In addition, many of the larger retrieval systems are transitional, having been designed and developed for batch search and publication systems. Some data bases are of limited quality and consistency in their indexing; exposure to more users and the ready comparisons that will result from extensive testing in the "marketplace" will inevitably result in a much needed shakedown of information systems. It is anticipated that very significant improvements in the quality of the content of such data bases, as well as major improvements in the ease and flexibility of the interactive dialogue between user and data system, will result.

Attitudes will also have a major effect on the growth of on-line services. The library community must be reoriented toward providing greater user access; libraries must be prepared for the expensive innovation (in the period of austerity) that on-line systems demand. Further, the measures of the performance of information retrieval systems—precision and recall—are largely inappropriate to on-line systems, just as they are inappropriate for printed indexes and card catalogs. New measures of effectiveness will be necessary, measures which do not assume that on-line users are seeking complete information or exhaustive bibliographies.

Future

In spite of the constraints, it now appears highly probable that major growth in on-line information services can be expected, growth comparable to that of timesharing computing services in the late 1960's. This growth, however, depends on networking. The mass user market that networking makes possible will exert pressure for quality services. It will no longer be necessary or even desirable for one computer center to process many data bases for its local users, with the attendant high storage and operating costs, as has been the pattern in some university computer centers. Even providing rapid service on one good file will strain the capabilities of some large computer centers. Networking would allow specialization in other services, such as economic modeling and linguistic processing.

It also seems clear that the competition among retrieval systems will become even greater. High usage rates and cost competition will redirect efforts from development of more elaborate systems to development of more efficient ones. Performance and the "user interface" will become matters of critical importance as the market chooses among competing services. Finally, the development of large systems will certainly have an eventual impact on the design and manufacture of computers; new pressures will develop for faster, cheaper storage, and the associative memory may become a necessity.

It is evident, therefore, that the ability to implement a major MEDLINE network of more than 120 institutional users in a period of 1 year reflects a maturation of many of the on-line and network developments of the past several years and presages a major extension to a wide variety of applications in the fields of science, technology, and education during the current decade.

References

1. R. V. Katter and D. A. Blankenship, *On-Line Interfaces for Document Information Systems; Considerations for the Biomedical Communications Network* (Technical Memorandum L-4320, System Development Corp., Santa Monica, Calif., 1969).
2. H. R. Seiden, *A Comparative Analysis of Interactive Storage and Retrieval Systems with Implications for BCN Design* (Technical Memorandum 4421, System Development Corp., Santa Monica, Calif., 1970).
3. R. V. Katter and D. B. McCarn, in *Interactive Bibliographic Search: The User/Computer Interface*, D. E. Walker, Ed. (American Federation of Information-Processing Societies Press, Montvale, N.J., 1971), pp. 121–141; W. Moll, *Bull. Med. Lib. Ass.* **59**, 458 (1971); F. W. Lancaster, *Evaluation of On-Line Searching in MEDLARS (AIM-TWX) by Biomedical Practitioners* (Univ. of Illinois Graduate School of Library Science, Champaign, 1972); C. A. Cuadra, *J. Amer. Soc. Inform. Sci.* **22**, 197 (1971).
4. F. W. Lancaster, *Evaluation of the MEDLARS Demand Search Service* (National Library of Medicine, Bethesda, Md., 1968).
5. D. S. Grubb, "Report on bibliographic retrieval network" (unpublished report prepared for the National Library of Medicine, 1971).

NEWS AND COMMENT

Public Relations: A Federal Focus on Health

The health of the people is really the foundation upon which all their happiness and all their powers as a state depend.—BENJAMIN DISRAELI

The week of 9 July was a big week for health in Washington. On Monday, Health, Education, and Welfare (HEW) secretary Caspar Weinberger went out to the National Institutes of Health (NIH) and told an overflow crowd of scientists that their training grants program is being partially restored to life.

