

CONGRESS:
THE FIRST BRANCH
OF GOVERNMENT

Information Systems for Congress

By Kenneth Janda

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The American Enterprise Institute for Public Policy Research initiated a series of studies by a group of political and behavioral scientists in June 1965 to examine the foundations of government by legislature in the national government of the United States. Eleven scholars, working through the coordinating efforts of Professor Alfred de Grazia of New York University, met together and in smaller groups several times in the summer of 1965 to take up the problem.

The purpose of the AEI special study group was to describe how Congress functions and how it might be aided in its work to achieve a good society, counting as part of that good society the legislative way of life itself. The work was undertaken with an eye to the needs of the currently operative Joint Committee on the Organization of Congress. For this reason the cutoff date for completion of the papers was set in September 1965.

Each scholar pursued his separate study with the common objective of organizing changes in Congress according to a model of a strong legislature. Each also studied the papers of the other contributors to ensure that the total collection of reforms proposed would create a consistent model of legislative government. Each author has expressed a general approval of the efforts of his colleagues, although he can accept final responsibility only for his own paper.

The American Enterprise Institute which, of course, neither endorses nor disapproves the findings of the study group, is publishing the individual contributions serially. The entire symposium is scheduled for publication early in 1966 under the title: "Congress: The First Branch of Government."

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Dr. Janda's major substantive interests are in voting behavior, the legislative process, and political parties. He is currently engaged in a major comparative study of *political parties throughout the world, which will employ a variety of information retrieval and data processing techniques.*

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STUDENTS of government generally agree that the legislative branches of modern governments have gradually lost power relative to the power of executive authorities. This phenomenon has been referred to variously as the "parliamentary crisis,"¹ the "atrophy of the legislature,"² and the "decline of the legislature."³ Although some students hold that Congress constitutes an exception to this generalization,⁴ most detect the same trend in the United States. Indeed this very symposium of recommendations for revitalizing Congress is an acknowledgement of it.

Congress' loss of power is manifested in three important governmental functions traditionally reserved to the legislature: initiating legislation, evaluating legislative proposals, and overseeing the execution of legislation. In recent decades, Congress has abdicated to the President its initiative in preparing a legislative program, has faltered in thoroughly evaluating proposals submitted by the President, and has been unable to exercise effective direction and control over the administration of legislation in which Congress has acquiesced.

Some students of government are not alarmed by the diminution of congressional power.⁵ They favor what has been termed an "executive force" model of government, which would ascribe even greater power to the President and relegate Congress to the role of

¹ David B. Truman (ed.), *The Congress and America's Future* (Englewood Cliffs, N.J.: Prentice-Hall, 1965), p. 1.

² William J. Keefe and Morris S. Ogul, *The American Legislative Process: Congress and the States* (Englewood Cliffs, N.J.: Prentice-Hall, 1965), p. 483.

³ K. C. Wheare, *Legislatures* (New York: Oxford University Press, 1963), p. 221.

⁴ *Ibid.*, p. 223; Ernest S. Griffith, *Congress: Its Contemporary Role* (New York: New York University Press, 1961), p. 88.

⁵ See, for example, James MacGregor Burns, *The Deadlock of Democracy* (Englewood Cliffs, N.J.: Prentice-Hall, 1963).

notarizing the President's legislative demands. Other students, including the authors of these essays, do not favor a governmental system in which Congress sits as a corporate notary public and are consequently alarmed by the present imbalance of power between the two branches. Their position is inspired by the belief that democratic government functions neither long nor well in the absence of a strong and independent representative legislature.⁶

As an alternative to government by executive force, this symposium creates a model of government by legislative force wherein Congress functions as a vital, independent authority which boldly initiates legislative proposals, thoroughly evaluates proposals presented to it, and effectively oversees the administration of enacted legislation. The recommendations in these papers are calculated to redirect the flow of power away from the presidency and back toward Congress. They do this by identifying the major obstacles to government by legislative force and by suggesting ways to remove or circumvent those obstacles.

Most of these recommendations are of two types: proposals for reform and proposals for reorganization. Broadly speaking, proposals for reform are designed to make Congress more representative of popular demands within the country and to facilitate expression of majority sentiment within Congress. Proposals for reorganization concentrate on improving the structural and procedural aspects of the legislative process.

The symposium contains many far-reaching proposals for reform and reorganization designed to strengthen Congress. The recommendations in this paper, however, cannot strictly be classified either under "reform" or "reorganization." They are better described as proposals for *retooling* Congress. This paper advocates the development of automated information processing systems to help Congress surmount one of the biggest obstacles to government by legislative force—the lack of information and knowledge by legislators faced with increasingly complex problems and decisions. My concern and recommendations focus exclusively upon the information problem confronting Congress.

⁶ This philosophy forms the central theme of Charles S. Hyneman, *Bureaucracy in a Democracy* (New York: Harper, 1950), especially pp. 10-17 and 77-79.

The Information Problem for Congress

STUDENTS of the legislative process have identified the information problem as a major factor in the decline of modern legislatures. Griffith, for example, fixes the need for information in "problems inherent in the complexity and magnitude of the legislative output itself."⁷ Woll also notes that "legislation today, in regulatory and nonregulatory fields alike, requires specialized information on the part of policy makers before it can be conceptualized, drafted, and implemented."⁸ The legislature's need for information to conduct the business of modern government has not gone completely unfulfilled; it has been satisfied largely by the executive. As Keefe and Ogul have observed, "The problems of modern government now have become so technical and complex that the legislature has found it increasingly necessary to defer to the executive for answers and recommendations."⁹

The concentration of information resources in the executive branch has had several consequences for legislative-executive relations. One of these, Robinson concludes, "is an increasing inclination to rely on the executive for the presentation of proposals to deal with problems. Congress' role, then, becomes less and less one of the initiation of policy alternatives and more and more the modifier, negator, or legitimator of proposals which originate in the executive."¹⁰ Not only does Congress lose initiative in creating a legislative program,

⁷ Griffith, *op. cit.*, p. 72.

⁸ Peter Woll, *American Bureaucracy* (New York: W. W. Norton, 1963), p. 130.

⁹ Keefe and Ogul, *op. cit.*, p. 483.

¹⁰ James A. Robinson, *Congress and Foreign Policy-Making* (Homewood, Ill.: Dorsey Press, 1962), p. 8.

but lack of information also prevents Congress from adequately evaluating the proposals it receives from the executive. As Woll states, "To a considerable extent, when the administrative branch can control the channels of information to Congress it can control the policies supported by that body."¹¹

As a consequence of these developments in legislative-executive relations, the very function of legislatures in the total governmental structure has altered over time. Harris' recent book, *Congressional Control of Administration*, begins, "Control of administration is one of the most important functions of legislative bodies in all modern democracies."¹² A recent survey of the structures and functions of parliamentary institutions in 41 countries concludes with an even starker recognition:

. . . the legislative function is no longer the preserve of Parliament. The initiative in legislative and financial matters has to some extent slipped out of its grasp; the practice of delegating powers has made for the curtailment of its role in the realm of law. But concurrently, the prerogatives of Parliament have shifted in the direction of control of government activity. The Government initiates and directs; Parliament controls, approves, disapproves and, now and then, inspires.¹³

But how well equipped are legislatures to play this new role? Again the information problem is present—this time frustrating the legislature's direction and control of the executive.

The executive branch is perhaps the legislature's main source of information.¹⁴ As Robinson reports:

For reasons which are not altogether clear, bureaucracies associated with executive offices have more efficiently collected and processed information than have legislatures. Not only is Congress unprepared to obtain independent information about the world through its own resources, but it must rely on data collected by the executive.¹⁵

¹¹ Woll, *op. cit.*, p. 131.

¹² Joseph P. Harris, *Congressional Control of Administration* (Washington: The Brookings Institution, 1964), p. 1.

¹³ Inter-Parliamentary Union, *Parliaments* (London: Cassell and Company, 1961), p. 298.

¹⁴ Charles L. Clapp, *The Congressman* (Washington: The Brookings Institution, 1963), pp. 115-18.

¹⁵ Robinson, *op. cit.*, p. 192.

Dahl and Lindblom state in general terms the consequence of a situation which finds the governed possessing more information than the governors:

Because the hierarchy originates much of the information its nominal superiors require in order to act intelligently, and because the superiors are usually less expert on any particular subject than some of their nominal subordinates, it is often possible for the hierarchy to manipulate communications in order to control their nominal superiors.¹⁶

Later on the same page, they continue:

In these situations the saving element is the existence of a plurality of competing and conflicting hierarchies that provide alternative sources of information to those who need to make decisions.

What "alternative sources" of information are available to Congress, and are they adequate to support a vital, independent legislative force in government? Some authors have implied that they are adequate by singling out Congress as one of the few legislatures in the world that has held its own with the executive.¹⁷ Griffith, in fact, asserts: "Congress has mastered, or has provided itself with the tools to master, the problem of assuring itself of an unbiased, competent source of expert information and analysis which is its very own."¹⁸ The tools of which Griffith speaks are Congress' professional staffs:

. . . the enlargement and strengthening of the staffs of Congress have in fact been a major factor in arresting and probably reversing a trend that had set in in the United States as well as in every other industrialized nation. This is the trend in the direction of the ascendancy or even the virtually complete dominance of the bureaucracy over the legislative branch through the former's near-monopoly of the facts and the technical and specialized competence on the basis of which decisions are ultimately made.¹⁹

Notwithstanding the fact that staff aids have helped Congress considerably with its information problem, few writers are as sanguine

¹⁶ Robert A. Dahl and Charles E. Lindblom, *Politics, Economics, and Welfare* (New York: Harper and Row, 1953), pp. 260-61.

