AUTOMATION IN TAX ADMINISTRATION

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INTRODUCTION

In early human history, tax collectors used the most rudimentary methods; some of these methods were so crude that they gave the profession a bad name. Over the centuries, however, civilized man has come to realize that taxes—though never quite welcome—must be collected with a maximum of taxpaper cooperation and a minimum of irritation or inconvenience. Even the taxpayer who supports the use to be made of his money still wants and deserves to be treated with consideration.

In this context, automation provides new tools for improving and, to some extent, simplifying tax administration. Of course, no computer, however sophisticated, can overcome the statutory complexities devised by ingenious legislative draftsmen. Therefore, tax policy is outside of the scope of this article.

But it is pertinent to inquire into the ways by which modern technology can assist in computations, verifications, comparisons, and other phases of the giant task of processing returns. Perhaps taxpayers can be spared this or that chore. Certainly more scientific selection procedures can spare the filers of "clean" returns from unnecessary audits. Over-all, automation has a role in making tax administration more efficient—and that is by itself a tremendous benefit to taxpayers.

The first step in source data automation was taken in the 1870s when Jean Baudot built the first paper-tape punch and reader. About the same time, William Burroughs produced the first commercially practical adding machine, and Christopher Sholes invented the first commercially practical typewriter. The real breakthrough, however, may very well have been made when Hollerith and Powers devised the forerunner of today's punchcard, which uses simple little holes as a unique language for processing information mechanically.

From these small but highly important beginnings man found it possible to cope with paper work on a vastly improved scale. Unfortunately, in spite of splendid beginnings and gradual improvements, source data automation has tended to progress more slowly than other technological improvements. That situation is changing, and significant improvements can be anticipated in the near term.

I

WHAT DO WE MEAN BY AUTOMATION?

Before exploring these potentials, we should understand our terms. Cartoonists and sensational writers have given many people some odd ideas of automation. No doubt some think it is a name for an Orwellian monster lurking somewhere in the

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mountains of West Virginia. We do have our National Computer Center at Martinsburg, West Virginia, but it houses only some human beings and a few tame machines. It has an enormous appetite for magnetic tapes, but we have not lost a taxpayer there yet.

Seriously, when we refer to automation and data processing, we usually mean mechanical or electronic systems for the performance of repetitive tasks at high speed. A generation ago, we thought of punchcard equipment and electric billing machines as rather advanced. Today, automation more often refers to such complex systems as magnetic tape computers, random access devices, and other forms of mass-memory, high-speed data storage, processing, and retrieval equipment.

Speed is important because the volume of work to be done is astronomical. Furthermore, each year brings a new crop of work even bigger than the year before. Work must either be done rapidly (and incompletely) or not at all. Certainly, special items or cases can be put aside for handling on a "when and if" basis, but the mass of transactions cannot be deferred because they would pile up faster than we are able to process them.

Automation equipment tends to be very expensive. However, considering the volumes of work, the unit costs of operation are relatively small. Remember that the Internal Revenue Service annually receives and processes approximately 110 million tax returns, 350 million information returns, and several millions of miscellaneous documents. To handle these volumes, we have established seven regional service centers to receive documents, transcribe data on to magnetic tape, and perform a host of business and accounting tasks. Although these centers are only a few years old, they are already approaching maximum capacity, and we are planning to expand them and also build three more.

Tapes from the the regional centers flow into Martinsburg, where the data are posted to a Master File of taxpayer accounts. After posting, we produce output tapes comprising our primary accounting and record system. The Individual and Business Master Files are the main files for income, excise, and employment taxes, and a separate file is maintained for exempt organizations. The output tapes go back to the regional centers for the issuance of bills and for many other essential purposes. A whole battery of large and medium scale computers and tape drives is used for all these tasks.

Of course, certain routine procedures are built into this processing flow. These include verifying the arithmetic on returns and checking for delinquent or duplicate returns. It should be noted, in passing, that the correction of simple mistakes in taxpayer arithmetic virtually repays the whole cost of the data processing system. In the past fiscal year, for instance, we found arithmetic errors which added $315 million to tax collections and brought unsolicited refunds to taxpayers of $140 million.[1]

[1] COMMISSIONER OF INTERNAL REVENUE, 1969 ANNUAL REPORT 13.

We have been building and improving this automatic data processing system for less than a decade, and we believe that tax administration has leap-frogged by almost light-year factors in this short time. But neither tax administration nor technology stand still. Our volumes are increasing rapidly, and, similarly, advances in technology have already made it advantageous for us to shift from one generation of computers to another and from one data input system to another in order to achieve greater capacity, speed, and economy.

To redesign our system for the decade of the 1970s, we have organized a large-scale project to re-examine all of our needs and to project the kind of new system which may cope with these requirements in the next several years.

