Computerized Research in the Law

March, 1976

The National Association of Attorneys General
Committee on the Office of Attorney General

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INTRODUCTION

Lawyers today are suffering an over-abundance of law. In Coke's day there were 5,000 reported decisions. Today, the American lawyer must deal with over 3 million decisions and 1.8 million statutes. And they are growing: it is estimated that there are about 30,000 new cases and 15,000 new statutes each year.[1] This report examines one possible solution to this problem. That solution is the use of computers for legal research.

You start by sitting at a terminal, a device which consists of a keyboard (like a typewriter), a television screen, a telephone and a printer. You activate the terminal by connecting it to the telephone and are ready to go. First you select the "library" you wish to peruse, such as the State of New York. Now, say you are bringing a habeas corpus action alleging that bail is too high. You select a key word phrase -- in this instance, "habeas corpus" -- and type it on the terminal. The screen instantly announces that there are 1,638 cases containing these words and invites you either to begin looking at them or narrow your search a bit.

This is a larger number of cases than you want to search, so you add "bail" to your key words, and type it in. The computer then searches for cases containing both "habeas corpus" and "bail" and reports that there are sixty-seven of these. This is still too many, so you add the requirements that either the word "excessive" or the word "unreasonable" appear within five words of the word "bail." There are eight such cases and you want to see them. You have three options: (1) you can get twenty words on either side of the key word you selected; (2) you can get the full text of the cases; or (3) you can get only the citations.

The first case, New York v. Klein, appears to be precisely on the point, so you can either have the machine print out the entire case on the screen, or read it in a reporter. You elect to take the first option.[2]

Obviously, not all searches end so successfully. Enough do, however, to justify the conclusion that computerized legal research has passed out of its purely experimental phase and merits consideration by all Attorneys Generals' offices as an aid to their operations. If for no other reason, attention is warranted by the fact that a number of prestigious, well-managed private law firms are using such a research system. Participants in a recent American Bar Association sponsored workshop covering the subject of the financial consideration and feasibility of automated law research also supported this approach. These groups represented judicial systems, government users, bar associations, private firms, publishers, and libraries. It was the consensus that automated legal search is feasible; that it will spread throughout the states; that it is a supplemental tool of search for the lawyer; and that it must not and cannot be bypassed. It is here to stay.[3]

The new technology has already demonstrated its potential to affect profoundly the entire legal profession. This special report will attempt to bring Attorneys Generals' offices up to date on these developments and provide some guidelines for evaluating their immediate value. The first section will give a general overview of how a computer-based legal research system actually works. The second part will describe in some detail currently available searching systems. The third part will consist of the major questions lawyers typically ask about computer-assisted legal research.

Obviously such questions do not have categorical answers, especially for such a diverse audience as Attorneys Generals' offices. This section will attempt to provide, instead of definitive answers, the major points on both sides of each question.

I. HOW A COMPUTERIZED LEGAL SEARCHING SYSTEM WORKS

Each computerized research program now available was designed or modified by individuals with individual perceptions of legal needs and priorities. Therefore, each has certain options that may or may not enhance its desirability to any particular Attorney General's office. Nevertheless, there are no really significant features possessed by only one system. Because they do share so many common characteristics, it is possible to present here an overview of full-text legal research that has general applicability to all available systems.

The Concept of Full-Text Legal Retrieval

A major characteristic of all American systems is that they employ the "full-text" concept.[4] When a document is being prepared for machine-readable filing, every word of that document is included. Hence, the person preparing the text, typically on a typewriter-like keyboard, need not have any specialized legal knowledge. Of course, typographical errors are inevitable at this stage. Since these could greatly affect the efficiency of the system, the completed work product must be scrupulously proofread. Supplementing these human efforts, the machine performs several types of accuracy checks automatically. It can prepare, for example, an indexed list of words appearing only once or twice in an entire text. Such a list will expose many spelling errors.

As the written material, referred to as data, is being entered into the computer, a set of internal instructions, referred to as a program, is translating it. Each word is converted into a set of symbols in order to facilitate efficient manipulation by the machine. The result establishes what amounts to a separate file for each converted word.

Retrieval of information so stored is as straightforward a process as in a manual filing system. The computer is given a series of commands instructing it to search for a specific word. That word is then converted into its symbolic equivalent, and the computer checks each and every file for the presence of the same set of symbols. Each time it finds a match, the contents of that file are either immediately translated back into a word and sent to the researcher or simply noted as a candidate for possible retrieval, depending upon the researcher's instructions. It should be emphasized that the computer, while completely accurate and tireless in carrying out its search for matching files, is totally witless. All it can do is recognize and retrieve, without fail, every occurrence of the data it is asked to look for. It knows nothing about the meaning of that particular match, or its value to the requestor.

Even with the machine's capacity to retrieve data with great speed and accuracy, most systems have devised ways to improve efficiency still further. The first step, which all systems use, is to create a list of all "common" words which are likely to be irrelevant to research needs. Obviously, few attorneys would want to search for the word "the", so there would be no value in keeping its location on record. Hence, legal searching systems do not set up files for such words as "the," "and," "hereafter," "whereas," "of," "by," "therefore," etc., although they are stored along with the full text

of the document. Surprisingly, eliminating such words, generally about 100 in number, reduces the amount which has to be researched by 40 to 50 percent.[5]

A Computer-Generated Index

Even the elimination of useless words leaves a staggering number of word comparisons to be made. Hence, the overwhelming majority of search packages have the computer create and maintain its own index. Frequently called a "concordance," such an index consists of every significant word of the full text; i.e., every word except the so-called common words noted above.

Creating this concordance is a simple affair and is done automatically. As the material in the source document is being read by the computer, the machine, after setting up each word's file, attaches to this file sufficient reference information to guide the machine to that word's precise location. Such references include the type of document (case, opinion, statute, brief), the document number assigned to it, and then the precise paragraph, sentence, and sentence position of that word. These words are then sorted into alphabetical order, with the computer automatically revising the list as new data are read in. When the machine is ordered to retrieve a word from the file, it need simply go to this index and collect all necessary reference information. It can then either tell the researcher what it has found or it can begin to translate and retrieve the information.

In principle, this procedure is analogous to creating and using a manual index, except that the word locations must be given with much more precision. In actuality, there are some substantial differences. Perhaps the most obvious one is the size of the index itself. However, sheer size is a deceptive consideration. For example, on one project it was determined that the Pennsylvania Statutes contained 31,113 sections (documents) and 6,230,520 total words. Of this number, only 23,979 different words were used after 112 "common" words were excluded. These non-common words were used a total of 3,415,189 times.[6] Even without such reduction, however, it is important to realize that size generally presents very little problem for the computer. Storage and manipulation of what seems to the human mind to be an overwhelming amount of data are routine to the machine. It is, of course, in just this capacity that the machine excels: mindlessly, but flawlessly, comparing information in a file to information given by the operator and, if desired, recording the results.

The concordance has two other distinguishing characteristics. First, after the common words are eliminated, there is no attempt to decide which words in the text of a document are important. A manual indexer, in contrast, must limit his index entries to the relatively few he considers important because of the difficulty of manipulating a large number of entries manually. The computer has no such limitations. Hence, with a computer index the researcher is, in effect, communicating directly with the authors of a text, not through an intermediate indexer of unknown skills and biases.

The second feature is less desirable. The concordance, despite its multitude of index entries, can be, by contempory standards, glaringly incomplete. Only words that appear in the text of the document itself are indexed. Conceptual categories, or descriptive terms that would be obvious

to a manual indexer, will not, without additional effort, be indexed. The author of the text must put them there; the machine cannot construe their presence.

Manipulating the Concordance

No index, no matter how compiled, eliminates useless material and takes its user to relevant information effortlessly and without fail. Even by this somewhat elastic standard, however, using only the concordance and simple "search" commands would have great limitations. Obviously, directing the computer to "select" all occurrences of a given word from a specified legal base would not, except in very unusual instances, yield much of value. More likely the procedure would bury the researcher under an avalanche of data, some of which might be useful.

Recognizing this limitation, researchers have directed attention toward developing techniques that improve the computer's capacity for separating the relevant from the irrelevant. A number of ways to increase selectivity have already been devised and potential refinements hold even greater promise. To date, the major breakthrough in improving the value of the concordance has been technological, by developing devices to refine interactive computer systems. In order to understand the importance of this development, it is necessary to describe both batch and interactive forms of searching systems.

Batch Processing Versus Interactive Systems

Batch processing of research requests was the first stage of computer-based searching. It works as follows. After some preliminary research and analysis, the user selects a term or set of terms for further inquiry. Generally, these searching terms are then entered into the computer by a set of punched cards consisting of both the terms and of instructions to the machine, known as the program. The program then goes onto a machine-maintained queue, awaiting its turn to be executed. The precise amount of waiting time depends on the length of the search, the priority assigned it, the length of the queue, and other such considerations. Usually, its turn comes within several hours and, assuming no programming errors were committed, the search is made, with results going onto another queue to wait for printing.

If the user were present at the job entry and return site, the results of the search could be examined at once. In such a case, the only long delay would be the indeterminate one of time on the queues. If one were at a distant location, the instructions would have to be mailed or telephoned to the center and then there would be the even longer delay between the completion of the search and its receipt through the mails. This time-consuming process would have to be repeated each time the researcher might wish to refine a search. Initial search results, for example, might indicate the need for either a broader or a narrower search.