¹⁷ See footnote 4.

¹⁸ Griffith, *op. cit.*, p. 88.

¹⁹ *Ibid.*

as Griffith in evaluating their contribution. The collective judgment seems closer to that of Woll, who writes:

Although Congress has made strenuous efforts to fulfill its constitutional responsibilities, neither its committees nor its staff aids are any match for the administrative branch with respect to knowledge and information in particular areas of legislation. Much of the staff employed by Congress comes directly from the administrative branch, in which initial competence was acquired in an atmosphere where the points of view of the agencies predominated.²⁰

Keefe and Ogul concur: "No matter how hard the legislature tries to inform itself (and Congress tries very hard indeed), its store of information and its access to necessary knowledge are rarely if ever as developed as that of the executive authority."²¹

One test to determine whether Congress has adequate access to information for fulfilling its governmental function is to examine congressmen's attitudes toward obstacles confronting them in performing their job. Unfortunately there have been little reliable data available on this point. But a recent study by Dartmouth's Public Affairs Center has provided the answer at least for the House of Representatives.²²

Findings for a random sample of 80 representatives interviewed during the summer and fall of 1963 indicate that congressmen do not feel that they have adequate control of information. Each respondent was asked to "name any problems which prevented him from carrying out the role he would like to play in the House and all problems which he saw as preventing the House from operating as he thought it should."²³ The responses were grouped into 14 categories; the percentages of all respondents mentioning "something in each category are given in Table 1.

²⁰ Woll, *op. cit.*, p. 131.

²¹ Keefe and Ogul, *op. cit.*, p. 483.

²² This study is reported in Michael O'Leary (ed.), *Congressional Reorganization: Problems and Prospects—A Conference Report* (Hanover, N. H.: Public Affairs Center, Dartmouth College, 1964).

²³ *Ibid.*, p. 22. According to personal communication from Roger Davidson, one of the researchers, the exact wording of the questions was as follows:

"Now, what are the most pressing problems you face in trying to do your job as Congressman—what are the things that hinder you in your tasks?" and "What are the most pressing problems which prevent Congress from doing what you think it ought to do?"

Answers given to both these individual and institutional foci were lumped together in Table 1.

TABLE 1: General Categories of "Problems" Articulated by Eighty Members of the House of Representatives^a

Type of problem	Percent mentioning
1. Committee system, seniority system and Rules Committee	27
2. Scheduling and general procedure	43
3. Member pay, office allowance, staffing	26
4. Diffusion of leadership and "failure" of incumbent leadership	23
5. Caliber of individual members	29
6. Problems arising from present operation of separation of powers	50
7. Problems of House-Senate comity	12
8. Public lack of understanding of Congress and failure in communicating with constituents	45
9. Service for constituents	58
10. Electoral system and electoral vulnerability of Members; campaigning	30
11. Complexity of decision-making; lack of information	78
12. Criticisms of present power distribution and policy output of the House	38
13. Lack of time ^b	39
14. Other	9

^a Source: Table V in Michael O'Leary (ed.), *Congressional Reorganization: Problems and Prospects—A Conference Report* (Hanover, New Hampshire: Public Affairs Center, Dartmouth College, 1964, pp. 22-23).

^b "Because 'lack of time' is such an obvious and commonplace problem, we excluded it from analysis whenever a Member mentioned his quota of ten other problems. It is therefore underrepresented in this table." *Ibid.*

As Table 1 clearly shows, by far the largest number of responses (78 percent) came under the category of "complexity of decision-making; lack of information." The same evaluation of the importance of this problem was expressed publicly by congressmen attending a conference held early in 1964 on the role of Congress in the American democratic process.²⁴ The summary of conference proceedings states:

Many members stressed that the quality and quantity of legislative output is jeopardized by the problems of gathering information. One Congressman expressed the conviction of most conferees when he stated that a high-priority goal should be to improve the gathering and analysis of information and the detailed consideration of alternative policies by Congress. It is in these areas; he felt, that Congress is most deficient.²⁵

²⁴ This was the first annual Orvil E. Dryfoos Conference on Public Affairs, held on the Dartmouth College campus, March 7-8, 1964.

²⁵ O'Leary, *op. cit.*, p. 45.

Thus, lack of adequate information for developing knowledge and making decisions is recognized by scholars and legislators alike as one of the major problems confronting Congress. Various recommendations have been made to cope with this problem in one way or another. Recommendations for home rule for the District of Columbia would, for example, reduce Congress' work load and provide members with more time to become informed about other legislation. Suggestions for electric voting machines to record roll call votes would also save time and presumably free congressmen for reading and otherwise informing themselves. And, of course, all proposals for increasing Congress' professional staffs are directed toward the information problem.

Despite the variety of these proposals, they are all curiously restricted in range. Basically, they can be divided into two types: those which offer the congressman more *time* and those which offer more *help*. Few offer him more *information*. Although these various recommendations impinge upon congressmen's lack of information, they do not attack it *directly* as an information problem. They are restricted in failing to propose information processing solutions to an information problem.

Many scholars and legislators have apparently resigned themselves to the inevitability of inadequate information. This thinking is revealed in the Dartmouth Center analysis of congressmen's own opinions about their problems:

. . . an examination of [Table 1] leads to the important conclusion that most of the problems perceived by Congressmen relate to conditions which are only marginally, if at all, susceptible to reform. The most frequently mentioned set of responses relates to the complexity of decision-making—the problem of obtaining adequate information and of selecting the proper alternative from among many conflicting courses of action. This group of problems—about one-fifth of all those mentioned—is probably a concomitant of policy-making under any set of rules or organizational form, rather than a manageable, "reformable" situation.²⁶

Dahl and Lindblom display a similar fatalism in conceding, "Probably the problem of the modern legislature cannot be solved. But it can be reduced by changing and simplifying the agenda of legislators."²⁷

²⁶ *Ibid.*, p. 23.

²⁷ Dahl and Lindblom, *op. cit.*, pp. 322-23.

By failing to view the lack of information as an information problem, one is led to recommend oblique rather than direct solutions. In this era, however, direct solutions to information problems are available through the use of automated information processing systems.

Present Use of Information Systems in Government

THE relatively recent development of methods and equipment for information processing may account in part for the failure to propose information processing systems as a solution for Congress' problem. Real advances in mechanical means of information processing did not come until the advent of electronic computers, which were not marketed until the early 1950's. Then there is always a lag between technological innovation and its application to practical problems.

Nevertheless, the paucity of recommendations for introducing information systems within Congress is still hard to understand, for automated information systems have been used in business and industry since the late 1950's. Moreover, as we will see, executive agencies of the government have long been engaged in programs of research and development of information systems to meet their own needs. Yet, the idea of information systems for Congress has still not caught on.

Consider the recommendations recently published in the *Interim Report* of the Joint Committee on the Organization of the Congress.²⁸ This document summarizes results of hearings conducted from May 10 through June 25, 1965. During this period, testimony and statements were received from 12 senators, 51 members of the House of Representatives, 17 political scientists, and representatives of 13 different voluntary associations. The recommendations advanced by congressmen, political scientists, and organizational representatives

²⁸ U. S. Congress, Joint Committee on the Organization of the Congress, *Interim Report* (Senate Report No. 426, 89th Congress, 1st Session, 1965).

are summarized, respectively, in Appendices A, B, and C to the *Interim Report*. Within each Appendix, the recommendations are classified into categories of proposed reforms. Table 2 summarizes the total distribution of recommendations within each category.

From hundreds of recommendations²⁹ summarized in the *Interim Report*, only three can be classified even liberally as proposals for providing Congress with integrated information processing systems. Under the category "electronic aids and television," the *Report* listed Representative Edmunson's suggestion for establishing "a public information center in the Capitol with an electronic board providing information on matters under consideration on the floor, name and

TABLE 2: Distribution of Recommendations for Suggested Reforms of Congress Made in Hearings of the Joint Committee on the Organization of the Congress,^a May-June 1965

Category of Reform	Number of Recommendations ^b
Committee Chairmen	18
Committee Jurisdiction	25
Committee Meetings	21
Committee Staffing	16
Office Staffing and Workload	17
Housekeeping Functions	23
Research Services	14
Fiscal Controls	45
Scheduling	14
Floor Procedures	26
Electronic Aids and Television	13
Oversight	14
Elections and Campaigns	10
Ethics	13
Foreign Policy	8
Leadership Policy	10
Total	287 ^b

^a These data are compiled from the enumeration of suggested reforms in Appendices A, B, and C to the *Interim Report* (Senate Report No. 426, 89th Congress, 1st Session, 1965) of the U.S. Congress Joint Committee on the Organization of the Congress.

^b Recommendations by congressmen, political scientists, and voluntary associations in each category have been summed without regard to duplication. Because some recommendations by the three groups may be substantially the same, the amounts in the Table do not necessarily represent numbers of *different* reforms. Some overlap exists, but the effort required to eliminate duplicates was judged greater than the gain in accuracy to be achieved.