II

POSSIBILITIES OF THE NEW SYSTEM

Of course, it will be some time before we know the full capabilities of the new system. While we have fairly well-defined ideas about what the system ought to be able to do, we still must reconcile our wants with the enormous costs involved and with the availability of the desired equipment.

However, it is not too soon to be thinking about the possibilities. Beyond a vast increase in capacity to handle the rapidly rising volume of returns, there are many other characteristics to be considered.

For instance, there are an increasing number of technical provisions which require reference to data of prior years. To mention a few, these provisions include income averaging, reserves for bad debts, income from installment sales, and so forth. Ideally, the system should be able to recapitulate the necessary prior-year figures and to verify the appropriate entry for the current year. Conceivably, we could send the historical figures to the taxpayer with his blank forms for the year and thereby provide a valuable service. Here is an example of how costs and benefits must be weighed and balanced, and it would be premature to guess whether this would be a feasible thing to do.

A. Random Access Capability

A great deal closer to day-to-day utility is the idea of random access. In our present system, information about a taxpayer's account can only be obtained by running sequentially thousands of reels of tape on which 100 million taxpayers are listed. In the future, we hope to build a system in which we can establish, post, and query any account more or less instantaneously. Furthermore, it is likely that terminal equipment could be installed in each of our fifty-eight district offices—and perhaps in some other large city offices—so that each of them could have direct access to the master files, wherever they are.

Every day, taxpayers have questions about their refunds, about bills for addi-

tional taxes, and about similar matters. Here is a concrete way in which increased automation can serve the taxpayers by improved communications.

B. Government Computation of Tax Liability

A little noticed provision of the recently enacted Tax Reform Act of 1969 authorizes the Internal Revenue Service to increase substantially the number of taxpayers who could ask us to compute their taxes for them.[2] This provision anticipates increased capacity through automation to perform such services. Of course, this service will be optional with the taxpayer, as it is today. For many personal reasons—especially a desire to know the size of the refund or bill—not many taxpayers avail themselves of this option. Nevertheless, it is another example of automated benefits.

C. Reports and Information Retrieval Activity

We also visualize a major enlargement of our ability to keep a computerized watch on statutory provisions, court decisions, regulations, rulings, and other substantive matters. At present, our Reports and Information Retrieval Activity (RIRA) provides a quick method of determining the status and outcome of litigated cases, according to the issues involved. This system has already advanced legal research enormously. But there is a world of additional information that could be correlated with it. The result would be more evenhanded treatment of taxpayers and would contribute to justice and equity. In the distant future, perhaps qualified representatives of taxpayers could get their questions answered from such a file, too.

How did RIRA come about? In the first place, the computer had shown us how to cope with large volumes of data by use of the master file concept. We wondered, therefore, why could we not develop a system that would harness the speed of computers to provide a means for searching, sorting, and identifying pertinent documents as they related to legal questions. In other words, if we were capable of consolidating all the related transactions for each taxpayer, why could we not bring together in the legal area all the information bearing on a particular tax problem?

In developing a legal information storage and retrieval system, we realized that the touchstone would be the terms used to describe the content of documents placed in the information store. The index thus becomes the key to the search and retrieval of information bearing on a specific inquiry.

Our major challenge was to select an index-word which not only well identifies the legal concept, issue, or fact situation involved but also adequately differentiates it from other similar terms.

Simply stated, our plan has been to develop an integrated legal retrieval system that will provide for each of our three principal categories (appeals, drafting, and

[2] Tax Reform Act of 1969, Pub. L. No. 91-172, § 942 (Dec. 30, 1969).

interpretation) a central repository of information from which our professionals can retrieve all the information they need to carry out their responsibilities.

The first link in the chain of subsystems that ultimately could constitute a fully integrated system is the Legal Case Coordination and Control System developed in the Office of Chief Counsel of Internal Revenue Service.

The first step was the development of an index—in this case called a Uniform Issue List—to identify cases entered into the system. The List is keyed to the sections and subsections of the Internal Revenue Code, but differs from a subject index in that it is not one of broad issues with a single reference to each issue but rather one of legal concepts and descriptions. In this way, it is possible to describe the various component problems within issues, and thus a single issue in a case may be indexed with as many as ten index references.

The first four digits of the index code refer directly to the Internal Revenue Code section pertaining to the issue. The remaining digits of the Code are used to index additional concepts associated with that section of the Code. For example, the index references under section 6653—Failure to Pay Tax—contain twenty-six such references and read as follows:

6653.03-12 Failure to report income—Illegal business profits omitted
6653.03-13 Failure to report income—Nontaxability claimed
6653.03-14 Failure to file return
6653.03-15 Erroneous deduction

As each case is opened, the attorney responsible uses the Uniform Issue List to index the item. The index code and additional information such as case name, docket number, status of the case, and date of origin are keypunched into cards which are then fed into a formatted file computer system.