Such a system did, and still does, fill a need; but its appeal is obviously to a limited audience. The major impetus for computer searching systems came with the development of interactive systems. With these, the researcher sits in an office, or perhaps a library, and describes a research request in simple English instructions, typed on what looks very much like a typewriter keyboard. This keyboard, part of the computer terminal, is

connected via a telephone line to a computer, which may be several states away. This centralized computer is large enough to service many of these terminals at what appears to be the same time. After the search request is completely entered, there is a lapse of time, typically about six seconds and seldom as long as a minute. Then a description of what information the search has uncovered begins to appear on a cathode-ray tube, which is a screen resembling the one on a television set. If the information is not satisfactory, the researcher can then quickly rephrase the question. This capacity of responding instantly to "feedback" from the machine is what makes such systems "interactive."

Searching Aids

Regardless of whether the researcher is working in the batch or interactive mode, he will need more than the concordance to obtain a satisfactory result. The computer is capable of performing a number of functions in addition to simply checking files. The following section will list and discuss these functions under three headings: (1) aids to selecting relevant documents; (2) aids to selecting relevant searching terms; and (3) methods of recording search results. Not every single, separate function can be described in detail in a report of this scope. Furthermore, not every searching system offers every option discussed, although different systems usually perform analogous functions, using different descriptive terminology. Finally, overriding all other differences, the utility of these searching refinements depends greatly upon whether the researcher is working in the batch or interactive mode. With these caveats in the background, the following three sections will describe techniques which improve search efficiency by refining the simple search command. It is these techniques, expecially when utilized with an interactive system, that have made computerized searching for legal materials worth considering by a wide audience.

(1) Aids to the Selection of Relevant Documents.

(A) "KWIC" (key word in context) Technique. With this option the key word or phrase specified is retrieved by the user in its unique context. The researcher gets back each match of the search-phrase specified, plus about twenty words (generally 100 characters) surrounding it. If the word or phrase so retrieved looks promising, its full context -- paragraph, page or entire document -- can then be retrieved for examination. Obviously, such scanning will make possible the rapid elimination of many irrelevant documents. It may also cause the researcher to redefine the search request. The researcher must still scan material that may not be relevant, but at least the process is less time consuming than it would be to locate and read the full text.

(B) Word "Roots." The computer can only distinguish exact matches, not close variations. For example, specifying a word such as "abstractor" would not retrieve references to "abstractor's." To avoid this problem, some systems allow the researcher to search for "abstract" as a root word. This would result in the retrieval of all references to "abstracted," "abstractions," "abstractor," "abstractor's," "abstractors," or "abstracts." Of course, sometimes a specific root word will retrieve a number of irrelevant ones. The root word "care," for example, would locate not only the related

words of "careful" and "careless," but also "career," and "caretaker," among others. Like the previous technique, the root-word option increases the probability that the researcher will not miss something relevant; but, at the same time, it increases the volume of material to be searched.

(C) Techniques based on Boolean Logic. In carrying out its search for a word or words, the computer is capable of "understanding" certain operators, generally labelled as "Boolean," or "Extended Boolean" after the Nineteenth Century English mathematician George Boole. Such operations include "and," "or," and "not," as well as some of their variations. Thus the use of "and" indicates that all search terms listed must be present. In an "or" statement the "or" expresses a series of alternatives, only one of which need be present. The "not" statement tells the machine that the terms after the negation must not be present. Variations, such as "exclusive or," have been devised as well. This one, logically enough, requires that one or the other term be present, but not both.

The value of these powerful functions is great. For example, by using the word "or," the researcher can link together a set of synonyms for the search word, thus increasing the probability of capturing pertinent information. Some systems have even experimented with a "built-in" thesaurus which automatically generates a list of synonyms for the key word specified. Again, such additions increase the quantity of useless material.

The other extended Boolean operators generally work to reduce this problem of information overload; especially given the machine's capacity to restrict searching to a specified range of material. For example, to qualify for retrieval, a specified combination of words can be required to occur in the same document, the same document and paragraph, or the same document, paragraph, and sentence. In order to be still more restrictive, the words can be specified as necessarily being in an exact word relationship, as "excessive" or "unreasonable" being required to occur within five words of the word "bail." Word order can similarly be specified, eliminating the possibility of retrieving references to "blind Venetians" when searching for references to venetian blinds. Finally, it is helpful sometimes to exclude certain phrases. For example, one may wish to locate all references to "budget" except those contained in the phrase "Bureau of the Budget." The Boolean operators permit such action.

(D) Other Limiting Commands. Often a specific research goal will allow the exclusion of irrelevant material with some precision. For example, one might be able to specify that only cases decided after 1970 are to be searched. In the same manner, the search may be limited to certain types of documents. If only the appellate brief file need be searched, the search net can be cast further afield; information overload would not be a major concern. Finally, the search can be limited to citations of a specific case, and only data containing references to that case will be retrieved.

(E) Ranking Procedures. Ranking procedures are used by some systems as an alternative to Boolean operators and by other systems as a supplement to them. The basic idea is that once a large number of cases are shown to contain a certain term, these cases are then ranked by some objective criteria. The material is then examined from the top-ranked item down, until sufficient relevant information is uncovered.

As an example, a simplified procedure might rank documents by the number of times the searched-for word or phrase occurs in each. The theory behind such a procedure is that the more frequently a designated key word appears in a given document, the more likely it is that the document merits further examination. At least one system, a Canadian one, is committed to research and development of more sophisticated ranking systems.[7]

(F) The Save Function. While not specifically designed to aid in the document selection process, a "save" function can serve this purpose. Basically, such a command allows the researcher to keep on file a series of searching commands discovered through actual practice to be useful in capturing pertinent material. Such a series of commands can be kept in an active file. It is then automatically updated as material being added to the data base is screened for possible applicability. Ideally, the user could be kept continually abreast of current information affecting a major area of interest simply by "accessing" this file (putting it onto the computer) and directing it to cover all new material.

(2) Aids to Selecting Appropriate Keywords.

One frustration in computer-assisted legal searching stems from having the conviction that there is a relevant case in the computer's files, but being unable to identify a search-term which will capture it. This problem has several obvious sources. Words have different meanings in different contexts, particularly in different historical contexts. To use an extreme example, a Supreme Court Justice, as compared to his modern counterpart, probably used very different words to describe analogous situations.

Concomitantly, judges may employ metaphors and complex similies that baffle the simple-minded computer. Many humanistically-inclined critics of the computer, incidentally, are concerned that machine technology may force all legal prose into dull, unimaginative forms. Leaving such a debate aside, however, one finds a number of practical alternatives already exist to assist the researcher in selecting productive search terms. The remainder of this subsection will discuss such techniques.

(A) Experience. The first and most obvious source for search words is the attorney's own background and familiarity with legal materials, including standard reference works, digests, etc. It must be emphasized that computerized legal research probably never can be a method for research that excludes all others. Instead, it is a supplement, intended to relieve the attorney of some routine obstacles to high quality research.

(B) "Browsing." The researcher may start with a term or two and just browse through samples of the legal material which those terms retrieve. Such an option is admittedly cumbersome when working in the batch mode. With an interactive system, however, the researcher can jump from page to page and from document to document much more rapidly than by using conventional library materials. The process of perusing the initial selections and getting the "feel" of possibly applicable law will generally stimulate the researcher's creative faculties and lead to refinements in the search.

(C) Synonym List. Some systems have as an option the capacity to produce, on demand, a list of possible synonyms for the search word specified by the user. Such a list might well help the researcher exhaust alternatives and/or refine the request. Once again, all of the standard reference materials can serve as additional sources for words or phrases related to, or opposite to, ones already employed.

(D) Alphabetical Index. Applicable parts of the concordance itself can obviously be examined. Occasionally, a researcher will feel confident that all possible word variations have been captured by a root word. Examining the alphabetized dictionary can test this confidence and, perhaps, reveal additional useful variations of the same word.

(E) Other Indexes. Some attempts have been made to integrate West's Index into the computer's internal index. In this experiment, portions of the West Topical Index were converted into machine-readable format. These West-assigned key numbers were used as indexing terms, thus augmenting the words taken from the text itself.[8]

(3) Recording Search Results.

In the batch processing system, recording search results is not a very complicated process. These results are simply printed and mailed to the requestor as standard computer output. In the interactive system, there are many more problems. The computer-driven printer can print at speeds of up to 1,250 lines per minute, making it a rapid and relatively inexpensive process for recording results. No interactive system can attain speeds anywhere close to this, so computer and researcher time may be tied up while results are being displayed.

For the initial interactive devices, or terminals, the recording problem was indeed serious. Results were printed on what was essentially a typewriter, which limited reporting rates to approximately 10 characters per second. Even when perfectly reliable, which they often were not, such terminals resulted in a great deal of wasted time.

With the introduction of terminals displaying results on cathode-ray tubes, results can be printed at the rate of 120 to 165 characters per second, with the print being of higher quality. This greatly improved speed and reliability obviously enhances the value of the various options for browsing through legal files and reformulating search strategies. Since the terminal also has the capacity to copy the entire screen, which displays approximately 2,000 characters, substantial bodies of data can be efficiently examined directly. The text of a case or two, a string of citations, or a large number of key words in context, for example, can be printed and evaluated at one's leisure. For large volumes of material, it is still more desirable to rely on the high speed printer. Generally, a single button on the keyboard activates this option, producing a work product that can be examined in more detail and that may, perhaps, form part of a permanent reference.