²⁹ See footnote b in Table 2.

location of committee hearings, etc."³⁰ The same category contained the Council of State Governments' proposal to use "automatic data processing for bill indexing, statutory search, budget preparation, etc."³¹ (Most of the other recommendations under this category dealt with such items as television, filming, and recording floor proceedings and installing electric voting machines.) The third and most comprehensive recommendation for an information system was listed under "research services," where Professor Alfred de Grazia referred to the use of computers and information processing methods for developing "an adequate intelligence and research system."³² (Other recommendations for "research services" dealt with expanding the Legislative Reference Service and forming a scientific advisory commission for Congress, among other things.)

The *Report* contained other recommendations intended to increase the information flow to Congress, but these neglected to include means for *processing* the information before use. In one sense, Congress has quite enough information available in the form of bills, reports, speeches, testimony, regulations, decisions, and so on. Congressmen are swamped with documents produced by Congress itself, and they are deluged with publications of executive agencies. On the one hand, not all this information is needed by Congress, while, on the other hand, Congress still needs much information it does not get. Speaking more properly, Congress' problem is one of obtaining *relevant* information. What Congress really requires is a procedure for acquiring the information it needs and a method for processing that information in order to learn what it wants to know. This conception of the problem suggests that far more is required than just increasing the information flow to Congress. It suggests information processing systems that are integrated with congressional tasks, functions, and activities.

Although the hearings did not produce many recommendations for automated information systems, some members of the Joint Committee on Organization expressed a personal appreciation of their possibilities. The statement of Representative Brooks is particularly relevant:

My experience as sponsor of legislation dealing with the streamlining and centralization of the Government's automated data processing equipment and procedures leads me to believe

³⁰ *Interim Report*, *op. cit.*, p. 18.

³¹ *Ibid.*, p. 28.

³² *Ibid.*, p. 23.

that the committee should explore the services of modern technology as it can assist the legislative process, especially in the areas of ADP [automatic data processing] and other electronic devices. Such innovation is not to be shunned if it would help the individual legislator to better fulfill his role as an informed representative.³³

Representative Brooks' statement refers to the successful use of data processing techniques within the executive branch. The branch of government with the lion's share of informational resources has been increasing its information processing capacity while Congress, which sorely needs to develop these muscles, has been virtually inactive. This situation clearly emerges from a review of executive and legislative activities in research and development of information systems during the last eight years.

Widespread interest in information processing systems and their applications in business, industry, government, and academic research has developed only within the last decade. In July 1957, the National Science Foundation inaugurated its periodic survey of activities in information processing with the publication of issue No. 1 in its continuing series *Current Research and Development in Scientific Documentation*.³⁴ Each issue in the series not only discloses new projects underway but also updates earlier reports—providing a statement of work in progress at the time. The continuous expansion of information processing activities during the period from July 1959 to November 1964 is reflected in the steady increase in the number of pages in each issue. This trend is graphed in Figure 1, which shows an increase from 55 pages for issue No. 1 to 486 pages for issue No. 13.

Some indication of governmental activities in information processing can be obtained by reviewing the projects reported in these surveys.³⁵ Most of the projects reported on were undertaken by uni-

³³ U. S. Congress, Joint Committee on the Organization of the Congress Hearings, Part 1 (89th Congress, 1st Session, 1965), p. 12.

³⁴ Issues in this series were published semi-annually through issue No. 11 dated November 1962. Publication had fallen behind schedule, however, and the eleventh issue did not appear until 1963. The series was resumed with issue No. 13, which was dated November 1964. That issue carried a notice stating, "No. 12 will consist of an indexed bibliography of all reports and publications cited as references in Issues Nos. 1-11. This report is scheduled for publication in early 1965."

³⁵ Perhaps a better source of information for such a review would have been the National Science Foundation publication series *Nonconventional Technical Information Systems in Current Use*, which reported on systems

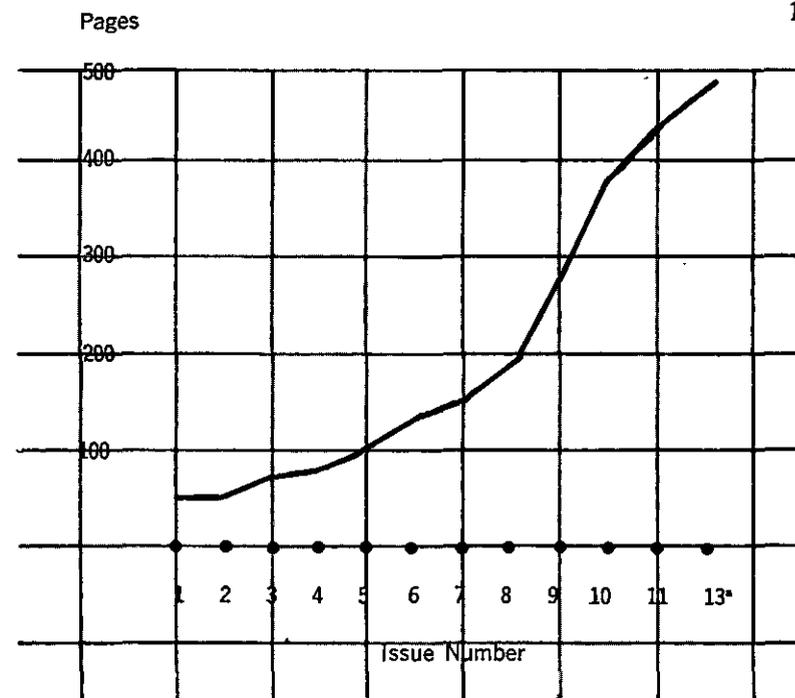


FIGURE 1: Increase in Number of Pages with Each Issue of *Current Research and Development in Scientific Documentation*, No. 1-13

* See Footnote 34 for an explanation of the absence of Issue No. 12.

versities and private corporations. From the beginning, however, some research work was conducted directly by the government—and almost exclusively by agencies in the executive branch.³⁶ Three of the 43 projects (7 percent) reported in July 1957 were conducted

that embodied new principles for the organization of subject matter or employed automatic equipment for storage and search. But according to my inquiries and my examination of the *Monthly Catalog of U.S. Government Publications*, this series terminated in October 1962, with issue No. 3. For the sake of continuity in reporting, I decided to use *Current Research and Development in Scientific Documentation* exclusively in this paper. Furthermore, it deserves to be noted that the term "scientific documentation" has been interpreted very broadly in the CRDSD series, which reported projects under such headings as "organization of information," "information needs and uses," "mechanical translation," and "equipment development."

³⁶ It is not always easy to decide what is and what is not an executive agency. Some of my decisions might be challenged. For example, the Rome Air Development Center was classified as an executive agency; the RAND Corporation was not. Disagreement with some of my classifications should not, however, be great enough to produce different interpretations of the data.

by executive agencies: two by the National Bureau of Standards and one by the U. S. Patent Office. By November 1964, 22 of 496 projects (4 percent) were reported by executive agencies. My compilation of the projects reported by all government agencies during this period is given in Table 3. Format inconsistencies from issue to issue and mistakes in tallying entries from tables of contents may have produced some errors in my tabulation, but the inaccuracy cannot be great.

TABLE 3: Projects Undertaken by Government Agencies as Reported in "Current Research and Developments in Scientific Documentation," Issues No. 1-13^a

Agency	Issue No.:	1	2	3	4	5	6	7	8	9	10	11	13 ^a
National Bureau of Standards		2	2	3	6	6	6	4	4	7	7	8	7
U.S. Patent Office		1	1	1	1	1	1	1	1	1	1	1	
Rome Air Development Center		1										1	1
National Library of Medicine				1	1	1	1		1	1	1	1	1
U.S. Atomic Energy Commission							1	1	1	1	1	1	1
Armed Services Tech. Info. Agency							1	1	1	1	1	1	
U.S. Army Chemical Corps Res. & Dev.							1	1	1	1			
National Institutes of Health						1				1	1	1	1
Air Force Cambridge Research Lab.								2	3	3	3	3	1
Post Office Department									1	1	1	1	1
Department of Defense										1	1	1	
Library of Congress										1	1	2	2
U.S. Forest Service										1	1	1	
U.S. Naval Ordnance Test Station											1		
Walter Reed Army Medical Center											1	1	
U.S. Army Biological Laboratories											1	1	1
Department of Agriculture											1	1	2
Bureau of Ships												1	1
U.S. Naval Postgraduate School												1	1
National Agricultural Library													1
U.S. Public Health Service													1
Totals per issue: ^b		4	3	5	8	8	12	10	13	20	23	27	22

^a See footnote 34 for an explanation of the issue sequence in this publication series.

^b Some agencies reported progress on the same projects in each issue. Amounts at the bottom of the columns, therefore, cannot be summed so as to give the total number of different information processing projects undertaken by governmental agencies.