Formatted file is a system of computer programs designed to build, maintain, retrieve, and report on a wide variety of information needs. It is flexible so that changing and expanding requirements can be incorporated with a minimum of reprogramming effort. This is a decided advantage because changes to a system in the past required almost as much time as its initial development. Most important, the formatted file system has a logical retrieval language, with which to seek out the answers to interrogations, and the ability to format those answers in a variety of ways. In short, it provides a capability to search a file of information using any combination of search items.

Thus, each of our attorneys has been supplied a unique mechanism for retrieving relevant legal information. He has an organized file on which to draw, and he has at his disposal a set of index terms and codes that tend to assure that he will find the most relevant information. The result is case coordination and consistent treatment of taxpayers similarly circumstanced. And last, but not necessarily least, the burdens and costs of duplicated research are substantially reduced.

In this connection, the Fifth Circuit Court of Appeals called on the Service and this system for assistance. In *First National Bank v. United States*,[3] a question was raised by the court as to whether the case being reviewed "was an isolated case of an isolated set of taxpayers in an isolated nonrepetitive setting, or was it one of those test cases so often tenderly coveted by tax counsel, private and government." Since counsel could not answer this question when queried by the bench, the court suggested that a "check be made by machine search through the RIRA computerized record keeping and data retrieval equipment developed by the Internal Revenue Service . . . ." Circuit Judge John R. Brown also stated,

> By post-submission memorandum, the Court has now been authoritatively advised that the question presented in this case, classified in this era of creeping numeralism as 2042.04-03 in the RIRA structure, is the only one pending within the Service, before the Tax Court or the District Courts.
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> The task of searching the tens of thousands of cases pending within the Internal Revenue Service and parallel court structures presenting an almost infinite number of legal issues would have been both impracticable and impossible but for the machine. The machine, suspect as it is for the supposed lack of judgmental capacity essential to adjudication, bears out again the hopes and predictions now bearing fruit in a variety of ways that it serves a useful, indeed perhaps indispensable, function in the judicial process as the world, and the people in the world, face the increasing complexities of an expanding social and economic structure.[4]

D. Substitution of Tape for Paper

No doubt the traditional kinds of paper forms always will be an essential part of the tax administration system. However, we have made significant strides in substituting magnetic tapes for paper as a convenience for taxpayers, and the prospect is for much more of this kind of filing. This points up the thought that, in terms of our total tax system, automation is a two-way street; not only IRS but many employers are capitalizing on the capabilities of the electronic computer to achieve substantial savings.

At present employers can substitute tape for the paper Form W-2 withholding statements which must be furnished annually to the Service for each employee. Similarly, corporations which pay dividends and financial institutions which pay interest can substitute tape for paper reports on Form 1099.

In 1965, with the cooperation of ten participants, IRS initiated what has been referred to as the magnetic tape reporting program. As background, it should be noted that each year IRS receives in excess of 350 million wage and income information items. Each one of these items represents a means for ascertaining nonfiling or underreporting of income by the recipient. Until 1965 all of these reports were submitted on paper.

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[3] 358 F.2d 625, 631-32 (5th Cir. 1966) (concurring opinion of Brown, J.).

[4] *Id.* (footnotes omitted).

In 1965, the first year for the magnetic tape reporting program, sixty-two reels of tape containing 1,650,120 individual report items were received. This pilot operation proved the practicality of the program and in the following year was expanded, on a nonpublicized basis, to about eighteen million items received from seventy-four filers who had heard of the program.

In 1967, IRS determined that the reporting program had proved feasible and took steps to encourage wider participation. Since then, the program has been mentioned in various IRS National Office Publications and instructions, and, from time to time, statistics concerning the growth of tape reporting have been released to the general public. In addition, personalized letters have been mailed to large organizations having the equipment to report on tape. As a result, there are currently over forty-eight million wage and income information items being reported on tape by more than 2500 filers. A year ago there were only some thirty-six million items reported on tape by 1050 filers.

Now what are the advantages of tape reporting for the IRS? Substantial savings result since transcribing data from millions of paper documents to punched cards and subsequent conversion of data to magnetic tape is eliminated. IRS also benefits to the extent of the costs, manpower, and time which would be required to convert these items—or about 12.5 cents per item. Just this year, in recognition of these savings, participation in the program became mandatory for every federal agency with a magnetic tape capability.

Of course, reporting on magnetic tape is also beneficial to the filer. An employer can save time and money in the preparation, balancing, transport, and storage of information documents. As a matter of fact, many concerns that do not have a tape reporting capability are using the facilities of data processing service organizations for this purpose.