II. CASE STUDIES

This section will treat the specifics of each currently available searching system in some detail, distinguishing simple statutory searching from the immensely more complicated retrieval of case law. Section III of the report will then attempt to evaluate computerized legal research at a more general level.

A review of the history of computer searching helps show its strengths and weaknesses as a solution to the problems posed by the continually expanding corpus of legal materials. In terms of speed, reliability, and ease of use, much has been accomplished in the past twenty years. These great strides forward seem to portend even better things to come. Less promising, on the other hand, is the fact that the basic concepts undergirding the field have remained essentially unchanged during the same period. Systems marketed primarily to search statutes will be covered first.

The Utility of Statute-Based Searching Systems

The usual contractor for statute-searching systems is the state legislature. The reasons for such a purchase are worth exploring for the light they shed on computerized legal research in general. Certainly, the Attorney General's office performs some analogous functions for which the same system might be used.

The computer's ability to uncover all usages of selected words or phrases in a state's laws expands immeasurably the lawmaker's capacity to treat the statutes as the system they in fact are. This enables him better to predict what will be the effect of changes in a given law. For example, when debating the constitutional amendment proposing the lowering of the voting age to 18 years, a legislature equipped with this tool could find instantly every existing reference in its laws to "age," which would help it ascertain where related changes might have to be made. Such projects would have been difficult, if not impossible, without computer assistance, so the consequences of certain legal alterations could only be guessed.

Even greater value, particularly on a day-to-day basis, comes from combining a search system with its companion feature: a bill drafting package. Competing firms offer this service, such as IBM's ATMS (Advanced Text Management System) and Data Retrieval's ALTER (Automated Legal Text Entry Revision), although all of these systems have a great deal in common. Any have the potential to enhance the efficiency of the average state legislature's operations, as indicated by the fact that more than 30 states have already begun using them. The reasons lie in the repetitive nature of much legislative work.

Probably the first step in the lawmaking process is to discover currently applicable laws, if any, to the situation under examination. This need is readily met by the computer searching system. This computer search can comb the entire body of statutes quickly and thoroughly, eliminating the possibility that a statute covering a particular question already exists somewhere, but has not been found. Next comes the difficult job of actually drafting new legislation, which must then be subjected to the objections of other interested parties, first in committee and then on the

floor of the legislature. In the past, this process has necessitated an enormous amount of tedious typing and retyping of the same basic information. Endemic to this effort was a great deal of tension caused by both the need to get accurate revisions back into the hands of the lawmakers for prompt consideration and the frequent need of lawmakers to discover the precise status of a bill at any given time.

These bill-drafting systems greatly expedite this redrafting process. Once typed, the text of a pending bill can, at the push of a few buttons, be displayed on a cathode-ray tube. Then the changes, and only the changes, need be re-typed. In some systems this is as simple a process as moving a special pointer to the spot in the text, as entered on the cathode-ray tube, where alterations are required and then typing them on the attached keyboard. The drafting program then makes the desired changes in the text and performs necessary routine editorial services. Pagination, margins, and the like are automatically revised. Almost instantly, the updated version of the statute is ready to be printed by the computer's high-speed line printer and distributed to the legislators for their renewed consideration.

Another value of this system, and the final one to be considered here, comes with the requirement of promulgating the law, either individually or as a complete set. The printing of compilations and re-codifications requires very little additional work or expense, assuming the entire set of laws was initially machine-readable, and all alterations to it were implemented via the computer. A related part of the bill-drafting package will automatically both organize the new corpus into an appropriate format, including typeface, headings and so forth, and then set type for offset printing. The resultant product, once bound, is indistinguishable in appearance from that produced by conventional methods. In fact, modern printing operations generally employ computer driven typesetting equipment, so all that is being done is to avoid the cost and the time, including proofreading, of a printer going through a separate typesetting process.

The emphasis on the description of these systems has been on how a legislature might use them, since it is the legislature which would be the major consumer. However, once available, the Attorney General's office could make use of them for research purposes at little or no cost.

Occasionally there will be a question whose answer would be virtually irretrievable by conventional research methods. For example, many offices may wish to uncover every reference in the state statutes to "Attorney General," in order to formulate a more comprehensive and precise description of responsibilities. Several systems are available for such jobs, but all are basically the same. One, Aspen, will be described in detail, and two others will be covered more briefly.

Aspen Systems Corporation

Aspen Systems grew out of an application of computer technology to legal research needs. The Health Law Center at the University of Pittsburgh was concerned with studying health laws. Since these laws were not available in separate, well-indexed volumes, the Center began a process of creating such a compilation, using computers.

The full text of the Pennsylvania Statutes was put into machine-readable files. Then a searching program was written to select every occurrence of "health" and several health-related phrases out of this body of statutory material. Each "key" word or phrase so selected was printed in its context, along with its precise location in the text. Using this index of key words in context (a KWIC Index), building a separate and complete compilation of all Pennsylvania's health laws proved to be quite straightforward.

The success of this experiment encouraged other applications since searches of the state statutes could now be performed at little additional expense. For example, a Pennsylvania state legislator had had a bill passed to change the reference in Purdon's Pennsylvania Statutes from "retarded child" to "exceptional child." A number of manual attempts to implement this law had been made. However, since the set of Pennsylvania state statutes is quite large, no one was ever confident that the task had been completed. With the code being machine-readable, however, the computer quickly located every instance that the word "retarded" preceded the word "child" or any of its gramatical variations, and made the necessary change.[9]

The director of this project subsequently set up a private corporation, Aspen Systems. The statute law of every state was to be made machine-readable, and the company would provide computer searches of that material for a fee. Substantial interest was generated, but problems developed. In addition to the fee, customers began complaining about such things as the length of time it took to get results back, uncertainty over whether what came back reflected recent revisions, the receipt of excessive amounts of irrelevant material, and the like.

Today, Aspen Systems is a subsidiary of the American Can Corporation. It has given up on its original goal of keeping current the statutory law of all fifty states. As one alternative, they have contracted with private firms to keep current every state's law on a given subject, such as insurance regulation. More of interest to state Attorneys General, the firm has contracted with approximately sixteen states to maintain their statutory law in machine-readable format.

Similar Services: Data Retrieval and IBM

Aspen Systems has two major competitors in its present role of providing a computer word-searching program focused on statutory material. Data Retrieval Corporation markets both a service for converting a state's laws into a machine-readable format and a searching program, SIRS (Statutory Information Retrieval System), to retrieve whatever portions of the law are specified. IBM, on the other hand, generally subcontracts the actual conversion process. Its searching program, STAIRS (Storage and Information Retrieval System), is, like all others, based on using key words as indexing terms. Its major distinguishing option is the capacity to rank the documents retrieved by several objective criteria, a routine discussed in Section I. In addition to these two programs, some states, such as Washington, have developed similar word-processing programs of their own.

Decisional Searching

While these three systems have found a profitable role to play, their

value to an Attorney General's office, for research purposes, would be limited. The major exception comes when the office is prepared to make its own commitment to putting additional material onto the machine-readable files. Such a step, not unreasonable, will be treated in Section III. In the typical situation, finding the applicable law is only one small part of an attorney's research task. Discovering pertinent interpretations of a law, or an unindexed administrative regulation is, on the other hand, a much more formidable task, one for which existing indexing tools are more cumbersome and one where computerized legal research holds the greatest potential value.

Excluding several foreign systems, there are three research systems now vigorously attempting to service the need for researching more than statutes. These three systems -- FLITE, LEXIS, and JURIS -- have been designed specifically for legal research tasks. Some of their limitations and advantages are apparent in the following descriptions.

FLITE (Federal Legal Information Through Electronics)

The FLITE System, originally dubbed Project LITE, shares with Aspen Systems a link to the University of Pittsburgh. In 1961, the Office of the Staff Judge Advocate, United States Air Force Accounting and Finance Center, in Denver, Colorado, began studying the concept of a computer-based, full-text legal information retrieval system. In October, 1963, it contracted with the University of Pittsburgh to put onto computer files the United States Code and a portion of the published decisions of the Comptroller General. With the IBM Corporation as a subcontractor, the project was quickly operational. Gradually expanding its data base and using an Aspen-type searching program, it offered to perform computer searches of its files for any official agency of the United States Government.

At its inception, use of the FLITE service was restricted to agencies of the federal government. As the original concept proved workable, indeed valuable, the organization grew and added much new data. Private parties are still denied access; but it is now open to any federal, state, or local government agency on a cost-reimbursement basis. Any state Attorney General's office, in other words, might employ this research service, the typical fee being $50.00 per search.

How useful this service might be to an individual research project depends upon several factors, the most obvious being what material is available for searching. Typically desired material would be the same as that listed subsequently in the JURIS section, since both can share each other's data. Additional materials include: Decisions of the Comptroller General of the United States, published and unpublished; Armed Services Procurement Regulations; Board of Contract Appeals Decisions and Court Martial Reports.

The next consideration for using FLITE, assuming that it has a file of information relevant to the researcher's need, is that the system is not interactive. Hence it is open to the objections mentioned earlier: delay (currently the organization claims to mail research products back the day after receipt); no modification of research questions once processing begins; and the possibility of inundation by an overload of information. These problems are, to some degree, moderated by FLITE's policy of having all requests routed through a staff attorney experienced with the system.

Working with such an individual will often result in screening out obvious user errors, including whether or not the research question is amenable to computerization at all.