On Tuesday and Wednesday, the government gave a health gala that it called a "federal focus on health." It was a 2-day public relations venture in which the government tried to get its point of view across, on its own terms, to some 130 science reporters. As Charles C. Edwards, assistant secretary for health, put it: ". . . In calling this conference today, we wanted to better describe what we are trying to do, what our philosophy [is], what some of our goals are. We feel quite strongly that we have been at times misrepresented. I think part of the reason we have been misrepresented is because we haven't done a good job of presenting our own case. . . . We wanted you to know what the real story was."

Everyone who is anyone in the federal health establishment was there to tell the story. Weinberger and Edwards were there. So was Edwards's deputy, Henry Simmons, who used to work with him at the Food and Drug Administration when Edwards was commissioner. Presidential counselor Melvin Laird, who dealt with HEW appropriations when he was in Congress and who had a hand in the early prosperity of NIH, put in an appearance. James Cavanaugh, associate director of the Domestic Council and a man who likes to keep a low profile, was there, although, unlike the others, he made no formal remarks. There was speculation that the President himself might drop in, but he never did.

The first day, the health gala took place in the old Executive Office Building next to the White House. The

second day, everyone traipsed out to Fort Detrick—now known as the Frederick Cancer Center—in Frederick, Maryland, which is about an hour's drive from Washington. There, NIH director Robert Stone, with the directors of each of the individual institutes in tow, chaired the briefing. (Edwards had been scheduled to be the ranking officer, as it were, but, after spending all day Tuesday at this affair, he apparently decided he had had enough and went back to work.)

The point of the whole event, its HEW and White House sponsors said, was to establish a dialogue with the press (one of those two-way street metaphors kept coming up). From the beginning, they promised there would be no news of a substantive nature, and they kept their promise. But the range of topics that came up for discussion was certainly extensive, including everything from training grants to national health insurance, to the national cancer and heart plans to Skylab. The dominant theme, if there was one, was that what this country needs most is a total health strategy—and one that does not cost too much.

The telling of the real story of what the government is doing about our collective health was begun by Weinberger, the man who was director of the Office of Management and Budget (OMB) when the decision to do away with training grants was made, the man nicknamed "Cap the Knife" because of his budget-cutting prowess, the man who is now in charge of the biomedical enterprise in all its many parts.

Weinberger, who has been at HEW only 6 months, is still something of an unknown to the medical and scientific communities, although, as his visit to NIH indicates, he is trying to make contact. Like the President, Weinberger is a Californian, a lawyer, and a politician. He graduated from Harvard in 1938 and from Harvard Law School in 1941. He practiced in San Francisco and served for several years in the state legislature. At the same time, one learned from the introduction given him by Lewis Helm, HEW's new assistant secretary for public affairs, Weinberger worked as a reporter of sorts. "He spent some years as a columnist on California newspapers [writing twice weekly on government affairs]. He understands pencil pushers' problems, and in addition he had his own television show in California for a number of years."

Weinberger tried to set the tone of the seminar, and, perhaps, to suggest a tone for his department, with a quote from Disraeli: "The health of the people is really the foundation upon which all their happiness and all their powers as a state depend." Said the secretary, "Basically, our approach is an agreement with that, and to fashion effectively, and we believe for the first time, a total health strategy."

There is no doubt that Weinberger and Edwards and the others at the top of the federal health establishment are thinking a lot about this notion of a total health strategy. Certainly, they speak about it frequently.

No sane man would argue with the statement that this country does not have, and never has had, anything that even vaguely resembles a coherent policy covering the conduct of biomedical research, the education of doctors, the delivery and cost of health care, and all the other things that are part of what HEW calls health. Many people share the Weinberger-Edwards opinion that a coherent strategy is desperately needed, but it is hard to get people to agree on what that strategy should be. Weinberger and Edwards are not entirely clear themselves about what it should be, and, indeed, as yet they have no such beast as "a total health strategy" to put before the public.