A word is in order about the nature of these government projects. Some of them—like the Post Office's, attempt to devise an optical scanner that will read addresses and sort mail, and the Air Force

Cambridge Research Laboratories' work on pattern recognition and speech analysis—cannot easily be construed as giving the executive an edge over Congress in managing information and knowledge. But in general, experience in any type of automated information processing begets other applications, and such projects provide the requisite experience. Moreover, some of them clearly do contribute to the executive's ability to manage information. A case in point is the Defense Department's project "to design an all-computer document retrieval system which can find documents related to a request even though they may not be indexed by the exact terms of the request, and can present these documents in their appropriate order of their relevance to the request."³⁷

The question may arise as to why Congress cannot be content with using the information systems developed within the executive. Why must Congress develop its own systems? This question deserves several answers. The first, of course, is that Congress' information needs are somewhat different from those of the executive and are unlikely to be fulfilled by any combination of systems prepared within the executive branch. Secondly, even granting that congressmen might use the executive's information systems upon occasion, they would not use them with the proficiency that comes from familiarity. And congressmen cannot be expected to familiarize themselves with every agency's particular system. Lastly, there is some doubt as to whether executive agencies would in fact grant congressmen unlimited access to their information systems. A staff report prepared by the Senate Committee on Government Operations in 1960 revealed such reluctance by an executive department to share its information resources with Congress:

The staff was informed by officials of the Department of Defense that the Library of Congress was not being fully utilized as a scientific and technological storage center by the Department of Defense because much of the Department's material is classified, and that it is the Department's position that a documentation storage center of this nature should be a part of the executive branch, and not under the jurisdiction of the legislative branch of the Government as is the Library of Congress. Further, it was pointed out that it is the practice of the Department of Defense and other agencies to withhold from the Li-

³⁷ Statement provided for the National Science Foundation report *Current Research and Development in Scientific Documentation*, No. 9 (Washington: U.S. Government Printing Office, 1961), p. 48.

brary classified and certain other information which is now being withheld from committees of the Congress under executive policy. This position is based upon the premise that such information should not be made generally available to any agency of the legislative branch, since it would then be available to committees of the Congress, and be inconsistent with Presidential policy. The executive branch of the Government has consistently held that officials thereof should not provide information to the legislative committees when it is considered to be in the national interest to deny such information, or when it is related to so-called internal affairs of the executive branch and not a legislative concern of the Congress.³⁸

All these considerations argue strongly for the development of information systems by Congress for use *within* Congress.

In 1965 the same Senate Committee on Government Operations reported on interagency coordination of information systems and commented on the relevance of all this activity to Congress' responsibilities:

It may be observed that, as the executive agencies better organize their intra-agency information systems and hopefully, interagency systems, they may thereby facilitate the studies of expert committees of the Congress.

It may also be noted that for the fulfillment of its many duties, the Congress may wish to have the latest technological systems directly at its own command.³⁹

What has Congress actually done so far to place such systems at its own command? In contrast to the work in progress by the executive branch, the National Science Foundation surveys disclosed only two projects conducted under authority of the legislative branch. The earlier project, first reported in 1961 was to survey

... the possibilities for automating large research libraries, with the Library of Congress as primary focus of the survey. The emphasis of the survey is on the information organization, storage,

³⁸ U.S. Congress, Senate Committee on Government Operations, *Documentation, Indexing, and Retrieval of Scientific Information*, (86th Congress, 2d Session, Senate Document No. 113, 1960), pp. 18-19.

³⁹ U.S. Congress, Senate Committee on Government Operations, *Summary of Activities toward Interagency Coordination* (89th Congress, 1st Session, Senate Report No. 369), p. 27.

and retrieval functions of libraries whose collections number in the millions and which serve research through the availability of both current and retrospective literature.⁴⁰

The later project, first reported in 1963, was designed to determine user reactions to the Library of Congress' *Monthly Index of Russian Accessions*. While the second project does not pretend to improve Congress' position relative to the executive in the struggle for information and knowledge; the suggestion for automating the Library of Congress, which resulted from the first project, may have real strategic consequences.⁴¹ Notwithstanding this effort, Congress has hardly distinguished itself by exploring the applications of automated techniques to its information problems.

If Congress itself is not undertaking these explorations, perhaps it is contracting them out to other organizations? How does Congress come out on this standard? Beginning with issue No. 6 in May 1960, *Current Research and Development in Scientific Documentation* has indexed projects according to their sponsoring organizations. The index to issue No. 6, for example, discloses that executive agencies (mainly the armed services) sponsored a total of 36 projects, although they themselves conducted only 12.⁴² Figure 2 graphs the total number of projects sponsored and undertaken by government agencies, as reported in each issue of *CRDSD* since 1960.

Although the armed services sponsor most of the government's information processing projects by far, many civilian agencies have also been listed as sponsors—including the Office of Technical Services in the Department of Commerce, Food and Drug Administration, Office of Education, Fish and Wildlife Service, and the Peace Corps—to mention some that have not reported their own projects. In

⁴⁰ Statement provided for the National Science Foundation report, *op. cit.*, p. 64.

⁴¹ A report on this project is published in *The Council on Library Resources, Automation and the Library of Congress* (Washington: Library of Congress, 1963). Also relevant are the proceedings of a conference reported in Barbara Evans Markuson (ed.), *Libraries and Automation* (Washington: Library of Congress, 1964).

⁴² The organization of the index in *CRDSD* did not facilitate checking for duplicate sponsorship. Because two or more agencies could sponsor the same project (and sometimes did), this does not mean 36 different projects. Moreover, there may be some additional overlap because of agencies mentioned both as sponsors and as conductors of a project. But my examination of these possibilities suggests that these occurrences would not significantly alter the pattern of data if taken into account.

The tally of projects supported by executive agencies does not include grants awarded by the National Science Foundation.

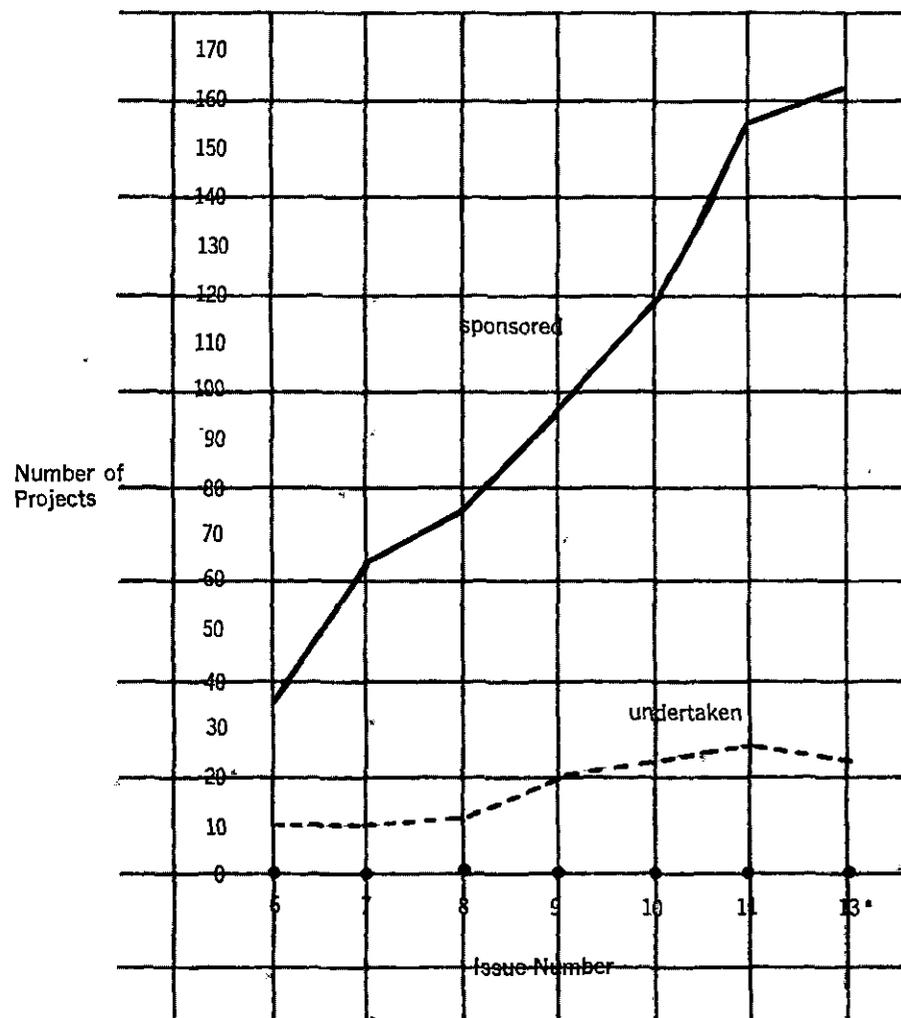


FIGURE 2: Growth in Number of Projects Sponsored and Undertaken by Governmental Agencies as Reported in issues No. 6-13 of *Current Research and Development in Scientific Documentation*.

* See footnote 34 for an explanation of the omission of Issue No. 12.

contrast to the support given by executive agencies for research and development in information systems, the National Science Foundation surveys disclosed *no* projects that were financed by Congress or its agencies. The projects undertaken by the Library of Congress mentioned earlier were *not* financed by Congress. The study of user reactions to the *Monthly Index of Russian Accessions* was supported by the National Science Foundation, and the more relevant investigation into automating large research libraries was supported by the Council on Library Resources, Inc.