The FLITE organization offers a number of services related to its legal searching efforts. Basically the same as the bill-drafting aids discussed under the statutory research systems, these work-products merit elaboration here. They serve as further examples of useful spin-offs that can come once the full text of a document is made machine-readable.[10]

(1) Text Editing Routines.

Basically, these routines cause the entire body, or selected segments, of a master text file to be analyzed by the computer for the occurrence of selected words or word groupings. When a selected word or words, used either individually or in a specified word group context, is located in the text, the particular line of text material -- with the identified word(s) appropriately underscored -- is printed for human review and analysis. The output format consists of a specific reference to the text segment in which the selected word(s) may be found, as, "Title 10, Section 1401," and the text line material in sequence of appearance within the main body of text.

An alternate text edit routine, used primarily for complete revisions of regulatory material, presents text and reference data as described above, plus, in the right-hand margin, a list of the word or words which may be substituted for the underscored word(s). Use of this special purpose routine serves to produce standardization in the drafting of regulatory material. If desired, a printed file of the text material, in its original and revised format, can be developed for review and analysis prior to finalization.

(2) KWIC Indices.

The FLITE system can develop selective KWIC indices from a body or segment of text. Under the FLITE system, a printed line of KWIC Index material consists of a maximum of 97 characters of text plus a maximum of 27 characters of cross-reference information. The text material contains the "key word", easily located because of positioning, presented "in context"; i.e., the individual line contains the preceding 46 characters (processed to eliminate partial words) and, including the key word, the next 51 characters -- also purified to remove word fragments.

(3) Other Specialized Indices.

Since some of the material in the FLITE data base is not indexed by the publisher, this service can be quite helpful. In addition to a key-word based index, a number of other useful indices can be generated upon demand. Two examples of such specialized or tailor-made indices warrant discussion here:

> (A) Indexing on decisions or opinions which have been overruled or otherwise modified. In this regard, FLITE has developed an index of Decisions of the Comptroller General which have subsequently been overruled or other-

wise modified. Obviously this capability could be applied to other materials specified by the user.

(B) "Citation" or cross-reference indexing. It is possible to prepare a cross-reference or "citation" type index on any FLITE text file. The following is an example of a FLITE cross-reference index developed from the text of the Armed Services Procurement Regulation. (Section numbers used for illustrative purposes only.)

Referencing Section	Referenced Section
1 - 200	2 - 306
	4 - 102
	5 - 200
2 - 350	1 - 200
4 - 103	2 - 350
	7 - 700

If desired, material may be rearranged and presented with "referenced section" data in column 1 and "referencing section" in column 2. To illustrate the value of such an index, assume, using the foregoing example, that section 1-200 of the ASPR is under revision. By referencing the index, the person drafting the revision immediately is alerted to the fact that the three sections listed in column 2 may also require modification. The cross-reference index principle may be used to reference between segments within the same body of text, as illustrated, or to identify references within one body of text to another body of text, e.g., citations to Court of Claims Opinions contained in the Decisions of the Comptroller General.

LEXIS

LEXIS is the major legal research system that is now available commercially. It is much more ambitious than FLITE in terms of ultimate goals, data bases already captured, and technology employed; and a great deal of information has been written about it. Of course, its profitable use by most Attorneys Generals' offices is still in the future, if ever. However, everyone seriously concerned with the problems of performing quality legal research efficiently, in the face of today's information explosion, should be at least familiar with this firm's history and the strengths and weaknesses of its product. The aim of this section is to provide that part which is unique to LEXIS; Section III will be concerned with evaluating computerized legal research in general.

(1) History.

In most countries where computer-assisted legal research has been developed, the central government became involved at an early stage. Its aim was purportedly to insure that the systems were run in the interests of society at large rather than for those who could best afford it. LEXIS, on

the other hand, is a pioneering attempt to combine the interests of a private, profit-making corporation with a non-profit organization set up and run by legal professionals. The organization grew, in fact, out of the close cooperation between Mead Data Central, a subsidiary of the Mead Corporation, and the New York and Ohio Bar Associations.[11]

In 1964, the Ohio State Bar Association, in cooperation with other interested organizations in Ohio, launched a three-year feasibility study of computerized legal research. Since none of the systems then in existence were wholly satisfactory to the study committee, it decided to develop its own system, based on the full-text method of search and retrieval. To that end, OBAR (Ohio Bar Automated Research Corporation), a non-profit affiliate of the State Bar Association, was incorporated in January, 1967.

OBAR then entered into an agreement with Data Corporation, an advanced technology company based in Dayton, Ohio. Under the terms of the contract, the corporation's full text retrieval system, originally developed for other applications, would be adapted to the search and retrieval of legal information. Although some private contributions were added to the project, resources beyond those initially projected were soon called for. In the summer of 1969, the Mead Corporation acquired Data Corporation and thereafter committed itself to underwriting the project, incorporating the Information Systems Division of Data Corporation as a wholly owned subsidiary. The new company, Mead Data Central, Inc., assumed the commitment with OBAR.

Attorneys in other states had also been thinking along these lines. In New York, for example, the Lawyers' Center for Electronic Legal Research (LCELR) had been formed in 1966 with goals much like the Ohio group. After almost four years of inquiry, the center also selected the Mead research system as the one most suitable for lawyers in its state. In 1970 it recommended its official adoption by the New York State Bar Association. Negotiations between the two parties, MDC and NYSBA, which culminated in January, 1971, provided for the gradual introduction of the MDC service in New York state.

Recognizing that this service had the potential of spreading beyond these two states, thereby resulting in lowered costs and a more comprehensive service, LCELR broadened its scope to represent other professions. It changed its name to National Center for Automated Information Retrieval (NCAIR). NCAIR's board of trustees is composed of judges, lawyers and accountants from all over the United States. It had been discovered that federal tax law, and decisions, are particularly well suited for electronic retrieval, so these soon became a major part of the LEXIS library. This action greatly broadened the category of potential users, especially with the realization by these private tax experts that they might be facing in court the federal government, which was rapidly developing a computer-assisted research service of its own.

Since this time, three other states, Missouri, Texas, and Illinois, have started down this same road. The initial experiment shows indications of meeting sufficient legal needs to become economically selfsustaining. It is no secret that the organization has in the past run substantial deficits and may continue to do so.

(2) Technology Employed.

The most significant technical characteristic of the LEXIS system is that it is completely interactive. This means, as discussed in Section I, that through an in-office terminal the researcher accesses a central computer located, in this case, in Ohio. A cathode-ray tube displays the results, facilitating rapid scanning and recasting of search questions. When LEXIS was first introduced, numerous complaints cited frequent system failures and poor quality displays; but these problems have almost completely disappeared.[12] Any listing of the LEXIS data base must necessarily be incomplete. The firm is expanding vigorously and new data are being added constantly: for example data for Pennsylvania, Massachusetts, California and Delaware are scheduled to be added this year. Hence, the following listing is merely suggestive.

1. LEXIS DATA BASE

FEDERAL TAX LIBRARY

The Internal Revenue Code: Subtitle A (income tax); Subtitle B(estate and gift tax); Subtitle F (procedure and administration); Part of Subtitle D (excise tax with respect to exempt organizations and interest equalization)

Regulations: (final, temporary and proposed) under the above Code sections

The Cumulative Bulletin beginning in 1954: Part I (rulings under the 1954 Code); Part II (rulings under the 1939 Code); Part V (administration, procedure and miscellaneous matters); Commissioner's Acquiescences and Non-Acquiescences; Finding List tables; announcements; technical and other releases

Cases: Tax Court decisions beginning in 1942; Tax Court memorandum decisions beginning in 1968; Tax cases decided in the Supreme Court beginning in 1913; Tax Cases decided in the Court of Appeals beginning in 1945; Tax cases decided in the District Courts beginning in 1970; Tax cases decided in the Court of Claims beginning in 1942

Legislative History: The 1954 Code and Subsequent Revenue Acts; House, Senate and Conference Reports associated with the 1954 Code and those acts

SECURITIES LAW LIBRARY

Relevant sections of Title 15 of the U.S. Code; Final and Proposed Rules and Regulations Promulgated Under the Securities Acts and Regulations of the Securities Investors Protection Corporation; Final and Proposed Regulations issued by the Board of Governors of the Federal Reserve System; Selected Interpretive Releases of the Securities and Exchange Commission; No-Action Letters beginning in 1971

Cases: Securities cases decided in the Supreme Court beginning in 1933; Securities cases decided in the Courts of Appeals beginning in 1933; Securities cases decided in the District Courts beginning in 1933; Selected Securities and Exchange Commission Administrative Decisions beginning in 1933

Legislative History: House, Senate and Conference Reports associated with the Securities Acts

TRADE REGULATION LIBRARY

Trade regulation cases decided in the Supreme Court beginning in 1890; Trade regulation cases decided in the Courts of Appeals beginning in 1950; Trade regulation cases decided in the District Courts beginning in 1950; Federal Trade Commission decisions beginning in 1950; Federal Trade Commission consent orders beginning in 1970

FEDERAL (GENERAL) LIBRARY

United States Code; Supreme Court decisions beginning in 1938; Courts of Appeals decisions beginning in 1959; District Courts decisions beginning in 1970

OHIO LIBRARY

Ohio Revised Code; Constitution of Ohio; Ohio State Reports beginning in 1821; Ohio Appellate Reports beginning in 1913; Ohio Miscellaneous Reports beginning in 1940

NEW YORK LIBRARY

Consolidated Laws of New York; New York Reports beginning in 1940; New York Reports Second Series; New York Appellate Division Reports Second Series; New York Miscellaneous Reports Second Series

MISSOURI LIBRARY

Missouri Revised Code; Missouri Supreme Court Reports beginning in 1957; Missouri Courts of Appeals Reports beginning in 1957

TEXAS LIBRARY*

Texas Revised Civil Statutes; Texas Supreme Courts Reports beginning in July 1971; Texas Courts of Civil Appeals Reports beginning in July 1971; Texas Court of Criminal Appeals Reports beginning in July 1971

ILLINOIS LIBRARY*

Illinois Revised Statutes; Illinois Supreme Court Reports beginning in 1972; Illinois Appellate Reports beginning in 1972

*These are introductory libraries for demonstration purposes, and will be expanded shortly after their operational availability.