In the future, we can foresee further automation of return filing. The next step, already approved, will permit employers to combine by means of magnetic tape the annual wage and withholding information for an employee with the Social Security wages reported on Schedule A of Form 941 for the last quarter of the year.

An experiment is being conducted to test the feasibility of accepting tape instead of paper for the quarterly tax return, Form 941, as well as the wage itemization. Some 5000 employers are sending their Forms 941 to the Bank of America which is serving as a centralized computer agency and converting the 941 data to tape. This tape is then sent to IRS for direct input to the Business Master File.

Legally, a Form 941 must contain a signature in order to be valid. Since a signature cannot be recorded on magnetic tape, Bank of America secures a power of attorney from each of the 5000 employers and then, along with the tape, sends a letter of transmittal attesting to the accuracy of the data. Going a step farther, the larger banks which are trustees for many thousands of estates and trusts are in-

terested in the possibilities of using their own automated facilities to produce tape returns instead of the usual fiduciary returns on Form 1041. No doubt similar proposals will arise for other returns.

It is well known that many preparers of individual returns send their data to computer service organizations which make the necessary calculations and print out the appropriate figures on the applicable lines of return forms. It may be a small step to bring their computers into communication with our computers via magnetic tapes. Of course, there are some legal problems that may have to be solved first. Obviously, before the Internal Revenue Service can accept a length of tape as a return, we will have to assure ourselves that it will serve all of the legal purposes of a paper return—including admissibility in court, when the occasion arises.

E. Input Preparation

It is evident now that whenever it is possible to eliminate key-stroking in preparing information for use in a computer system, one should do so. It saves time and money—two extremely important commodities in large-scale systems.

This brings me to the situation in which human transcription is still an absolute requirement in our efforts to develop source data automation systems. To me, this is in many ways the most fascinating of our investigations, if only because it has been most resistant to change. However, we do need alternatives to key-punching cards as the basic means of transcription.

We feel that substantial improvements should be made in four major areas. These are: (1) original transcription; (2) verification of transcription; (3) detection of other (nontranscription) errors in the transcribed data; and (4) error correction techniques. Original transcription currently is mechanically slow and involves artificial redundancies. Verification by replication is neither foolproof nor efficient. The present card-punch system provides no means for detecting errors arising from source recording or prior processing. And finally, error correction techniques in today's system are clumsy and costly.

We have developed a new system, which we refer to as the Direct Data Entry System. This system is now operational in two of our regional service centers—in Austin, Texas, and in Chamblee, Georgia—and we will complete installation, on a staggered basis, in the other five centers by 1972.

This system uses a keyboard, but its great potential for us lies in the fact that operator correction of errors is vastly simplified and more efficient; that key verification of information can be substantially reduced; and that the system operates "on line"—that is, transcribed data are produced in magnetic tape mode as an output of the system, thus reducing the number of transformations and handlings of records to one from the three required in today's punched card system. In order that one may understand the nature of the change, I should describe the system more fully.

The transcription device is similar to a keypunch keyboard. This device is hooked to a display device which is nothing more than a cathode ray tube. The heart of the system is a computer (in this case, a communications processor) that has magnetic core, magnetic drum, and magnetic disc components for storing data at various stages in the process.

Information is keyed by an operator and displayed on the face of the cathode ray tube. If the operator detects an error (and operators do detect their own errors more frequently than we realize), it may be corrected simply by positioning an entry marker over the incorrect character and entering the correct character (previously an operator has had to repunch an entire card, a costly process if the error occurred at the end of the card); or if the operator finds that she has made many errors in widely separate places, she may erase the entire contents of the screen and start over. This correction capability is accomplished exclusively through hardware.

Blocks of information are then stored on magnetic discs, and the computer is used to zero balance and mathematically verify the data. If an error is detected, the verification operator calls back from disc storage the sections of the record in which the errors occurred for display on the cathode ray tube available to her. When she corrects the record, the data are reassociated, and the mathematical verification process is repeated.

If no mathematical error is detected initially, the verification operator merely verifies identification information (name, address, Social Security number, and so forth), a substantial contrast to verification of the entire record in today's punched card system.

After blocks of information have been completely verified, they are transferred to magnetic tape and the Service has achieved another milestone. We expect a twenty to twenty-five per cent savings from this change. In a large system, which annually calls for the expenditure of millions of dollars, this is no small item. Of equal significance, however, is the system's improvement. Only those who have worried about the handling and controlling of a half billion punchcards each year can appreciate the relief that accompanies their elimination.

Automation serves the tax administrator in hundreds of ways. While these services may have little direct benefit to the taxpayer, he is the long-run beneficiary. If automation reduces the unit cost of processing a return—and it does—the taxpayer saves on the cost of running the Internal Revenue Service. If automation enables completion of essential work that would never be possible with manual methods—and it does—the taxpayer gains assurance of fairer treatment. To put the matter bluntly, the more thorough the work of Internal Revenue, the less likely it will be that would-be chiselers will shift their tax burdens to honest citizens.