The foregoing analysis of projects reported in *Current Research and Development in Scientific Documentation* was intended to illustrate Congress' lethargy in exploring the application of information processing systems to its information handling problems. By any standard, its activities in this area lag far behind those of the executive branch, which is already far ahead in informational resources. An extrapolation of present trends indicates a broadening, rather than a narrowing of the "information gap" that now exists between Congress and the executive.

The thesis of this paper is that this gap can be reduced substantially by retooling Congress with modern equipment and techniques for information processing. Before suggesting in some detail how this might be done, a few words are in order about some technical aspects of information processing systems.

Technology of an Information System⁴³

IT is perhaps most important to point out initially what automated information systems are *not*. They are not devices for grinding out policy decisions, and they are not designed to replace human judgment. Rather they are intended to provide the human decision maker—here, the congressman—with knowledge for making informed choices. Automated systems for information processing, therefore, should not be confused with electronic schemes for solving complex social and political problems by putting them on a computer.

Dahl and Lindblom caution against sophomoric thinking that machines can replace man in decision making:

Techniques regarded by some people as of great importance are mathematics and electronic calculators. Crudely stated, if there are too many variables for the human mind to handle at once in policy judgments, the problem is to reduce the variables to mathematical equations that can be fed into electronic calculators for a solution. Thereby, it might be suggested, an entirely new level of rationality in policy decisions would be possible, a leap

⁴³ This paper will not discuss technology of information processing in any detail, but there is a growing literature on the subject. On computers in general, see Bert F. Green, Jr., *Digital Computers in Research: An Introduction for Behavioral and Social Scientists* (New York: McGraw Hill, 1963). Information processing is treated in Charles P. Bourne, *Methods of Information Handling* (New York: Wiley, 1963); Allen Kent, *Textbook on Mechanized Information Retrieval* (New York: Wiley, 1962); Joseph P. Spiegel and Donald Walker (eds.), *Information System Sciences* (Washington: Spartan Books, 1965); and Allen Kent (ed.), *Specialized Information Centers* (Washington: Spartan Books, 1965). Kenneth Janda, *Data Processing: Applications to Political Research* (Evanston: Northwestern University Press, 1965) may be helpful to the beginner.

forward roughly equivalent to the invention of language, writing, printing, or mathematics itself.

It is not really open to doubt that mathematics and electronic calculators can be of enormous aid in a number of specialized situations where quantification in comparable values is possible. . . .

Yet it would be easy to exaggerate what mathematics and electronic calculators are capable of. For as a substitute for decisions by human beings through social organizations the electronic computer suffers from several basic limitations.⁴⁴

The limitation that Dahl and Lindblom recount deal with inability to reduce all variables to numbers, difficulties in assigning values to alternatives, uncertainties about consequences of actions, and problems in controlling those who control the machines. All of these limitations, and others, attest to the absurdity of substituting computers for congressmen.

When Dahl and Lindblom published their book in 1953, computers were used almost exclusively for solving mathematical problems. Now, however, computers deal with words as well as numbers, with sentences as well as equations. They can therefore accept questions and provide answers. Computerized information processing systems are not designed to solve problems by means of mathematical equations but to provide information upon request. They propose not to eliminate the congressman as a decision maker but to increase his capabilities for making decisions by telling him what he wants to know.

A computer's ability to do arithmetic in a hurry is well known, but a computer can do other things as well. It can make logical decisions: if value A is larger than value B, do X; otherwise, do Y. It can also manipulate symbols, reading data in one way and printing them out in another. These capabilities enable computers to do more than just "compute." Speaking more broadly, they *process* data. The term "data" is usually associated with numerical values, and, strictly speaking, computers recognize and deal only with numerical values. But numbers can be made to stand for letters of the alphabet, which enables computers to process alphabetical as well as numerical data.

The term "information processing," in its broadest sense, applies to computer handling of either alphabetical or numerical information. "Information retrieval" is a somewhat more restricted term, fre-

⁴⁴ Dahl and Lindblom, p. 76.

quently reserved only for computer processing of alphabetical information. In an even narrower sense, "information retrieval" is sometimes applied only to computerized systems that store alphabetical information in memory, search the memory according to a set of instructions, and then retrieve items of information which satisfy the instructions. This paper will employ "information retrieval" in its narrower sense—meaning storage and retrieval—and "information processing" in its broader sense—including data processing and information retrieval.

Interest in computer processing of textual material first began with problems of information retrieval. Although librarians have always been engaged in storing and retrieving information, applying computers to these tasks seemed to breathe new life and interest into the methodology. Information retrieval technology now involves more than just computers, and considerable progress has been made with the use of microfilm and even purely mechanical devices. However, while product development in non-computer techniques of information retrieval seems promising, computers will clearly be the dominant force in information processing systems of the future.

Until recently, non-computer information systems had the great advantage over computers of being immediately accessible to the user: the system (e.g., a file of key-sort cards) could be at his side, available for use whenever he wanted an item of stored information. But few people could afford to maintain an electronic computer stationed alongside their desk at their beck and call. Economical use of the computer required that it be placed in a central location and fed a series of "jobs" assembled in "batches." The answers to a specific job, even a short one, could not be obtained until the entire batch had been processed and all the results printed out. The period of time required between submitting a job for processing and picking up the results—called the "turn-around time"—depended on the nature of the equipment and its work load. Even now, it is not at all uncommon for turn-around time to average about six hours, which is hardly quick enough to satisfy demands for immediate information. Recent technological developments in the computing industry, however, have brought the processing power of computers much closer to the user and his needs.

The development of "time sharing" and "remote terminals" has produced the first feasible desk-side information processing systems. "Time sharing," as its name implies, enables many different users to tap into the same computer at the same time. In actuality, the computer processes only a small part of one person's job at a

time while rotating from user to user. But it returns so quickly that the wait is unnoticeable to the user, who feels he has sole use of the machine to answer his inquiry—thereby eliminating turn-around time completely. "Remote terminals" are input-output devices located in the user's office and connected to a central computer (usually on a time-sharing basis). These devices enable the user to communicate his inquiry to the computer (input) and provide for the computer to express its answer (output) without requiring a trip to the computing center.

Important advances in input-output devices themselves have also increased the value of computerized information processing systems. Typewriter keyboards now allow the user to type out his inquiry to the computer as if he were preparing a memo to his assistant. In due time, the user will even be able to communicate his request orally to the computer. And the perfection of optical scanning devices will empower the computer to "read" instructions typed, printed, or even handwritten on paper. Still more flexibility appears in types of computer *output*. The computer can answer by typewriting (for short replies) or through a high-speed printer. It can also display information on a cathode ray screen for viewing or photographing. If desired, standard oral messages can be recorded on tape and selected for response.

Not all of these devices have been fully developed, but perfection is close at hand. Time sharing and versatile remote terminals should certainly be incorporated in planning information systems for Congress.

Features of an Information System for Congress

THE information processing system sketched out below is meant to illustrate ways in which electronic equipment and computers can help congressmen perform their job. Its various features presuppose a sophisticated level of technology. Although some features incorporate devices that have not yet been perfected, the system in its broad outlines can be put into operation with present capabilities. In any event, the task of recommending an information processing system for Congress should not be limited by the capabilities of today's equipment. Not only can we count on continuing progress within the industry to increase the performance and improve the flexibility of computing hardware in general, but we should also be aware that manufacturers are often able to design and build machines to meet customers' individual needs and specifications. This is already routinely done for agencies in the executive branch, most notably for the armed services. Preserving the strength and integrity of our national legislature—and thereby preserving the virtue of our government—is worth the price of some research and development to deliver the system that Congress needs.

The system outlined here is not necessarily the ideal one for Congress. It is suggested as a starting point for future thinking. Of necessity, the suggestions are not very specific, for specific suggestion would involve specific equipment, which is certainly premature. Instead the features of the system advanced here are primarily designed to illustrate how information processing can be tied directly to congressmen's daily activities.

Information systems for Congress probably should be organized on four different levels, serving Congress as a whole, each chamber

separately, committees within Congress, and individual congressmen. The levels of organization are not irrelevant to type and amount of computing equipment needed. It is hardly conceivable that a single computer, however gigantic, can service the combined needs of Congress, each chamber, scores of committees (standing, select, special, and joint), plus 535 individual members and their staffs. Some configuration of computers would probably be required to handle this load. Be that as it may, this discussion will largely ignore physical requirements and assume simply that each congressman and each committee will be served by a remote input-output terminal connected on a time-sharing basis to some central computing facility.

The proposed features of an information system for Congress will be grouped and discussed according to different levels of organization.

Congress as a whole: Certain kinds of information can best be collected and processed centrally for the use of both houses of Congress. Individual congressmen would tap into this centralized service.

1. *Informing congressmen of relevant bills:* Every congressman develops interests in particular legislative measures. These interests may develop from committee work, personal attitudes, or constituency requests; they may be permanent in nature, or merely temporary. At present, congressmen seek to locate bills affecting their interests by searching the "Daily Digest" of the *Congressional Record* and other publications about Congress, such as *Congressional Quarterly*. Sometimes the congressman finds what he wants; sometimes not. In any event, his search always requires time, and he seldom can be confident that he did not miss something relevant to his interests that was indexed under a different heading. Moreover, the congressman never has the information come after him; he must go after it.