2. COST STRUCTURE FOR LEXIS

Note:

There are three classes of subscriptions to the service. Schedule A has a minimum monthly use commitment of $1000; Schedule B has a minimum monthly use commitment of $2500. Schedule Q has no minimum charge: one rents the equipment for $500 per month and simply buys time. With the first two options, the user has to agree to spend a minimum amount per month, although carry-overs are permitted up to the end of each calendar quarter. The cost per hour is as follows:

SCHEDULE "A"

Research Time (Peak Hours)	$97 per hour
Research Time (Off-Peak Hours)	$48 per hour
Surcharge for Search Time*	$195 per hour

SCHEDULE "B"

Research Time (Peak Hours)	$77 per hour
Research Time (Off-Peak Hours)	$48 per hour
Surcharge for Search Time*	$195 per hour

SCHEDULE "Q"

Research Time (Peak Hours)	$112 per hour
Research Time (Off-Peak Hours)	$48 per hour
Surcharge for Search Time*	$195 per hour

*Search time is that small portion of Research Time beginning with the transmission of a search request to the Central Computer and ending with the appearance on the research terminal of a statement that a certain number of documents (e.g., cases) satisfy the request.

There is also a non-recurring installation and training charge of $2550 for the first research terminal installed in a firm's office. For each additional terminal, the subscriber pays a non-recurring charge of $250.

JURIS (Justice Retrieval and Inquiry System)

The JURIS system is growing rapidly from a modest effort to harmonize the diverse legal functions of the Justice Department into a full-blown legal information retrieval system. With ninety-four U. S. Attorneys' offices scattered over the United States, the Department of Justice faced predictable coordination problems. The first of these was the need to present a unified and coherent public stance. All U. S. Attorneys' offices had to be informed of what was going on in different areas in order to prevent taking positions in diametric contradiction to one another. Secondarily, the Justice Department, like other large law offices, found itself doing a great deal of repetitive activity, generally labelled as "reinventing the wheel." It was not uncommon, for example, for a time-consuming research project to proceed in complete ignorance of a parallel effort conducted some months earlier by another attorney on the staff.

From such problems came the Justice Department's original decision to enforce the capture of all potentially re-usable material in machine-readable form, as a by-product of the typing process. In other words, when the typist prepares a legal document, such as a brief, he must use a magnetic typewriter. Thus the work product is simultaneously produced in a machine-readable form. With a minimum of effort and expense, this material can then be put into computer files for searching by the JURIS program. Thus, material produced in one office is almost instantly available for use, and guidance, in another.

As the project was proceeding, it became obvious that the value of this investment could be greatly enhanced with some additional effort. Since the search capability, including the necessary equipment, already existed, it was decided to make other legal material available as well. Thus, after a long feasibility study, the Department of Justice contracted with LEXIS, providing access to that firm's full data base. Related information of use was also obtained from FLITE. The Department has since cancelled its LEXIS contract and is proceeding in conjunction with FLITE to build a sizeable data base of its own.

There are subtle variations between JURIS and the other systems described, but the similarities would be more evident to most observers. It too employs the principle of key-word searching of the full text of legal material. Moreover, JURIS is an interactive system, employing all the current technical advances with a full range of options. The greatest advantages to JURIS lie in the ease with which one can "browse" through material. It is probably easier to page through material backwards and forwards, than in LEXIS. With JURIS, the researcher can go directly to the point in the document containing the search word or phrase. It is not necessary to scan each page in order. JURIS also has great flexibility when it comes to merging, separating, and re-merging search requests.

(1) Possible Use by the Attorney General.

As with the initial FLITE policy, access to JURIS is limited to the legal staff of its own Department. However, with growth this policy might change. More immediately, many Attorneys Generals' offices are located physically close to a U. S. Attorney's office. Given a common interest, it is conceivable that some sharing might be arranged on an informal basis even now. Once again, the first consideration is what is available for searching. Since legal information is now being added at a rapid rate, the following list includes material on the verge of being available as well. In addition to this information, JURIS has purchased West Headnotes for all state court cases in the National Reporter System since 1967 and federal court cases since 1961.

3. JURIS DATA BASE

Case Law: U.S. Reports, Vols. 176-420 (1900-1975); U.S. Reports, Vols. 1-175 (1756-1900)**; Federal Reporter, 2d Series, Vols. 300-511 (1961-1975)*; Federal Reporter, 2d Series, Vols. 1-299 (1924-

1961)**; Federal Supplement, Vols. 195-393 (1961-1975)*; Federal Supplement, Vols. 1-194 (1924-1961)**; Court of Claims; Vols. 203-206, Slips (1973-1975); Court of Claims; Vols. 134-202 (1956-1973)

Statutory Law: Selected Titles of the Code of Federal Regulations; U.S. Code, 1970 Ed. thru Supp. II; Executive Orders 7/73 thru 4/75; Public Laws passed by the 93rd Congress; Public Laws passed by the 94th Congress

Internal Work Products: Selected Briefs from the Solicitor General's Office; Selected Briefs from the Civil Division; Selected Briefs from the Tax Division; Selected Briefs from various U.S. Attorneys' Offices; Briefs filed in the Court of Appeals for the District of Columbia by the U. S. Attorney; Miscellaneous Pleadings, Memos, Bulletins

Files of Special Relevance to U.S. Attorney, District of Columbia: Briefs for D.C. District Court, 1/74 to present; D. C. Court of Appeals Case Law since 1970**; Briefs filed in D. C. Court of Appeals 1/74 to present**; Selected D. C. Superior Court case law

*Projected Availability Date: June, 1976
**Projected Availability Date: after July, 1976

This discussion of JURIS concludes Section II, case studies of operational, computer-based legal research systems. The concluding section of this special report will pose the major questions asked about computerized research.

III. EVALUATING THE COMPUTER AS A LEGAL RESEARCH AID

It is fine to know how a computer actually searches for documents; it is interesting to know the history and present status of legal searching systems. Most practicing attorneys will, however, want a more systematic presentation of the new technology's strengths and weaknesses. With this fact in mind, the third and final part of this special report will pose and discuss five questions most frequently asked concerning computer based legal research: (1) How accurate and reliable is it? (2) What type of training is necessary to use it? (3) What is its cost-to-benefits ratio? (4) How much does computer-based research cost? (5) What are the major implementation considerations? This last subsection is a case study of Ohio, the only Attorney General's office currently using LEXIS.

How Accurate and/or Reliable is Computerized Legal Research?

While price is, by definition, the bottom line of any investment consideration, inherent worth is ultimately the most significant factor to be evaluated. The cost of computerized legal research may, indeed, drop in the future; but unless the service rendered can promise accurate, reliable results, no conscientious manager could recommend investing in this kind of service. Providing the framework to assist in cost determination will require pulling together and expanding upon points already made regarding the advantages and disadvantages of computer-based legal searching.

(1) Advantages.

The most obvious advantage is the speed and accuracy with which the computer follows an order. In a matter of seconds it will search millions of words, uncovering every instance of a specified word or phrase. Little more could be requested in terms of speed, accuracy and thoroughness; it simply will not fail to retrieve any material that meets criteria specified in the search argument. Thus, if the attorney requests retrieval of all material containing the phrase "electronic surveillance," there is virtually no chance that the computer will miss anything containing these exact words.

As a means of keeping abreast of the information explosion, speed, accuracy, and thoroughness are the major selling points for computer research. A list of its advantages can be augmented, however, by considering several facts of the research process. Many factors, in addition to boredom, eyestrain, and time constraints, militate against the attorney's identifying, and hence preparing for, all possible aspects of a legal action. As a human being screens masses of material for closer review, decisions regarding relevancy, for example, are often made at a subconscious level. The computer can help here because, unlike the attorney, it is an inanimate, nonsocial, non-valued entity. It follows orders dispassionately, retrieving every scrap of material meeting the objective criteria specified. It will look in places the attorney might not even consider.

The computer's inability to pre-classify material by itself ties into an even more significant advantage for legal research: avoiding third party indexing. Any index built by humans has certain problems. Most frequently mentioned is the fact that the human indexer occasionally does careless

work. A case mis-indexed is simply a case lost. Less obviously, any manually maintained index can devote, at most, only a few index entries to any one case. This entry decision necessarily involves a great deal of discretion. Two equally well qualified attorneys might easily and honestly disagree over what about a case merits indexing, or even over its proper legal hierarchy. For example, cases on "adequacy of consideration" might occur in several hierarchies: Contracts, Consideration, Adequacy; Vendor-Purchase, Consideration, Adequacy; Personal Injuries, Releases, Consideration, Adequacy.[13]

As another consideration, the significance of a case is often altered by time, and prior decisions are seldom reread to be re-indexed. Finally, the hierarchical structure of index categories has been carefully designed and is not readily altered. New law may be squeezed into old categories, simply because of the inherent reluctance to develop more appropriate ones.