III

CURRENT USES OF AUTOMATION

A. Machine Selection of Returns for Audit

Illustrative of how the taxpayer benefits from automated procedures is the new IRS system of selecting individual income tax returns for auditing. Before automation, thousands of man-hours of the most experienced technical manpower in IRS were used to sort out stacks and stacks of returns and select those which would be assigned for audit scrutiny. This scrutiny might be conducted by a mere form letter asking for explanation of an item or two, by means of an interview in an IRS office, or by sending a revenue agent to the taxpayer's premises for examination of his books and records.

This method was not only wasteful of valuable manpower, but it resulted in selecting a substantial percentage of returns which were, on examination, found to be correct. In such cases the examinations wasted IRS manpower and unnecessarily inconvenienced the taxpayers. This resulted not from poor judgment of those selecting the returns, but was instead the inevitable product of trying to guess what an examination would produce.

With automation, this selection process is being radically changed. By feeding into computers data on the errors discovered in specially examined sample returns, we have been able to develop a scoring system which enables the computer to choose returns for audit which have a much higher likelihood of error than was possible by manual selection. Although it sounds simple, the computer actually must apply a sophisticated mathematical formula (discriminant function) in order to appraise the error probability of each return.

The essence of this technique is to determine mathematically the weights (or relative importance) of various significant return characteristics. The capacity of the computer is then used to scrutinize all returns in the same uniform way by applying these weighted criteria to any applicable characteristics that appear on the documents. In this connection, these weights are so determined as to maximize the separation of returns with potentially large tax errors from those with few or no errors or errors of little tax consequence. Then each return is scored relative to other returns by a proven formula and automatically classified and assigned or not assigned for audit examination according to these relative scores.

If our present expectations are realized, the computerized mathematical selection method will increase the effectiveness of a given level of audit manpower by: (1) reducing the proportion of examined cases resulting in little or no tax change; (2) increasing the average tax change resulting from audit; and (3) further reducing the manpower heretofore required in the classification process—manpower that can be more profitably engaged in actual examination work. In addition, as I mentioned, all individual returns filed would be uniformly screened for audit by

the same selection standards and with the same degree of intensity irrespective of the filing or examination district.

In doing this, the computer increases our audit capabilities in two ways. In the first place, most of the experienced agents who made manual selections are now available for the more productive job of conducting examinations. In the second place, by eliminating many error-free returns from the audit program, more of the available manpower can be devoted to correcting errors in returns that contain them.

B. Cooperation with Other Agencies

Some of the benefits of automation involve other agencies which have common interests with the Internal Revenue Service.

Employers, for instance, are familiar with the Federal Tax Deposit system. Instead of sending checks or money to Internal Revenue offices at semimonthly, monthly, or quarterly intervals (depending on the size of the remittances) for redeposit in banks to the credit of the United States Government, employers now make the deposits directly in banks and take appropriate credits on their quarterly returns.[5] Federal Reserve tapes then tell us what has been deposited. This saves a great deal of waste motion in moving money around and, by making money available to the Treasury some days earlier, saves interest on the public debt.

Studies have been made, from time to time, of proposals to extend the bank deposit system of tax payment to other kinds of tax remittances. I have no doubt that eventually a wider area will be included in the bank deposit system in order to utilize its computerized facilities.

Automation saves taxpayers from a number of duplicating requests from other government agencies. This is done, of course, in strict compliance with the laws on confidentiality of returns. For instance, many business and farm operators are saved the necessity of filling out questionnaires—as once they did—of the Census Bureau, which uses tax data for much of its censuses of business, farming, and manufacturing. Similarly, IRS and the Social Security Administration exchange data tapes and other information. To the extent that the laws authorize state governments to examine federal returns, this process, too, is being automated.

C. Cooperation with State Governments[6]

In the search for tax revenues, the states and the federal government are often pictured as competitors. But in the administration of taxes, they are the friendliest of partners. This cooperation was quite informal for the first century of the republic. The federal government then depended heavily on alcohol and tobacco taxes, and this first gave rise to friendly exchanges of information and other assistance.

[5] INT. REV. CODE of 1954, § 6302(c).

[6] *See generally* Ecker-Racz, *Tax Simplification in this Federal System*, in this symposium, p. —.

The legends of the "revenuers" versus the moonshiners include memories of this cooperation.

Cooperation became both more formal and more sophisticated with the advent of income taxation. On the federal side, the first statutory recognition of this activity appears to be a provision in the Act of 1909[7] which permitted the states to inspect the returns of corporations under an "excise tax" measured by income. This was four years before the ratification of the sixteenth amendment to the Constitution, specifically authorizing direct income taxation.