An information retrieval technique called "selective dissemination of information" (SDI) has a very definite application here. SDI originally was developed to notify scientists as their library received new publications relevant to their research interests. In brief, SDI operates as follows.⁴⁵ The scientist personally prepares a list of the key terms describing his research interests. This list, which constitutes his "interest profile," is stored on magnetic tape, along with interest profiles from many other scientists. Meanwhile, as each new

⁴⁵SDI is described in detail in *IBM, Selective Dissemination of Information* (White Plains, N. Y.: IBM Technical Publications Department, No. E20-8092, dated 1962).

publication comes into the library, a group of abstractors examines the document, describes its contents with a set of key terms, and prepares an abstract summarizing the research. Periodically this information is also recorded on magnetic tape. The computer then compares the scientists' interest profiles with the key terms describing each publication. When a document is found that deals with a term in a scientist's interest profile, the computer prints on a special form the name of the scientist and the abstract of the document. This form is then mailed to the scientist, notifying him that such-and-such a publication has been received in the library. If, upon reading the abstract, he decides he would like to see the whole document, he can return the card by mail to receive a copy of the original publication.

Much the same idea can be used for notifying congressmen of bills relevant to their interests that have been introduced in either house of Congress. Congressmen could establish their own "interest profiles," which could be changed or updated at any time, to be matched against abstracts of bills prepared soon after they have been introduced. Through a remote terminal in his office, the congressman could be notified of the bill, its sponsor, and the committee to which it was referred. He could then send for copies of the bills that especially interest him simply by typing the appropriate request on a keyboard input to the computer. At somewhat greater expense, the computer could actually print out complete bills upon his request.

If a congressman were to change his interest profile during the session, the system should be able to search the entire file bills previously introduced. In fact, the system should be able to search all the bills for specific key terms by any congressman upon request. The main advantage of using interest profiles in an SDI system is to disseminate information of interest to congressmen *selectively* and *automatically*. Relevant information is literally brought to their attention without their having to go after it.

2. *Disseminating information about lobbyists:* At present, lobbyists are required to register either with the Clerk of the House or the Secretary of the Senate. These registrations are required by law to be published quarterly in the *Congressional Record*. However, there is some question about how useful this reporting procedure is to congressmen.⁴⁶ For this reason, it is proposed that registration data on lobbyists could be stored on magnetic tape and made avail-

⁴⁶Lester W. Milbrath, *The Washington Lobbyists* (Chicago: Rand, McNally, 1963), pp. 318-19.

able for computer search and retrieval. Congressmen could then instruct the computer to search the lobbyist file for the name of any individual who has approached him with respect to legislation before Congress. Through its remote terminal, the computer could reply immediately whether or not the person is a registered lobbyist, whom he represents, with what particular piece of legislation he is concerned, what organizations he has represented in the past, his address, etc.

There is no doubt about the importance of the role in the governmental structure played by lobbyists, who constitute one of the most valuable sources of independent information available to Congress. The purpose of this recommendation is not to hamstring lobbyists' operations but to place congressmen in a more knowledgeable, and therefore more advantageous, position from which to interact with lobbyists. This proposal reflects the familiar thesis that "knowledge is power." Whatever increases the knowledge of individual congressmen increases their power, and thereby strengthens the position of Congress as an institution. Increments to knowledge can come from many quarters, and this proposal to keep congressmen informed about lobbyists is simply one possibility.

3. *Communicating with the Legislative Reference Service:* The Library of Congress and its Legislative Reference Service are already engaged in automating their information handling procedures. Congressmen's terminals could tap into these systems for routine interrogations of their information files. Specialized inquiries, however, might better be communicated through the terminals to a reference person in the Library of Congress or LRS, who would translate them into technical requests for computer searching. Results of the search could be routed directly back to the congressman through the terminals. This direct connection would again increase the amount of knowledge available at the congressman's fingertips.

4. *Searching the U.S. Code:* The entire U.S. Code of Laws has already been recorded on magnetic tape by the Health Law Center of the University of Pittsburgh and is available for computer processing.⁴⁷ The tape can be searched for laws affecting any given subject. The computer can retrieve all laws under that subject in the Code and also find laws dealing with one subject but entered under a dif-

⁴⁷ John C. Lyons, "Computers in Legislative Drafting," *American Bar Association Journal*, June 1965. See also Earl W. Brydges, "The Electronic Solon," *National Civic Review*, July 1965, p. 351. I want to thank John S. Appel for calling this citation to my attention.

ferent heading. It should be noted that at least one state legislature already has such a "legal retrieval" facility at its command. State Senator Earl W. Brydges reports on New York's system:

"Give me all the laws affecting banking that are not in the banking law," New York Senator Jeremiah B. Bloom recently asked the computer. The machine spewed forth 1,604 of them that this experienced lawmaker never knew existed. "This means," he said, "we have to bring sense out of this disorder. How can any bank possibly know its duties and obligations with so many laws scattered all over the legal lot?" And when Senator Bloom starts to modernize the law, the computer will point out duplications, obsolete sections and reorganize the laws into a logical order on command.⁴⁸

Congress should provide itself with at least the same capability for conducting its lawmaking business that state legislatures have seen fit to develop.

Each Chamber of Congress: Some activities of Congress, particularly those of a scheduling and housekeeping nature, are best handled on the basis of each chamber. Applications of information processing techniques to a few such activities are illustrated below.

1. *Locating bills in the legislative process:* Congressmen should be able to learn immediately upon request the location of any bill in Congress, its status in the chamber, and its history of action to date, including amendments, committee votes, floor votes, and scheduling for future action. This information could be gathered within each chamber and immediately stored in the computer. It could then be recalled by the congressman simply upon keying the bill number into the remote terminal typewriter. The response should appear at the terminal in one of two forms: a printed message—if hard copy is desired—or visual display on a cathode ray tube—if the information is to be used immediately. In general, the use of visual display units in input-output terminals would substantially reduce the amount of paper messages generated by the computer, and would thereby result in savings on material and filing of documents with transient value.

2. *Providing information about votes:* One of congressmen's main complaints is that they find it difficult to obtain information about measures on which they must vote.⁴⁹ Summoned by sound of the

⁴⁸ *Ibid.*, p. 350.

⁴⁹ Clapp, *op. cit.*, pp. 145-49.

voting bell, congressmen sometimes rush into the chamber with little or no knowledge of what the vote is all about. Often the only information available is that supplied by a colleague on the floor or even by the doorkeeper. A chamber-based information system can substantially increase the congressman's knowledge of the vote as it is announced.

With the announcement of the vote, his office terminal can reveal the issue involved along with the bill number, sponsorship, legislative history—all of which could be taken from the information files proposed above. It would also be possible to build into the system, if desired, voting positions favored by the President and adopted by party leaders, including also perhaps the positions of individual congressmen volunteered in advance of the vote. At somewhat greater expense, announcement of the vote could include a summary of the issue and consequence of the vote for passage of the bill. The net result of these proposals would be to arm individual congressmen with relevant information in order to make more rational voting decisions.

3. *Providing for automated voting:* Voting itself can be viewed as an information process, with individual congressmen originating information instead of receiving it. But replacing traditional roll call voting in Congress with electronic voting machines is a controversial proposal—notwithstanding the fact that these machines have been used for varying lengths of time in 30 states legislatures.⁵⁰ The Dartmouth survey of congressmen's attitudes toward this innovation reveals 62 percent opposed to it and 35 percent in favor, with 3 percent undecided.⁵¹ On the other hand, the *Interim Report* of the Joint Committee on the Organization of the Congress shows electronic voting advocated by five congressmen, two political scientists, and one organizational representative—while opposed by only one congressman.

The main advantage claimed for electronic voting machines, of course, is the saving of time. Galloway has calculated that record-

⁵⁰ Council of State Governments, *Book of the States: 1962-1963*, Vol. XIV (Chicago: Council of State Governments, 1962), p. 54.

⁵¹ O'Leary, *op. cit.*, p. 58. The representatives were asked to state if they agreed or disagreed with this proposal: "Use electronic voting devices on the floor of the House, which would record a Member's vote on any measure on which one-fifth of the Members present request such a vote (that is, the present requirement for a roll call vote)." Conceivably, some congressmen might be in favor of electronic voting based on some other criterion or perhaps on all votes. Therefore these figures may understate support for electronic voting in general.

ing votes electronically would have saved the 78th Congress as much as two calendar months.⁵² While virtually everyone concedes the time-saving advantages of automated voting, opposition to this innovation is sometimes rooted in the fear of what *else* it will do besides save time. The authors of the Dartmouth study of congressmen's attitudes toward reforms detected this apprehension:

Some efficiency-minded respondents looked to electronic voting as a method of saving at least an hour of their time each day of a session; other Members, equally concerned with the demands on their time, explained their opposition to automatic voting by suggesting a "horror show" of unanticipated consequences of such an innovation.⁵³

Probably the most vocal opposition to electronic voting stems from concern that installation of voting machines would limit congressmen's freedom to attend to business outside the chamber. This is the position taken by Representative Matthews, the single opponent of the innovation listed in the *Interim Report*.

I think the fact that we have 20 or 30 minutes in the House—and I don't don't know, sir, what the time is in the Senate—to leave from attending to those myriad responsibilities at other places and yet get to the House to answer the roll is more of an advantage than the electronic voting device. . . .