Most lawyers active in a particular specialty could undoubtedly find numerous examples of the problems these indexing limitations create. As one instance, section 103 of the Patent Act of 1952, responding to a landmark 1950 Supreme Court decision, specified that the subject matter to be patented must be "non-obvious" to a person having ordinary skill in the art.[14] After passage, a flood of legal scholarship discussed the subject, attempting to interpret the term "non-obvious." Most patent infringement cases since 1952 have had occasion to deal with section 103 of the statute. Furthermore, it was extensively interpreted in three cases decided by the Supreme Court. However, despite all of this case law and other significant legal literature: "no legal index [by 1966, at least, when this study was originally made] includes the terms 'non-obvious' or 'obvious' in or near the hierarchical generic headings of 'patentability' and 'invention', or anywhere else. The single most significant legal issue in this field of law for the past fourteen years has not succeeded in breaking the mold or pattern of the preconceived legal index structures; even the legal index for the major unofficial reports specializing in patent law does not yet include these descriptors of the statute."[15] A computer-based index, on the other hand, could easily ferret out such references.

(2) Disadvantages.

The most obvious disadvantage of computerized legal research relates to the kinds of material that is kept in the machine-readable files. Relevant material may not have been converted to computers. Even more insidious is the danger that information already converted is no longer current. The researcher may base a brief on cases retrieved, only to discover that a recent decision was not added to the data base. Any good system should obviate these problems by advertising plainly the depth and currency of materials in its files. In many LEXIS files, cases and other material are now available weeks to months before they are available in traditional sources.

The more fundamental disadvantages of computerized research are rooted in the inherent weakness of the concordance and the totally mindless way that it is used by the machine. As noted earlier in this report, the computer can merely compare each discrete word file in its memory bank to the searching command. If it finds a match, it simply notes the fact. This

ability to ignore a word's context can sometimes be useful, but most users most of the time would consider this a disadvantage.

The obvious problem is the constant danger of retrieving a vast amount of irrelevant material, accentuating rather than alleviating the problem of information overload. Words have many different meanings and these meanings are constantly changing. For example, "warranty" in the past was more commonly a real property notion, whereas nowadays it is more common in the area of personal property and contracts. The meaning of "fencing law" has also altered considerably. Words may also mean different things in different contexts. In traditional searching, contexts are immediately clear from the hierarchical organization of the material. Thus, the word "release" is not ambiguous when it appears in an index under a personal injuries classification; but it could mean any number of things when it is only one more word in a sea of words.[16]

In contrast to this problem of getting irrelevant information, computerized searching can easily overlook material of obvious importance. The search word or phrase must appear in the body of the text. It is entirely possible, for example, that an indexer using a traditional conceptual approach might use as an index entry the phrase "captain of the ship doctrine" from medical malpractice law, although neither that phrase not any of the words in it would appear in the text so indexed. But a text that used none of these words would be invisible to the computer's word search system, even though the searcher would regard the reference as critically important.[17]

(3) Summary.

In the past 15 years, over one hundred articles in law journals and other periodicals have examined the accuracy and reliability of computerized legal research. Almost all take a strong position, either lauding or condemning it, without, however, reaching the nub of the issue. Both traditional and computer-based searching systems have glaring weaknesses; neither can guarantee that all relevant information, and only relevant information will be retrieved. A computer search may miss pertinent information, generally because the material retrieved is too voluminous for careful consideration, or the search phrase does not happen to meet a match in the text of a relevant document. A traditional search may also miss valuable material, generally because the researcher runs out of time and energy or the index did not meet the searcher's needs.

The central problem is to determine the probability that a computer search will yield a satisfactory result, and compare this figure to the probability that the traditional search will yield a satisfactory result. It would seem clear that in a great majority of cases, given researchers of equal competence with their tools, the probability of discovering relevant materials would be greater with computer assistance. Given limited time, a skilled researcher is more likely to find appropriate key words than all appropriate index terms. Moreover, this advantage will probably increase as writers of legal documents become more sensitive to the possibility that their work will be searched by the computer.

What Type of Training is Necessary to Use the Computer?

Assuming that there are advantages to using the computer for legal re-

search, will the average attorney willingly embrace the technology necessary for such use? The answer seems to be "yes," but it must be emphasized that the response will not be automatic. This subsection will discuss the various efforts necessary to induce non-technical people to employ machine assistance on professional tasks.

It is, of course, possible to have a skilled computer expert manipulate the machine for the attorney. With an interactive system, however, it often happens that the computer's response to an initial question will stimulate the user to think along new lines. Thus, both the United States Department of Justice and Mead Data recommend that an attorney with a solid background in the subject being researched should perform the actual searching. With this objective in mind, great strides have been taken to reduce necessary equipment and language skills. Most machine commands can be placed in the English language and will make sense even to a non-technically oriented user.

Nevertheless, while it is relatively easy to learn the rudiments of computer operation, it can take considerable time and effort to become comfortable both using the terminal and understanding fully the wide range of available options. Moreover, familiarity can fade without frequent use. As a result lawyers aware of the computer might tend to avoid using it, even for tasks, such as Shepardizing, on which the machine is highly efficient.

As a first step to meeting these problems, there must be a training program when the system is first introduced. The U.S. Department of Justice, for example, has a formal program lasting six to eight hours, and the LEXIS program takes approximately three-quarters of a day. If requested, an in-firm follow-up refresher (about two hours) is provided four to six weeks after this initial training. Both attorneys and professional computer people may serve as trainers. In the Justice Department the training is spread over several days to allow the new ways time to sink in. Only about half of the period, incidentally, is spent on formal training, with the remainder devoted to a research problem of the trainee's choice.

However, in addition to formal training sessions, individual tutoring sessions are often necessary, and not just for new personnel. The Department of Justice, for example, found it advisable to approach researchers informally, discover what projects they were working on, and demonstrate how the computer system could help. As another strategy, one major Ohio law firm, a LEXIS subscriber for six years, employs law students as intermediaries. Once trained, the students become zealous promoters of the system, eventually converting many of the attorneys.[18]

With such effort, acceptance of the computer as a valuable research aid gradually comes. Internal studies of FLITE and JURIS, for example, show a pattern of increased usage combined with satisfactory results. Thus FLITE, by 1972, was responding to some one thousand requests for assistance per month -- up substantially from its modest beginnings in 1964. Respondents indicated that the FLITE search produced relevant data in 92 percent of requests and that the quantity of non-relevant data received was acceptable in 77 percent of these.

In addition, two-thirds of all replies indicated that the research done by FLITE would have been virtually infeasible by conventional means.[19] A survey of LEXIS while it was still being used by the U. S. Department of Justice revealed a similar pattern: usage grew significantly, with 99 percent of the users responding to a questionaire stating that the service should be continued.[20]

How Can a Cost to Benefit Ratio be Determined?

Without much doubt, the computer would add something of value to an Attorney General's office, as it would to any firm doing legal research. The real question, however, is whether the value obtained from adding this tool exceeds its cost. The reason this consideration is properly secondary at this time is that any current cost to benefit ratio will likely alter significantly over the next decade, necessitating an open mind and additional studies as time passes. In other words, even if an office can decide with certainty that computerized legal research is not worthwhile at this point, it may become so later on. With this caveat, the final subsection of this special report will attempt to provide a framework for estimating this cost to benefit ratio. The actual ratio would be different for each Attorney General's office.

The primary consideration in determining the economics of computer utilization is the frequency a given body of data -- in this case legal information -- will be accessed. Secondarily, one must decide how rapid and accurate the retrieval process must be. If any sizeable body of information would be utilized infrequently, the costs of converting it to machine-readable format would probably not be worthwhile, assuming speed and accuracy were not at a very high premium. If, on the other hand, this body of information could be used with frequency, conversion costs would probably be worth bearing. The larger the conversion project, of course, the more potential users there must be. Since data conversion costs would generally be quite high for a large body of legal information, the number of different research requests potentially directed to this corpus must be large, In short, the central determination is how frequently the data will be accessed: the more users, the lower the cost to each. At the present time this economic consideration is greatly affected by whether the data in question are statutes and regulatory material or cases and opinions.

(1) Statutes and Regulatory Material.

The number of potential users for machine-readable state statutes is almost certainly sufficient to justify conversion in most states. In the first place the scope of the project is not excessive. The number of words to be converted and the frequency with which they are revised are large, but not when compared to case law. Those involved with the legislative branch will probably be heavy users of this system, and would probably access the information with sufficient frequency to justify the project. The high premium put on speed and accuracy when the legislature is in session, of course, adds to its value.

Thus, regarding statutory material, the Attorney General's office faces a system with an already established clientele. It would almost certainly be advantageous for the office to exploit this system with more frequency than is now done. The cost, if anything at all, would be minimal.