What they have instead are thoughts about the elements involved in establishing such a strategy and an idea about what is wrong with the present nonsystem. Things are fragmented because scores of programs have been established to meet single problems without any thought of the whole. Things cost too much, and even the government itself is contributing to the inflationary spiral in health. And, cost aside, many of the existing programs simply are not doing for people the things they are supposed to do.

Starting with the premise that federal funds are finite—important though health may be—Weinberger says the first requirement for fashioning a total health strategy is a "re-look at all the things we are doing and a willingness to stop uncritical funneling of billions of dollars and millions of man-hours into programs that, however meritorious they may have been when they

A Few Training Grants Are Back

Ever since the Nixon Administration announced last January that it intended to phase out the NIH training grants program that supports young scientists, their institutions, and their teachers, the biomedical community has been in a swivet. Every conceivable kind of pressure has been put on Congress and the White House to do something to save these precious grants, ranging from relatively vapid telegrams of protest to the pressure of personal persuasion by persons with access to people at the top.

Now, with words to the effect that it never really meant to stop training biologists—the intent, said Weinberger, was "to try to devise a better way to do it"—the Administration has announced "a $30 million program of Research Training Fellowships, to begin this fiscal year, aimed at strengthening the Nation's biomedical research capability."

The old training programs will be phased out as originally planned and this new program put in its place. The vast majority of the funds will go directly to individuals, not to institutions, in amounts of $10,000. "Only when we are unable to find qualified researchers in a high priority area will awards be made through institutions," said Weinberger at NIH. Policy governing the program will be made, he claimed, in the office of the director of the NIH. This, he said, would "allow us to handle in a coordinated manner the total research manpower needs now and into the future, and then to channel training funds into specific areas of need."

Weinberger said that this new fellowship program eliminates things he and his aides did not like about the old one, such as money going to institutional support, faculty salaries, overhead, and "other perfectly worthy enterprises" that they failed to see as directly related to increasing the number of trained biomedical researchers.

Under the new program, the government will spend $90 million during the next 3 years. Under the old program, the figure was about $130 million per year. If you are trying to save money, that is progress.—B.J.C.

started, or however necessary they may have been when they started, were developed individually and implemented in relative isolation from other programs, isolated from any general sort of priority consideration or discussion or any results-oriented evaluation of any kind on a continuing basis."

Here, Weinberger is restating the philosophy that was expounded last January when the President's budget was presented (*Science*, 9 February), and which lead to the proposed abandonment of many programs. "The whole idea of a government stopping something that it has been doing is revolutionary," said Weinberger, who has found out how difficult that is to do. He wanted to dismantle the regional medical programs, get the government out of community mental health centers, and bring other programs to an end. But a few weeks ago, Congress said "nothing doing" and passed a bill that would keep many of them alive for 1 year at a cost of $1.2 billion more than the President wanted to spend. Nixon signed the bill anyway (*Science*, 13 July). Weinberger is taking a "we will carry out the law because we have to" attitude about it but hopes that, after they study the matter, Congress will let the programs die next year.

Meanwhile, Weinberger, Edwards, and their associates will continue to work on a total strategy, which will include a national health insurance plan. Again, the Administration says that one of its most important elements must be cost control. "It would be quite possible, indeed it has already been done, to design a national health insurance plan so broad that the American people and their government simply can't afford it," Weinberger declared. The Administration's plan, which will go to Congress early this fall, will not be inflationary, he maintains. Apparently, the House Ways and Means Committee has indicated it will take up the question of national health insurance when it receives the plan.