Until recently, state inspection of federal returns was carried out by the following methods:

(1) Personal visits by authorized state officials to Internal Revenue offices to copy all or selected returns from their states; and
(2) Arrangements to have photocopies made by Internal Revenue, on a cost-reimbursement basis.

The development of magnetic tape computer systems has simplified this process. Within the last year, the Internal Revenue Service reached a stage in the implementation of its Automatic Data Processing System where it is able to offer to all states a magnetic tape copy of names, addresses, and key data from the Service's Master File of individual returns. At the present time, thirty states and the District of Columbia have solicited and contracted for these tapes.[8] In addition, several other states are exploring their equipment capability to use the tapes.

As in the case of visual inspection of returns, magnetic tape abstracts of returns are confidential.[9] This point is worth emphasis because of the fact that computer equipment is usually operated and managed by machine specialists who are not necessarily trained tax officials. Special precautions are necessary if any machine work is to be contracted to private organizations.

Another aspect which should be noted is that political subdivisions of a state have no direct authority to inspect federal returns and can obtain such access only upon the request of their governor. This method of preventing duplication of efforts by states and their municipalities was enacted long before local income taxes became significant. It is an especially wise provision now that several states have authorized imposition of county and city income taxes.

The principal use made by states of the inspection privilege is to determine whether comparable state returns have been filed by all of the residents of the state who filed federal returns. To the extent that the state taxing authorities have the manpower and other resources to do so, some comparisons can also be made of the amounts of income reported to the two jurisdictions. However, differences in

[7] Act of Aug. 5, 1909, ch. 6, 36 Stat. 11.

[8] At a nominal charge, based on the cost of production, not the cost of data input.

[9] *See* the penalty provisions of INT. REV. CODE of 1954, § 7213(a)(2), for unauthorized disclosure of federal return information by state officials.

definitions of income and deductions hamper such comparisons. Furthermore, persons deriving income from different states may have allocation problems. On the other hand, it was recognized about two decades ago that audit adjustments made by one jurisdiction are likely to be significant to the other jurisdiction.

The benefits of such federal-state agreements are being demonstrated daily. As each new state has signed such an agreement, we usually find some new type of cooperation utilizing the special characteristics of that state.

While the original agreements were limited to the exchange of information on audit adjustments—an activity which continues and grows—the new agreements also provide assistance in identifying nonfilers, locating taxpayers with delinquent accounts, and strengthening the enforcement of various excise taxes, such as the federal highway vehicle use tax.

These benefits accrue to the federal government as well as to the state governments. The agreements are no longer "one-way streets." For instance, in a fairly typical situation, it may be that the federal government can offer a state audit information which will be highly productive of revenue, but the state may have very little audit information to tender in exchange. However, the state's property tax, sales tax, and similar records may provide valuable help to the federal government in locating delinquent taxpayers who have moved from the last address shown on the federal records. Similarly, the truck registration and personal property tax records of the state may help the federal government in identifying taxpayers potentially liable for the highway vehicle use tax.

Because of the cost of record-keeping and tabulation, it has not been feasible to keep a regular tally on either the federal or state benefits. However, an indication can be obtained from a survey in the fiscal year 1962. At that time, twenty states and the District of Columbia had signed agreements. Information supplied by these agreements enabled the Internal Revenue Service to collect approximately $22 million in delinquent taxes alone. In the calendar year 1964, the Service assessed nearly $7 million of deficiencies as the result of audit information from these states. A similar survey, in the calendar year 1964, of eighteen states and the District of Columbia showed that they made deficiency assessments totaling $25 million on the basis of federal audit information.

One of the new techniques for maximizing the benefits of exchanging audit information is a system for sharing the audit workload. Each year the Service selects for audit examination more returns than can be reached by the available federal audit personnel. Accordingly, arrangements have been made in certain states to have some of these returns examined by state personnel. This avoids duplication of effort between federal and state examiners and is already providing significant benefits to both jurisdictions.

Technology is enhancing these benefits further. Since many states now have computer equipment, it is possible to process larger volumes of data in both juris-

dictions by exchanging magnetic tapes. As mentioned above, the Internal Revenue Service is now offering tapes which extract from the Service's individual Master File names, addresses, and key items of data for each individual with an address in a particular state. In the future, it is expected that the various jurisdictions will develop additional tape records of a more specialized character. These modern methods are overcoming some of the early problems in federal-state cooperation when data desired by one jurisdiction had to be obtained by manual sorting of returns and laborious handling and copying of information.

D. Aids to Tax Planning

Aside from the tax collection process, automation has long been important in the tabulation and analysis of statistical data which are necessary for the purpose of tax planning.