. . . it would seem to me that we have our committee responsibilities and can't always be right on the floor. We are over in our offices, or meeting with a delegation, for example. And the electronic system may not necessarily work here in our setup as well as it would work and as it does work in some of the State legislatures.⁵⁴

The same attitude is revealed in the remark addressed to an advocate of electronic voting by Representative Griffin, a member of the Joint Committee:

. . . when you suggest that we have electronic voting and electronic devices for taking quorum calls, are you saying that committees should never sit while the House is in session?

⁵² George Galloway, *Congress at the Crossroads* (New York: Thomas Y. Crowell Co., 1946), p. 80.

⁵³ O'Leary, *op. cit.*, p. 25.

⁵⁴ Joint Committee on the Organization of the Congress, *Hearings, op. cit.*, p. 130.

I raise that question because I think in order for it to be effective, all the Members would have to be on the floor in order to press their electronic button or whatever it is.⁵⁵

It is true that voting machines in state legislatures require members to be present on the floor in order to cast their votes. But this condition can be eliminated through proper technology and, in itself, constitutes no real obstacle to automated voting in Congress. At the very least, congressmen could be empowered to cast their votes by direct connection from their offices.⁵⁶ Various electronic safeguards might be employed to insure that this power is not usurped by imposters voting in the congressmen's stead. One obvious protection against this would be closed-circuit television showing the congressman casting his vote. The action could be recorded on video tape and preserved to prove the legality of each vote. An even more ambitious step toward freeing congressmen to move about Washington without missing out on roll call votes would be to establish congressional "polling booths" in government buildings throughout Washington for their use while visiting executive agencies. These too could be equipped with closed circuit television and devices to protect against usurpation.

The point is that proposals to install electric voting machines should not be defeated merely by arguments that this would restrict congressmen's freedom. Under proper planning, it could very well increase their mobility while saving their time. On the other hand, electronic voting might deserve to be rejected for the reason that it would impair Congress' vitality rather than improve it. Other authors in this symposium, for example, fear the loss of personal contact and communication that now occurs when congressmen congregate for roll call votes.

The introduction of electronic voting would undoubtedly have many unknown consequences for congressional behavior. Perhaps additional assessment is required in order to predict its net effect upon Congress. But vague fears of unanticipated consequences alone should not kill this innovation. Virtually all change brings some unforeseen results. The task is to calculate carefully according to best available knowledge, and choose the means best designed to achieve a given goal. To do more is impossible; to do less, irrational.

⁵⁵ *Ibid.*, p. 37.

⁵⁶ There seems to be no constitutional requirement for congressmen to be present when casting their votes. The relevant passage states, "and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal" (Article I, Section 5).

Individual congressmen: Congressmen vary in their legislative interests, constituency relationships, and styles of operation. Any information system for Congress should be adjustable to fit their individual needs. Here are a few suggestions of ways in which each congressman might use his own information processing facilities.

1. *Deciding how to vote:* Many pieces of information are important for congressmen's voting decisions. Some of this information can be furnished automatically by computer announcement of every vote, as described above. Yet there are many political factors, personally important to the congressman, that would not be included in the announcement but which he might like to review before voting. For this purpose, each congressman should be equipped with computing facilities to handle his personal file of information and his own retrieval system.

When a roll call vote is announced, the congressman could use this system to review his voting record on the subject; past votes can be stored in memory and recalled for study. He could also examine the attitudes of various groups in his constituency toward the issue; the computer could retrieve whatever constituency data he had read into storage beforehand. Exactly what he would put into storage would depend on what information he has collected and how his system has been organized. He might, for example, want to recall his own speeches and public statements on various issues. In the last analysis, the shape taken by the system would be determined largely by the imagination and resourcefulness of individual congressmen.

2. *Maintaining relations with his constituency:* Congressmen could use their computing facility for performing a variety of constituency-oriented activities. Constituents' names and addresses could be stored in memory along with other relevant data for automatic preparation of specialized mailings, e.g., to campaign contributors, labor leaders, businessmen, supporters of the congressman's party, supporters of the opposition party, and so on. Constituency mail might even be answered with the computer. Some printing devices now have both upper and lower case characters, which would give each computerized reply the appearance of an original letter, with the printing done at the rate of hundreds of lines—not words—per minute.

Obviously, this computing capability might also be used to analyze polling data and elections returns, thus helping the congressman in his continuous campaign for re-election. Here again, input to the

computer would depend largely on the politics of the congressman's constituency and the ingenuity of individual congressmen. A man from a safe district might not bother with such analysis; one from a competitive district might cultivate it to a high degree.

3. *Reading and analyzing written material:* Modern congressmen are expected to devour daily an astounding stack of reading matter. In addition to the massive *Congressional Record* there are bills, committee reports, House and Senate documents, agency reports, constituency mail, newspapers, and so on. Much of this material need only be quickly scanned for occurrences of terms of interest before thoughtful reading begins. Other material has to be analyzed thoroughly, sentence by sentence. Automated equipment definitely can be used to scan documents for relevant passages marked by certain terms and—perhaps surprisingly—can also be employed for careful content analysis, sentence by sentence.

Some progress remains to be made in optical scanning equipment before computers are ready to assist congressmen with their reading load. Devices have already been built, however, that can read a variety of type fonts and enter the information into a computer for processing.⁵⁷ All the material to be read need not be stored in memory; this would soon exhaust the storage capacity of the largest computer. Instead, programs can be devised that would retain only material which satisfies search instructions that are given to the computer beforehand. In this way, the computer would not generate reel upon reel of magnetic tape for the thousands of pages it reads. It would analyze information in the process of reading it and be selective about what is communicated to the congressman.

Congressional committees: Most legislative work in Congress is conducted through committees, and at least the standing committees should serve as a basis for organizing a congressional information system. However, it is even harder to be specific about system features at the committee level, for the shape of the system will depend largely on the committee's jurisdiction and will have to be tailor-made to its workload. But a few general features readily suggest themselves.

1. *Compiling histories of committee action:* Over the years, each committee often considers many bills with identical or quite similar

⁵⁷ Work undertaken by the Post Office Department is quite relevant here, which underscores the fact that research and development in even purely "administrative" applications of technology can have broad consequences for information processing in general.

content. To a large extent, the combined memories of the senior committee members can recall important facts about similar bills that had been considered in the past. Upon occasion, however, their memories fail, and they forget results of previous hearings and actions on proposed legislation. More important, perhaps, is the inability of newer committee members to draw as extensively upon previous committee experience, which prevents them from functioning to maximum capacity as lawmakers.

To make previous experience generally available, the full history of committee action could be compiled on magnetic tape and made available to any committee member for computer processing. Upon request, any member could find all bills on a given subject that the committee had considered in past Congresses, the bills' provisions, whether or not hearings were held, relevant documents reporting the hearings, action taken by the committee, action taken in the chamber, action by the other chamber, whether the bill became law, and so on. Most of this information is available now through traditional methods of research. This proposal, however, would make the search and retrieval operations automatic, swift, and routine—thus eliminating the need for laborious study in order to locate basic information.

2. *Processing data on subjects under committee jurisdiction:* This is a general proposal for strengthening research capacities of committee staffs by equipping them with computers. It is difficult to say exactly how the computers would be used, for that would depend on the research needs of the committee. One example might be to use a computer for analyzing questionnaire data collected on special groups affected by governmental programs. The data could be processed and analyzed by the committee staff using Congress' own computing facilities. At present, committees do conduct such surveys, but they usually process their data on computers in some executive agency—which is usually only too happy to oblige.⁵⁸ This method of operation, however, hardly promotes Congress' independence of the executive. Congressional committees should be

⁵⁸ A good example of congressional use of executive computing facilities is provided by the Subcommittee on Domestic Finance of the House Committee on Banking and Currency, which used computers and computing time provided by the Federal Reserve Board and the Federal Deposit Insurance Corporation to analyze questionnaire data collected from some 3,000 commercial banks. This research is reported in several documents issued during the 2d Session of the 88th Congress, including *Correspondent Relations: A Survey of Banker Opinion* and *A Study of Selected Banking Services by Bank Size, Structure, and Location*.

given their own research tools so that they need not be beholden to the executive for information, expertise, or computing time.

3. *Controlling the administration:* One of the most needed areas of improvement for Congress lies in direction and control of the federal bureaucracy. In general, congressional committees are organized to parallel executive departments and to divide responsibilities accordingly for reviewing activities of given agencies. Committees can increase the effectiveness of their direction and control over the agencies through information processing techniques. One such application immediately suggests itself: analyzing past and projected budgetary expenditures for each agency.

Appropriating monies and authorizing expenditures are cited together as the main weapon in congressional control of the executive. But it is generally conceded that Congress is underpowered to review effectively the enormously long and complex budget set before it by the executive. As Wallace has written:

Congress does not now have access to nearly as much analytical data about the budget as does the Executive. Although there is probably a point beyond which additional information does not help to predict consequences of action, Congress has not yet reached that point. The present disparity between its information resources and those of the Executive means that effective control . . . is held in the hands of those who possess detailed information with respect to the various administrative needs and the adequacy of this or that amount of money for carrying out a particular program.⁵⁹

Committees could use the computer for exhaustive and comprehensive analyses of current estimates according to past estimates and subsequent expenditures. The sources of increase and decrease (if any) can be pin-pointed and subjected to closer scrutiny. Patterns of supplementary appropriations could be entered into the analysis. At the very least, the committee should be able to do fundamental arithmetic on a grand scale with executive budgets. This in itself would not insure economy and efficiency within the bureaucracy, but—coupled with other analytical procedures devised by the committees and executed on the computer—it should give Congress more punch to use in the battle of the budget.