Cancer and Heart Plans Finished

Plans were on the agenda of the federal focus on health in other fields too. Weinberger himself brought up the subject of the national cancer plan and announced that it is complete—more than 2 years after it was begun—and should be made public soon. First, however, "It is running around the various loops that matters this important must follow before they are finally

POINT OF VIEW

Anti-Science—A Misunderstanding

The modern revolt against science has been spurred by a misunderstanding of the nature of science, argues J. A. Passmore, professor of philosophy at the Australian National University, Canberra. Passmore believes that some of the misunderstanding rests with critics of science such as Theodore Roszak (see Science, *1 December 1972) and some with the way that scientists have presented their affairs to the public. In the excerpts below (taken from the December issue of* Search, *the journal of the Australian Association for the Advancement of Science), Passmore analyzes the revolt against science as one that "condemns science for making itself the instrument of power, looks with dismay on the devastation to which science-based technology has given rise, rejects a world made gray by standardization . . . [and] seeks to reinstate the imagination and direct sensual enjoyment."*

The more intimate involvement of science with government and industries has left it particularly vulnerable to the charge that it is merely their spokesman. In and through its relationship with government and industry, science has lost, too, its old reputation as the exemplar of the ideal of open, public discussion. . . . One can easily understand why the critics of science now contemptuously reject the claim that it embodies democracy in its ideal form. . . . It is certainly no compliment to physical science that it flourishes in a Soviet Union in which philosophy is dead, history a farce, creative literature survives only as an underground activity. . . .

It is relatively easy, then, to build up a picture of the contemporary scientist as a mercenary, prepared to serve any master who will build him his machines. Scientists themselves, through their own organizations, have done much to form this image. . . . But if science, in its own official pronouncements, equates itself with business, it must expect to be regarded as such—so that, let us say, a cutting back of scientific research funds for economic reasons is of no greater public interest than a decision to cut back on advertising. And it cannot expect, any more than business expects, to be listened to as a disinterested moral force. . . ."

As for the technological effects of science, in this case it is more difficult to construct a balance sheet. . . . Yet it has to be admitted, I think, that there are characteristics of science which are at least partly responsible, in a quite direct way, for our present technologically induced ills. Science has not been so structured as to consider those topics which cut across specialties. And even within particular fields of investigation it has preferred atomistic experiments in laboratories to fieldwork observations. . . .

To return to Roszak with his condemnation of science as destroying the special, the unique, the marvelous, . . . no doubt much science is boring and many scientists are boring people. The same is true of any form of human activity. . . . In the 19th century, the Germans finally put into practice the Baconian ideal of team research, of discovery through perseverance. For the first time men with second-rate minds—worthy, reliable, but uninspiring—could make for themselves a career in science. . . . This is the sort of scientist, undoubtedly, that Roszak is particularly attacking. But their presence within science should not obscure the fact that, like mathematics, science is still one of the greatest triumphs of the human imagination. . . .

Then why should it be so often condemned, not only by Roszak, as unimaginative, mechanical, routine? In part, the scientists themselves are to blame. Intent on emphasizing that experimental method which is their badge of authority, their professional distinguishing mark, they have deprecated their own imaginativeness. They have wrongly supposed —exactly like their critics—that the exercise of the imagination and the experimental method are essentially opposed to one another: they have failed to understand that science is the wedding of the two.

released. . . ." One can just see it, all three volumes.

Speaking of the cancer plan, the secretary took the occasion to speak about cancer research in general and clearly stated he does not think it unwise to spend as much money as the country is on cancer to the exclusion of research in other fields. From intensified cancer research, he said, "there is an enormous fallout," that will be of benefit to other fields.

Although Weinberger made no specific reference to the national heart plan in his prepared remarks, the sub-

Briefing

Medical School Teachers Will Learn about Politics

The Institute of Medicine of the National Academy of Sciences is starting a congressional health fellowship program which will be closely modeled on that of the American Political Science Association (APSA).

The fellows are to be mid-career professionals—medical school faculty members, most of whom will be in their 30's. They will be posted with various House and Senate committees whose work is related to health policy, where they will perform the usual committee chores.

The purpose of this exercise, says Richard Seggel of the program's staff, is to "let them know what the real world—the real political and governmental world—is like," and "why things are moving the way they are." Says Seggel, "You go out there and talk with them and most are very upset about the way things are happening here [in Washington]."