To assure that Congress will obtain detailed information on how the tax laws are working, the law specifically directs the Internal Revenue Service to extract and publish statistics (without identifying any taxpayers) from each year's crop of returns.[10] This statistical work was the first task to be converted to punchcard tabulating equipment a generation ago, and it was the first to be converted to computer equipment shortly after World War II.

Out of this experience with automation has come one of the most important tools in modern tax planning. This is the tax model,[11] a magnetic tape file which identifies the many characteristics of individual income tax returns, according to the nature and frequency of their occurrence. The model enables precise measurement of the consequences of any proposed changes in the tax laws and is used for many economic studies. In fact, it is used by many academic and business analysts outside of the government.

It was the magnetic tape and the computer which made it possible for the Internal Revenue Service to create and manipulate what we call a tax model. In this sense, the model is a miniature representation of something in the real world—a microcosm of the American taxpayer population, which provides a means for estimating how changes in the tax law will affect that population.

Internal Revenue's tax model consists of data taken from a sample of individual income tax returns filed in a given year. When we vary one or more of the items on this tape, or when we vary a factor that affects them, such as a tax rate, we can recompute all the tax returns making up the universe and estimate the effects of proposed changes on the population at large.

Our present tax model comprises 87,000 returns stratified by the size of adjusted gross income, out of a population of 71.7 million individual income tax returns filed

[10] INT. REV. CODE of 1954, § 6108.

[11] First announced in an unnumbered IRS News Release (Aug. 22, 1968).

for 1967.[12] The model is so constructed that additional subsamples of many different sizes can be drawn from the original file.

The data record in the model comprises eighty items from the individual return form—virtually all income, deduction, exemption, and credit information required for tax computation. In addition, codes indicate such essential characteristics as sample class, place of filing, form of deduction, marital status, and the like.

Since the tax model is a magnetic tape record, it can be manipulated by the computer to evaluate the tax effects of the following kinds of changes in the law:

(1) New tax rate schedules;
(2) Changes in the exemption allowance for different categories of exemption;
(3) Floor and ceiling limitations on specific deduction items (similar to the present medical deduction);
(4) Exclusion of a portion of certain types of income (sick pay, dividends, and so forth);
(5) Changes in the treatment of capital gains; and
(6) Substitution of credits for specified deductions.

Our model has been used very successfully and has helped to remove much of the guesswork in revenue estimating, so that there is now considerably less likelihood that final decisions in this vital area will be biased by unknowns and uncertainties.

E. Measurement of Tax Compliance

Another kind of automated statistics is at the heart of modern tax administration. The major task of the tax administrator is to deploy his available resources in the ways that will produce the most good. It is axiomatic that there are never enough resources to do as much work as the tax administrator conscientiously believes should be done. Therefore, he has a very difficult allocation problem.

How much of our resources should be devoted to data processing, to collecting delinquent accounts, to securing delinquent returns, to auditing returns, or to investigating suspected fraud? No scientific answer is likely. However, the stakes in tax administration are very high ($187 billion last year), and the least we can do is base our judgments on sound information.

For this reason, IRS has established a Taxpayer Compliance Measurement Program (TCMP) which is designed to pinpoint the frequency and kinds of errors and omissions to be found in the major areas of tax administration. The data are fed into computers and produce yardsticks to show where compliance resources are needed.

[12] The model is actually a subsample of the regular sample of 344,000 returns used to produce IRS, STATISTICS OF INCOME—1967, INDIVIDUAL INCOME TAX RETURNS. *See id.* § 7, Sources of the Data, Description of the Sample and Limitations of the Data.

As tax administrators, all of us are haunted by the same basic question: "How successfully are we enforcing the tax laws?" No doubt some taxpayers think we succeed far too well, and no doubt the perfectionists would fault us for missing some margin of tax liability contemplated by the tax laws. Viewed from either angle, it is equally obvious that we need to know more about the extent to which we collect the taxes legislated by the Congress. We need not only to measure income and tax gaps but also to identify specific problems and issues related to these shortcomings so that we can more efficiently use our administrative resources to cope with them. We, in the Internal Revenue Service, have been methodically piling up data from our tax returns for more than 100 years. We know to the dollar how much we have taken in from each tax for each year. In our enforcement activities we know how many delinquent returns were obtained and how much tax resulted, how many delinquent accounts were collected or closed and how many remain in inventory, what arithmetical and mechanical errors have been discovered as a byproduct of our data processing system, and what underpayments or overpayments of tax were detected through the audit program. This is no small achievement. It occupies a very large and dedicated force of highly skilled public servants.

But this success does not release us from the obligation to find out what might have been or what ought to be. For this purpose we have organized within our Planning and Research Office[13] a team of economists, mathematicians, statisticians, systems experts, lawyers, accountants, and others with special qualifications for finding and analyzing facts.