More importantly, computerized information retrieved is highly accurate on statutory material, simply because the language of statutes is generally unambiguous. In other words, the drafters of statutes do not employ similies, metaphors or other poetic language. Moreover, they endeavor to formulate generalities and strive to avoid specific topics. Finally, and most important, is the use in statutes of a "preferred language": unlike decisions often written by a judge with an eye to his reputation as a stylist, statutes are drafted with a view to precision and consistency.[21]

The use of these advantages does not have to be in the distant future. According to a Council of State Governments survey, forty of the fifty state legislatures have, or are on the verge of, adopting a statutory retrieval system.[22] Thus, in the majority of jurisdictions, computer statutory searching is already available at low cost to the Attorney General. There are, unfortunatly, two major drawbacks. First of all, the adoption of new technology does not come by itself. Someone or some group of individuals with authority must be charged with the responsibility for uncovering present statutory research efforts that might be facilitated by computer assistance. Otherwise, in each individual case, learning the new way will be too much trouble. As mentioned earlier, such research opportunities do exist, and the establishment of a person or group research center in the office would probably reveal more.

The second roadblock cannot be breached with such ease. While machine-readable statutes are generally available and can be searched with great efficiency, the need to search decisional material is generally far greater. A study made by the FLITE organization, for example, revealed that less than 10 percent of its search requests were directed towards statutory material.[23] Statutory material can clearly be searched with profit, but the demand for such searching is dwarfed by the demand for searches of decisions. Since it is in this larger category that costs can become excessive, a careful consideration of all factors is essential.

(2) Decisional Material.

How much interest an Attorney General's office might take in computer-based decision searching depends upon several factors. Computerized searching has been shown to be of considerable value. The question is weighing this value against its cost; how often would it be profitably used? It is this determination which would be unique to each office, with the major consideration being an analysis of research now done and the cost of doing it. There must be considerable staff time devoted to doing research involving the sources that would be converted. Computerization may, in fact, reduce search and retrieval time by 80 percent, (the maximum figure cited by proponents);[24] but, unless the total time now expended on searching is large, even an 80 percent reduction may not save a significant amount of time. One indirect measure of the volume of such research is how much money the office now spends on conventional tools to access this primary data (e.g., West's Indices) and how frequently they are used.

Assuming that the office spends a considerable time digging into primary source material, the next question is to determine the major types of cases now requiring such primary research. The computer is most efficient in retrieving decisional material that uses fairly standardized terminology,

such as tax, real property, and wills and trusts cases; and decisions that are very "fact specific", such as criminal justice, torts and Workmen's Compensation precedents. For the same reason, it is unmatched for checking or building a line of precedent, or for verifying the accuracy and current status of a single citation. Unlike Shepardizing which only goes forward and is dependent upon a precedent being cited in the text, computerized research, searching with words and citations, can go in both directions, picking up references that a Shepard's index alone might miss. Finally, it is often helpful to know, for example, how a given judge has responded to a similar question put, perhaps, in a different way. Computerized research is also the only efficient way to determine whether a particular individual company has been previously involved in a specified type of litigation. Once again, however, one must try to estimate the frequency with which it would be worthwhile to use such a capability.

One study, which was relatively hostile to computerized legal research, asserted that lawyers conducting legal research find themselves looking for one of three things: (1) the same, or a very similar factual situation; (2) an analogous factual situation; (3) a rule or concept which benefits a specific client and is applicable, by the use of human reason, to that case.[25] The type of material on which the computer works best, as indicated by the previous listing, falls into the first category. Once the computer is turned onto research designed to uncover material falling into categories two and three, efficiency drops markedly. It will still work, of course; but the approach must be indirect and can be as frustrating and as time-consuming as are conventional efforts. The machine itself is incapable of reasoning by analogy or of building concepts: two processes which are important to legal research. Here, the consideration must be how important is the case and, perhaps, whether one's opponent is using the computer. An important case may still justify this lowered efficiency.

To recapitulate, the degree to which a given Attorney General's office might profitably support a computerized research system depends on the composition of its workload. If a great deal of time goes into searching for material involving similar factual situations, computer assistance can definitely pay for itself. It can also be valuable if the office handles a considerable amount of litigation of wide-ranging importance. Since an Attorney General's goal is not simply to win cases, but to properly interpret law and precedent in the public interest, computerized research might be even more useful than in a private firm.

How Much Does Computer-Based Legal Research Cost?

The cost of computer assistance to any individual office cannot be precisely estimated in advance. The most important factors are whether or not the information to be researched is already machine-readable, how much it costs to convert, and how frequently searches of this information are requested. This subsection will discuss currently available computer-based research aids, pulling together cost information from elsewhere in the report, as well as adding cost information for options not previously examined.

(1) LEXIS.

The first cost of a LEXIS system is the non-recurring installation and training fee of $2550, which is reduced to $250 should an additional termi-

nal be desired.[26] Beyond this figure, the system will cost at least $500 per month, which is approximately the cost of leasing the equipment. How much the monthly bill will exceed this figure depends upon usage. As a general guide, the Ohio Attorney General's office spends $1600 each month. Once this figure is expended, in fact, access to the system is tightly restricted. The terminal supervisor in Ohio has indicated that most users are satisfied with this amount of research time.[27]

(2) FLITE/JURIS.

Both of these systems are operated by the federal government. As indicated earlier, access is available in a "batch" mode to the shared data base through FLITE. The price of a search will vary, but will seldom go above $50.00. The cost of preparing the various computerized research aids will vary more. The search fee includes consultation with a staff attorney, who will actually frame the search. Access to JURIS is not currently open to the state Attorneys General, at least on a formal basis. The cost to the Department of Justice, incidentally, of maintaining this system is roughly $1,000,000 per year, with about 25 percent of this figure being the cost of adding new data.

(3) Statutory Research.

The programs discussed earlier which search statutes vary in price according to options requested. A reasonable estimate would be $550 per month for leasing fees. Beyond this figure, there is the cost of the terminal and other equipment, generally at least another $250 per month. If the laws have not yet been converted to machine-readable format, the cost to get started could go quite high. One estimate is that it costs approximately one-third of a cent per word to make data machine-readable.[28] At least one state used prisoners to keypunch the statutes, thus saving a considerable sum. Of course, the majority of Attorneys General are in states whose laws have already been converted and thus the state government already owns or leases the necessary searching equipment. In such states, a search by the Attorney General would cost almost nothing.

(4) Internal Work Products.

An example of less expensive computer assistance to the research task involves converting the full-text of documents, but on a less grand scale. As stated above forty states lease or own a program which can perform statutory research. Such a program can, of course, also search decisional materials. It would be relatively inexpensive for the Attorney General to begin to use this searching capability on internal office material. An opinion, for example, which is typed on a magnetic typewriter is then machine-readable. It could be put into a computer storage device for later searching. If other office work products were treated similarly, a large body of machine-readable data would gradually be built up at a minimum expense. Experience with this information would help determine the value of going back to capture previously completed material. Once again, the conversion costs would be about one-third of a cent per word.

It was in just this way that the U.S. Department of Justice got started. As with JURIS, an ancillary benefit would be that such machine-readable data could be instantly disseminated to any state or local government office which has a compatible terminal. Such a capability would certainly help to integrate the state's legal system.

Of course, it is not necessary to convert the full text of a document. One way that the computer can facilitate legal research at very little cost is through maintaining an index of frequently used office material. For example, every opinion written by an Attorney General's office is already generally assigned one or more indexing terms. A clerk could keypunch a computer card consisting of the opinion name, a file location number, and the appropriate indexing terms. A simple computer program could be easily written to sort these cards, arrange each index term in alphabetical order, and print the index. The major advantage to having the information machine-readable would come when new opinions are written and must be added to the index. Given the new cards, the machine can quickly compile a new, real-phabetized list and print it as standard computer print-out, on microfilm, or as prepared for offset printing in a bound volume.

(5) Westlaw.

Westlaw represents a possibly useful option not previously discussed. In this system, operational since April, 1975, West headnotes and key numbers comprise the data base to be searched. Thus, conceptual searching should be simplified, but at the cost of being unable to communicate with the full text of a document. Available material now consists of lawyer-prepared summaries representing all state court cases reported in the National Reporter System from 1967 to date. Also included are summaries of all federal court cases reported in the National Reporter System since 1961.

In promotional material the West Publishing Company claims to have run tests of this system against its "full-text" competitors, with results favorable to Westlaw. These tests would require careful scrutiny, however, by a disinterested party before accepted at their face value. At the least, Westlaw may represent an attractive alternative when a full-text service is unavailable. Experience with Westlaw may justify undertaking the larger-scale operation.

The cost is $1200 per month, with a $2.50 additional charge for each search. This price includes all equipment and communications charges. If an individual office has access to a standard computer terminal, such as an IBM 3275, the monthly fee would be less.

(6) Autocite.

This less expensive computer-based searching service is offered by Lawyers Cooperative Publishing Company. This firm has put into machine-readable format the precise citation of virtually every American case, including whether it materially affects a previous case. The list is updated regularly. A subscriber to this service can instantly verify citations for completing a brief, as well as discover if a new decision has overturned the case being cited. Generally, if the office has access to a magnetic typewriter, no special terminal is needed. This machine can be hooked up, via a special attachment to the office telephone, to Autocite's centralized data base. The current fee is $150 per month, with a usage charge of $.25

per minute.

Major Implementation Considerations Faced by an Actual User: The Ohio Experience[29]

Ohio currently has 150 regular Assistant Attorneys General who have the opportunity of using the computer terminal. In addition, about 30 legal interns are permitted to use the terminal if required to do so. Of the 180-plus individuals who could make use of the computer only about 50 do so with any regularity.