The object of the fellowships is simply to get more people with political savvy into positions of influence in medical centers and schools. It will also enlarge the pool of politically sophisticated health professionals who can be tapped for administrative positions in government.

Salaries for the fellows will be paid from a 3-year grant of $710,000 from the Robert Wood Johnson Foundation.

Ivan L. Bennett of New York University Medical Center has been appointed head of the fellowship program's policy board, which includes representatives from the foundation, the institute, and APSA. (Robert Marston, former director of NIH, will run the program itself.) Bennett says the program was established partially in response to the many requests about how to gain firsthand knowledge if one wants to obtain a health-related position in the federal government.

Each of 115 medical centers and free-standing medical schools in the United States has been asked to recommend one applicant. The board will then choose six. The winners will spend 6 or 8 weeks in orientation sessions and will then be incorporated into the APSA program.

Seggel points out that the new program is appropriate now that medical schools and centers are becoming increasingly involved in community affairs, with all the political entanglements that can include. The fellowship program is also undoubtedly a sound defensive move to stave off further cuts in federal health grants, as it will arm health professionals with the knowledge of how and why top-level policy is made.—C. H.

New Leadership Proposed for Fort Detrick

When the order was given to convert the biological warfare laboratories at Fort Detrick in Frederick, Maryland, to a cancer research center, the natural solution was to fill Detrick with the extensions of programs already in progress at the National Cancer Institute (NCI). As a result the Frederick center now conducts a hotchpotch of projects on behalf of various NCI program officials.

A plan to give the center a new identity has been mooted by Sidney Weinhouse of the Fels Research Institute in Philadelphia. As chairman of an ad hoc committee to the advisory board of the NCI, Weinhouse has proposed that a research scientist of outstanding caliber be appointed overall director of Frederick. Only thus can the place be metamorphosed from a "geographic entity" where the overflow of NCI programs are accommodated to a world-renowned center of pioneering cancer research.

In addition to the service-oriented programs at Frederick, now amounting to $9.5 million, the new director should have control over a research program of his own, worth about $2.5 million, the Weinhouse committee suggests in an interim report to the NCI advisory board. With a rank equivalent to that of the NCI division heads, the director should be free to develop ties with universities and create an environment at Frederick conducive to research.

Weinhouse pays tribute to the "speed and apparent efficiency" with which the Frederick contractor, Litton Bionetics, has carried out the conversion to cancer research. But the work now being carried on there is a "conglomeration of fragmentism . . . with no unifying overview," and suffers from a "crucial lack" of scientific leadership. The committee is also concerned whether the projects now under way are scutinized carefully enough, whether their goals are worthwhile, and whether they are necessary or duplicate work elsewhere. (Weinhouse says that these are general concerns that do not refer to any particular project at Frederick.)

Appointment of a scientific director would cut into the preserves of the NCI officials who have programs at Frederick and might be expected, for this reason, to be unpopular. But Weinhouse says that senior members of the NCI and the NCI's advisory board are favorable to the idea. He has no candidates in sight for the directorship, though says that various names have been bandied about. According to others, these names include NCI researchers George Todaro and Robert Gallo, and I. Bernard Weinstein of Columbia University. NCI spokesman Frank Karel says that no definite action is likely to be taken until the Weinhouse committee completes a final and more detailed proposal.
—N.W.

ject did come up during questioning.

Question: The national heart plan seems to have vanished somewhere in HEW. Could you give me some. . . .

Obviously, Weinberger does not like accusations that these plans, or others on related health matters, are lost. He broke in before the question was complete to say, "No. It hasn't vanished anywhere. . . . It reached my office 2 days ago. . . . It is there, alive, well, and moving along the necessary loops." It was completed by officials of the National Heart and Lung Institute in early May and has been somewhere in HEW since the middle of that month, in loops. In contrast to the voluminous cancer plan, the heart plan is a tidy, single volume only some 60 pages long.