⁵⁹ Robert Ash Wallace, "Congressional Control of the Budget," *Midwest Journal of Political Science*, May 1959, p. 152.

Issues in Automating Congress

IT WOULD be foolish to recommend an automated information system for Congress without considering some of the basic issues involved in this dramatic innovation. Four seem to be of paramount importance: cost of the system, smoothness of transition, mastery of the system, and effect upon the distribution of power. Each of these issues will be discussed in turn.

Cost of the System: I would not hazard a guess about the dollar cost of an automated information system for Congress, for this would be far beyond my competence. But I can roughly estimate the absolute outer limit of expense. Let us suppose that the physical and human facilities of a modern computing center at a major university were provided for exclusive use of *each* representative, *each* senator, *each* standing committee in both chambers, the House and Senate *separately*, and Congress as a whole. The total number of computing centers needed would be as follows:

Number of congressmen	535
Standing committees	36
Both chambers	2
Congress itself	1

Total	574

The annual operating budget of the computing center at Northwestern University can serve as a standard. Its budget for 1965-66 is \$533,000. This amount covers rental cost of its basic machines, Control Data Corporation's new 3400 computer and its satellite, the CDC 8090; rental of a full complement of auxiliary equipment;

salaries of 17 staff members and wages of many hourly workers; and all associated supplies, cards, paper, magnetic tape, etc. Utilization of Northwestern's computing facilities has steadily increased over time. At present, the center serves 35 separate departments and schools in the University and has on file more than 500 active projects ranging in scope from nuclear physics to classical Greek. Even with this tremendous use by hundreds of students and faculty members and even with projected increases for the future, the present equipment will probably be able to handle Northwestern's demands for computer time for the next two years.

Suppose a vast computing facility like Northwestern's was made available to each of the users listed above. The annual operating cost for 574 such computing centers would be slightly less than \$306 million. Given the magnitude of annual expenditures for some projects within governmental agencies, this does not seem like an astronomical figure. And a more sensible configuration of equipment using several very large central computers and remote control stations would bring the cost down to bargain prices for this contribution to democratic government.

Smoothness of Transition: It would be folly to automate abruptly. Automation should proceed gradually, one step at a time, while maintaining traditional procedures to prevent bugs in the system from disrupting communications. Disseminating notifications of new bills might be tried first. This technique involves computer programs and procedures that are now almost routine in information processing. It could be introduced in Congress with relative ease and would give all congressmen a taste of innovation simultaneously. If their reaction is favorable, the next application might be in the committees. Some committee staffs already have had considerable experience in data processing with computers in the executive branch and thus can aid in the transition for Congress.

Authorization for establishing information systems at the committee level should, of course, be permissive—enabling committees to automate at their own initiative. The change would not be sweeping, but should provide for incremental expansion, committee by committee. Finally, similar arrangements should be made in establishing systems for individual congressmen. Those who want to automate their own information-handling activities should be enabled to do so. A gradual approach like this should allow the system to win acceptance on merits demonstrated through actual performance rather than promise. And if the system seems to be developing

undesirable consequences, it could be altered or even scrapped—whatever the evidence indicates.

Mastery of the System: Further expansion of professional staffs is frequently recommended to cope with Congress' information problem. Congressmen are understandably reluctant to follow this advice out of fear that their own staffs would become bureaucracies and would, in turn, be difficult to control. They might also resist installation of automated information systems because of the same basic fear: losing control of their own tools. This fear may be all the more pronounced because the tools are space-age inventions unfamiliar to elected officials.

Installation of computing systems for Congress would clearly demand employment of person trained in the technology. This means both computer operators and—even more important—computer programmers. Probably each chamber would have to maintain a small staff of programmers to develop and maintain its information processing systems. In addition, the standing committees would have to add programmers to their staffs, and eventually individual congressmen might themselves employ programmers on a part-time or job basis. These technicians will possess specialized knowledge. The question is: can congressmen make them work effectively and obtain the information they want and need?

Some people stand in awe of electronic computers, computer programmers, and men from IBM. The uninitiated imagine white-robed technicians communicating in a strange language and performing mysterious ceremonies around frightfully complex machinery. In short, computers and related things seem far beyond the ken of these ordinary mortals. Congressmen might find absurd the suggestion that they might learn how to use computers themselves. But if is not absurd; computers are tools that can be used, if not mastered, by intelligent and interested people.

I submit that congressmen can readily acquire a basic understanding of computers and computer programming for effective use of the system. A series of talks by capable instructors followed by equipment demonstrations should prove adequate for communicating this understanding. In time, this instruction could become part of the orientation for new members. My experience in teaching computer use and computer programming to college juniors and seniors in political science indicates that a working knowledge of the equipment is acquired very rapidly, once the initiation has occurred.

Effect upon the Distribution of Power: "Knowledge is power." Granting that premise, the question becomes, "Who gets the knowledge?" This is largely answered by disclosing the beneficiaries of the information system outlined above. Two groups will benefit: Congressmen individually and committees of congressmen. The fundamental belief underlying this whole proposal is that Congress can be strengthened as a legislative institution by improving the effectiveness of congressmen as individual lawmakers. Providing congressmen with more information and greater knowledge is a major way of doing this. Providing committees of congressmen with more information and greater knowledge also strengthens Congress, by promoting specialization and division of labor in lawmaking. As a consequence, Congress as a whole will become a far more effective force in our governmental structure.

This proposal studiously avoids concentrating remote terminals in the hands, say, of the elected leadership or perhaps party committees. Such concentration would produce no substantial increase in knowledge and information available to individual congressmen and would accelerate centralization of power within Congress. And centralization of power within Congress would have as *its* main beneficiary the party in control of the White House, which ultimately means the President. And we do not need recommendations which further strengthen the President's hand in his dealings with Congress.

The recommendations in this paper harbor no great or systematic alterations in the present distribution of power within Congress. Providing a quantum of knowledge to all congressmen across the board might hasten the effectiveness of newer members, but this effect, although welcome, is not likely to be substantial. Providing specialized information to standing committees simply recognizes and reinforces their current influence in the legislative process. Other things being equal, then, this proposal should benefit no political factions within Congress.

But other things are seldom equal, and some individuals may wring more knowledge, and therefore more power, out of the information system than others. I am certain this will happen, but I see no basis for alarm from any particular quarter—unless people in that quarter place little confidence in their abilities to compete successfully with others in using these tools. Some congressmen will work the system better than others, but it is impossible to forecast in advance who these will be—which means, again, no predictable change in the distribution of power.

Conclusion

WITHOUT doubt, establishing an automated information system within Congress will have many unanticipated consequences. Far-reaching changes have always accompanied the introduction of new technology into society. The automobile brought not only faster transportation but also giant shopping centers and drive-in movies. Television brought not only improved communications but also TV dinners and "family rooms." Technological innovation in society changes ways of living; in Congress, it will change ways of lawmaking.

It is impossible to predict in advance all concomitant outcomes of this proposal. No doubt, some changes will be evaluated negatively by congressmen and by students of the legislative process. But the final tally of pluses and minuses should find this innovation clearly moving Congress toward a more vital and independent role in our governmental system. The evaluation of a state senator who has experienced the application of computing techniques in New York's state legislature supports this estimate in full. Senator Brydges says:

The computer places one of the greatest research tools in history in the hands of legislatures from coast to coast. Because it can do its work quickly, surely and extensively and print laws in quantity, it saves interim committees, research counsel and law revision agencies thousands of man-hours that would be consumed simply in trying to find all laws on a specific topic and reproducing them in quantities for scissoring, pasting and reshuffling. Its importance, however, lies beyond its ability to serve as a legal research assistant. The computer

becomes a means of restoring the legislature to its proper equal status with the judicial and executive branches of government. Today and in the future, control over facts—the ability to research in depth and quickly—can gain for legislatures some of the capabilities for leadership they have lost over the years.⁶⁰

If computers can do this for state legislatures, why not for Congress?

⁶⁰ Brydges, *op. cit.*, pp. 351-52.

Papers in This Symposium

"Toward a New Model of Congress"

Alfred de Grazia

"Information Systems for Congress"

Kenneth Janda

"'Check and Balance' Today: What Does it Mean for Congress and Congressmen?"

Lewis Anthony Dexter

"Congress and the Executive: The Race for Representation"

Roger H. Davidson

"The Service Function of the United States Congress"

Kenneth G. Olson

"Congressional Liaison"

Edward de Grazia

"Introducing Radical Incrementalism Into the Budget"

Aaron Wildavsky

"The Committees in a Revitalized Congress"

Heinz Eulau

"Decision-Making in Congress"

James A. Robinson

"Legislative Oversight"

Cornelius P. Cotter

"Availability of Information for Congressional Operations"

Charles R. DeChert

"Strengthening the First Branch: An Inventory of Proposals"

"Congress: 1989"

Alfred de Grazia