization is to succeed.

IMPERATIVES FOR SSA

The opportunities for improvement in SSA'S management of information technology in the next few years would be enhanced by:

- pacing work force reduction to match real gains in technological capability; i.e., avoiding abrupt reductions that disrupt or threaten smooth operations and produce excessive resistance by workers and managers to further automation;
- a period without major changes in SSA programs and adrninistrative responsibilities, or, if such changes are mandated, provision of ample time to plan and implement the changes;
- absence of major reorganizations other than those that reflect and support rationalization of the work flow to accommodate changes in processing systems;
- enhanced capability to recruit competent and well-trained systems designers, managers, and programmers (which probably depends now on pay and classification schedules);
- continued funding for SMP itself, and for SMP-related support functions, such as technical and management training;
- strong commitment by top leadership to achieving the goals of SMP and to building a cooperative relationship between managers and workers;
- insistence by top leadership on real cooperation between operations and systems development personnel;

- an emphasis on continued strategic planning, and assurance of resources dedicated to this activity; and
- early resolution of the issue of independent agency status for SSA.

These desirable conditions imply certain responsibilities for SSA leadership, for the Administration, and for Congress. For all parties, they would require placing long-term objectives ahead of the desire for immediate realization of the benefits sought through systems modernization. Congressional oversight will be most effective if it is directed toward insisting that the agency and its executive branch monitors strive to create the necessary conditions for progress, rather than focusing on assignment of blame for problems in the past.

SSA is changing as SMP is implemented, although these changes may not be quite as rapid, nor as deep and smooth, as SSA suggests. Most congressional staff people have not had the opportunity to be well informed about recent and current progess in SSA. SSA excessive defensiveness, attempts to deny any and all failures, and resistance to outside advice encourages its critics to suspect and expect the worst. In the past, there has been strong tension between the institutional drive to secure the resources to make much needed changes, and the defensiveness of those people who are struggling to cope, not always successfully, with day-to-day problems. This has at times distorted or obscured the picture that is presented to Congress. These distortions—whether in the past or in current efforts to rewrite history-are now important chiefly to alert Congress to the need to probe deeply and target questions carefully in order to assess reliably the degree of improvement in service delivery. Much improvement is clearly possible through the use of new information technology, and is the best way of justifying the significant resources invested in SMP from 1982 to 1990 and beyond.