In a way, this search for facts is just as exciting as big game hunting, or any other major sport. The players do not wear any special uniforms or carry any weapons more alarming than slide rules, but they play for high stakes. Their success can contribute significantly to the fiscal soundness of the government and to the ability of the government to carry on its essential programs.

Our program for measuring compliance with the taxing statutes was inaugurated in July 1962, and I would like to set forth here the statement of purposes and objectives which was adopted at that time:[14]

> Section 1. Purpose
>
> .01 This Supplement establishes the Taxpayer Compliance Measurement Program [TCMP] and provides the general guidelines under which the program plans will be developed and carried out.
>
> .02 The general purpose is to integrate into one Reports System all essential information needed to optimize Federal tax administration.
>
> .03 This includes bringing together and coordinating into one comprehensive system all information required to measure the dimensions of Federal tax admin-

[13] Office of Assistant Commissioner (Planning and Research), described in Statement of Organization and Functions, § 1113.8, 34 Fed. Reg. 1657 (1969).

[14] Manual Supplement No. 12 RDD-14, Taxpayer Compliance Measurement Program, July 2, 1962.

istration workloads, their trends and projections; the related requirements, such as manpower, training, equipment and buildings; and the basic economics involved, such as costs, direct and indirect tax yields, and improvements in existing cost-yield ratios.

Section 2. Program Objectives

.01 In general, the program will measure in a coordinated and scientific manner:

(1) The size and nature of the total tax administration workload;
(2) the portion of the tax administration job that is accounted for by current operations;
(3) the portion of the tax administration job that is left undone, or the tax administration gap;
(4) the level of taxpayer compliance;
(5) changes in the level of taxpayer compliance, and whether compliance is increasing or decreasing under existing programs;
(6) the effectiveness with which current operations are being conducted; and,
(7) the portion of the tax administration gap that is worth closing.

Our principal studies under TCMP are for (*a*) delinquent accounts; (*b*) delinquent returns; and (*c*) the audit of returns on file.

In the case of delinquent accounts, we are making nationwide tabulations to determine the characteristics of delinquent accounts, with a view to finding the causes and cure of delinquency—insofar as that may be possible. An early dividend from this program was a cost study which showed that it would be profitable to send taxpayers a second notice of overdue accounts before assigning them for delinquency processing under our Taxpayer Delinquent Account system. We estimate that the institution of this second notice has reduced the annual issuance of delinquent accounts by about one-half million. We also expect that our analyses of the size and other characteristics of delinquent accounts will help us to redeploy some of our collection resources so as to obtain a better ratio of collections to costs.

Another part of TCMP involves determining the characteristics of returns filing delinquencies among business taxpayers. This information permits us to determine the resource requirements and their allocations to manage and control this part of tax administration more effectively.

The most complex of the TCMP studies relates to the audit of returns already on file. As a starter, we took a probability sample of all of the individual income tax returns filed on Form 1040 and Form 1040A for the tax year 1963 and arranged to have thorough audits made of each of these returns through direct contact with the taxpayer. In the ordinary audit procedure we try to screen out taxpayers and issues which seem least in need of correction. These selections are based on many years of experience but, obviously, they leave us without information about the returns or issues which are not examined.

Therefore, a TCMP audit is aimed at getting the full story from a representative

sample of taxpayers so as to be able to estimate the size of the total error workload—pinpointed as to particular types of taxpayers and specific issues.

Furthermore, by repeating these studies at reasonable intervals, we can measure the trends in compliance and noncompliance. This should tell us whether we have enough enforcement manpower and whether it is correctly deployed. We expect these studies to pay big dividends in improved tax administration. By enabling us to improve the selection of returns for audit, it will make it unnecessary to contact large numbers of taxpayers whose returns are acceptable—obviously saving the taxpayers from inconvenience and avoiding the waste of all too scarce audit manpower. It also means fuller collection of the taxes contemplated by the statutes, and it means more efficient operations and better cost-benefit ratios.

From these studies, we also hope to pinpoint weaknesses in forms, instructions, and procedures so that they can be strengthened. Where TCMP identifies common errors due to general public misunderstanding, it will provide the foundation for educational and publicity programs that can produce important results, with minimum costs and inconvenience to all parties concerned.

CONCLUSION

I think it is worth noting that these applications of scientific methods to tax administration demonstrate the progress which has taken place in our ancient profession. Ours may be the second oldest business, but it is determined to keep up with the times.

Automation usually involves extremely sophisticated techniques and equipment. It would seem to have little relationship to simplification in the man-in-the-street sense of short-form returns. But automation is a tool rather than an end. It can and does improve tax administration. And, no matter how obscure the link, the ultimate beneficiary is the taxpayer.