The only announcement that came out of the focus on health that constituted, or was intended to be, news had to do with blood. There is a new national blood policy, which will lead the country to an all-volunteer donor system if it works. What HEW wants is a nationally coordinated system for handling blood that will solve existing problems of uneven distribution, uneven quality (too much blood is contaminated with hepatitis virus), and high cost. Apparently, however, HEW has no strict guidelines for achieving this goal. Instead, it will call a conference of all institutions and agencies in the private sector that are in the blood business and ask them to handle the details. What if they cannot get together and do away with the internal bickering that has characterized many of their previous dealings with each other? HEW will try to get its ideas translated into law; but first, it is going to try to get a volunteer blood system from the private sector voluntarily.

The focus on health was the Administration's first large-scale attempt to get its views on these matters to the press. Some reporters believe it was the first honest effort to be cooperative at all. Like most ventures of this kind, it had its advantages and its failings. Certainly, its bringing together of so many government health figures was useful to the press, particularly to the considerable number of reporters who came from out of town. And certainly, the obvious attempt public affairs secretary Helm is making to make health officials more accessible in the future is appreciated. And, exposure to their thinking is useful. The main trouble with the health gala was that one came away with the feeling that, really, nobody had very much to say.

—BARBARA J. CULLITON

Research Systems: OECD Verdict on Five Countries—So Far, So Good

The Organisation for Economic Cooperation and Development (OECD) has extended its comparative study of national research systems to five small but industrially successful Western European countries—Belgium, the Netherlands, Norway, Sweden, and Switzerland. The study* complements an earlier one of France, Germany, and the United Kingdom (*Science*, 14 April 1972) and compares the small countries' research efforts favorably with those of the big three of the European Community.

If the five small countries are compared collectively with the three big countries, says the report, "it would appear probable that the former have not only made a contribution to the advancement of science which is proportionately greater than that of the latter, but they have utilized and applied their science with much more profit and efficiency than the big countries."

The OECD surveyors, however, mix a caution with the kudos. They note that the research systems of the five small countries have flourished in a period when research efficiency could be judged strictly by its contribution to economic growth. These countries are now entering an era when science and technology are being called on to cope with problems of the society which cannot be defined in purely economic terms. The report suggests that existing research systems face trouble in meeting these new social and cultural objectives.

The gross anatomy of research systems in the large and small countries is seen to be very different. Most obviously, the small countries have not embarked on major, national technological undertakings in defense, space, and nuclear energy with their large commitments of money and manpower.

The authors of the report also note a marked difference in the general atmosphere prevailing throughout the scientific enterprises in the small countries as compared with the large. The former do not show the symptoms of the "recession" in science which has caused anxiety and unrest among scientists and engineers in the large countries. Evidently there has been reasonable continuity in science funding and science policy in the small countries. In the case of France, Germany, and the United Kingdom, on the other hand, the report observes that there have been determined and sometimes abrupt

Table 1. Performance and funding of R&D in the government sector relative to the national R&D effort in member countries (1967). [OECD figures]

Country	Gross national expenditures (10^9)	Government financed R&D		Government performed R&D		Performance as percentage of funding
		10^9	%	10^9	%	
Belgium	176.008	33.096	18.8	18.333	10.4	55.4
Netherlands	513.812	200.267	39.0	13.812	2.7	6.9
				(113.139)*	(22.0)*	(56.1)*
Norway	80.711	46.759	57.9	16.596	20.6	23.5
Sweden	336.090	135.840	41.1	47.748	14.5	35.1
Switzerland	303.950	64.117	21.1	19.293	6.3	30.1
France	2,506.750	1,340.615	53.5	804.742	32.1	60.0
Germany	2,084.324	835.700	41.3	106.225	5.1	12.7
United Kingdom	2,480.088	1,229.215	49.6	575.156	23.2	46.7

* Figures in parentheses include funds for a legally independent research organization which has traditionally been classified as a private nonprofit institution but really functions as part of the government sector in the Netherlands.

* *The Research System. vol. 2.* Obtainable from OECD Publications Center, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C. 20006. $6.75.