The system is available to authorized legal personnel only after certain requirements are met. These are that persons planning to use the terminal must be trained in the proper use of the system either by a company representative from Mead Data Central or by a member of the staff who has had sufficient experience. In addition, each individual must "sign in," recording their name, date, office section, and the total number of minutes and seconds spent at the terminal. Also required is that each individual use the personal identification number which is assigned by Mead Data Central's Dayton office.

The LEXIS retrieval system is in the law library, allowing the computer and the books to form a compact and effective research unit. The unit itself measures 30" by 42", and a 9' by 9' area is sufficient as far as space requirements are concerned. On a small work table next to the computer, there are copies of both regular and law dictionaries and the LEXIS training manual. This manual has proven very helpful.

The Ohio Attorney General first contracted with LEXIS in 1969. Initially, the equipment could be used for an unlimited amount of time at a base monthly fee of $1,000. This policy continued until June of 1973 when a complicated billing system was adopted. Now, cost averages out to a monthly minimum of $1,500 with a charge of $80 per hour for a use over 12 and 1/2 hours for any given monthly period.

However, the first monthly bill under the new billing system was in excess of $5,000. This figure led to the conclusion that much closer supervision would have to be maintained in order to allow valid use of the equipment, while at the same time keeping the costs within bounds. Therefore, the decision was made to control the use of the equipment and to initiate a training prerequisite.

Three procedures are used to guarantee maximum benefits from the LEXIS system. First, good communication is essential. Interoffice memoranda advise all users of any improvements and/or additions made to the system by Mead Data Central. Such additions might include expanded coverage of material and information which has been entered into the system's data bank. Moreover, each individual is reminded that the system is available for use, and has value as a research tool. Secondly, continuous training sessions are conducted. Everyone using the LEXIS system is given ample opportunity to learn proper operation of the unit. Introductory sessions, covering the mechanical portion of the procedure, take about 30 minutes. These introductory sessions are conducted by a member of the staff who has had a number of official training periods by a Mead Data representative. The LEXIS

Manual of instructions is signed out to trainees for a few days' study after which a follow up session is scheduled. This involves a more detailed explanation of computer or search logic.

Once the researcher has been trained sufficiently in the use of the system, an individual identification number for personal use is issued. With each use, the individual records this number in the computer system, so that the printout that accompanies the bill will reflect the use by both person and office section. If an individual session is overly long, more than one hour's time, this person is contacted and asked if there is any difficulty. Suggestions are also made for more efficient operation.

Any cost savings would have to be stated in terms of lawyer hours saved while using LEXIS. Ohio has not done a detailed cost-savings study to date. However, they feel that it is obviously possible for a well-trained attorney to save hours of research time by using the computer system. The most beneficial aspect of using the computer terminal is that one can scan the data bank covering general areas of the law with which he is dealing in order to narrow his detailed research to specific cases, statute sections or sections in legal treatises. This process shortens research time and supplements conventional research methods.

Several problems have been experienced in the use of the data retrieval system. One is the time used by attorneys operating the terminal. Inefficient operation arises from the fact that the LEXIS system is unique and somewhat technical, requiring some in-depth thought on the part of the user before beginning a search operation. Initially, most individuals use the system while at the same time attempting to formulate an approach to a particular research problem. During training sessions it is stressed that the approach to the problem should be thoroughly analyzed before dialing into the computer. Also, the computer is programmed to repeat only those words that were and are being entered into the data bank. Therefore, it operates on the concept of "key words" and these key words must be used in the search process or improper results will be obtained.

There was some malfunctioning of the system after it was first installed. The problems were caused by terminal breakdowns, by inexperienced users, and by system failures at the computer data bank at Mead Data Central. However, this has not been a problem during the last six months as the system has become more streamlined. There have been only two breakdowns in the past year. The LEXIS/OBAR terminal is now a highly reliable piece of equipment.

An additional point would have to be expense. Since June of 1973 Ohio has paid an average of $1,500 to $1,700 per month, and these amounts were the result of fairly stringent controls on the use of the equipment. The time factor must be watched very closely during the month to insure that the $1,500 to $2,000 range in any one month is not exceeded. Therefore, at times the use of the terminal is severely restricted. Mead Data will send weekly time records upon request.

Finally there is a research problem. Legal concepts and a theoretical approach to concepts cannot be researched, examined or better understood by using the LEXIS system. The terminal can only duplicate words or phrases which are entered into it by way of the search request. It is a very me-

chanical process and the more preparation made toward researching a problem before using the system the better the results will be. The data bank is made to search for specific items as opposed to generalities. In this sense researching statutes is quick, simple and effective. Researching a legal theory or synthesis of case decisions may not be as quick or simple.

Conclusion

The major thread running through this report is that computerized legal research is a mixed blessing. On the one hand, it can promise relief to the conscientious attorney who is endeavoring to keep abreast of relevant legal information. On the other hand, this relief comes at a high price, both in terms of actual money invested and in terms of the mindless way the computer must necessarily select material for human review. The ultimate task is to weigh benefits against costs. In this regard, each Attorney General's office is unique and this report cannot pretend to have made this crucial determination.

FOOTNOTES

1. Leslie Kurtz, Yeah, But Can LEXIS Teach Legal Method, STUDENT LAWYER (February, 1974), reprinted in 15 JURIMETRICS JOURNAL 119 (Winter, 1974).

2. Id. This article is the source of the habeas corpus example.

3. L. M. Vernon, Financial Considerations and Feasibility, 163 AUTOMATED LAW RESEARCH (a collection of presentations delivered at the First National Conference on Automated Law Research March, 1972 sponsored and planned by the Standing Committee on Law and Technology of the American Bar Association).

4. At one time, several firms marketed searching packages for "citations" only. Most have gone bankrupt. This report will not cover such systems.

5. S. E. Furth, STAIRS: An Interactive Full-Text Retrieval System, supra note 3, at 26.

6. J. F. Horty, Jr., Use of the Computer in Statutory Research and the Legislative Process, in R. P. Bigelow (ed.), COMPUTERS AND THE LAW, 55-56 (Published in 1969 by the Standing Committee on Law and Technology of the American Bar Association)

7. H. Lawford, Quic/Law: Project of Queen's University, supra note 3, at 67-93.

8. B. W. Basheer, JURIS: Justice Retrieval and Inquiry System, supra note 3, at 61.

9. D. T. Link, Law Searching By Computer, supra note 3, at 6.

10. These descriptions are abstracted from 14 AF JAG L. REVIEW 22 (Winter, 1972). This entire issue is devoted to the FLITE system.

11. This history of LEXIS comes primarily from Jerome Rubin LEXIS: An Automated Research System, supra note 3, at 19.

12. Richard M. McGonigal, Computerized Legal Research, one Law Firm's User Experience. 15 LAW OFFICE AND ECONOMICS MANAGEMENT 213 (1974).

13. William L. Baine, Computers and Legal Research, 30 CAL STATE BAR J 100 (1975).

14. The following example comes from Irving Kayton, Retrieving Case Law by Computer: Fact, Fiction and Future, 35 GEORGE WASHINGTON LAW REVIEW 1 (1966).

15. Id., 3.

16. Supra note 13 at 104.

17. Id. at 106.

18. Supra note 12, at 217.

19. Supra note 10, at 34.

20. B. W. Basheer, Computer Research in the Law, in Committee on the Office of Attorney General, National Association of Attorneys General, 13 PROCEEDINGS, THIRD MANAGEMENT INSTITUTE, (1975).

21. Richard S. Morgan, The Nature of Statute Law or Parliament Speaks in a High Level Language, in 3 RUTGERS JOURNAL OF COMPUTERS IN THE LAW 128 (1973).

22. Council of State Governments, STATE USE OF ELECTRONIC DATA PROCESSING at 8. Lexington, Kentucky (1974).

23. Supra note 10 at 67.

24. Supra note 8 at 56.

25. Philip Slayton, 22 ELECTRONIC LEGAL RETRIEVAL, published by the Department of Communications of the Government of Canada, (1974).

26. More information on all of these systems can be obtained by writing to them directly. Addresses are given in the Appendix.

27. Interview with Maryanne Giganti, Head Librarian, Ohio Attorney General's office in Columbus, Ohio, Jan. 7, 1976.

28. The cost estimates were provided by a local IBM representative.

29. This summary is based on a letter from Dwight C. Petty, Jr., Ohio Attorney General's office, to Lawrence L. Hoffman, Los Angeles Attorney's Office, Aug. 27, 1975.

APPENDIX

For more information on the research systems discussed, the following organizations can be contacted directly:

Aspen Systems Corporation
20010 Century Blvd.
Germantown, Maryland 20767
(301)428-0700

Data Retrieval Corporation
5600 West Brown Deer Road
P. O. 23437
Milwaukee, Wisconsin 53223
(414)355-5900

FLITE
3 00 York Street
Denver, Colorado 80274
(303)825-1161 Ext. 6433

JURIS
Legal Systems Section
U. S. Department of Justice
425 I Street
Washington, D. C.
(202)376-2607

Autocite
Lawyers Co-Operative Publishing Company
Data Base Marketing Division
Rochester, New York 14603
(716)546-5530

LEXIS
Marketing Department
Mead Data Central, Inc.
200 Park Avenue
New York, New York 10017
(212)833-8560

West Law
Customers Service, West Publishing Co.
50 Kellogg Boulevard
St. Paul, Minnesota 55102
(612)228-2620

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END

7 additional