realized, but we need to know still more. What is known has not yet been put to use very effectively. The design and construction of methods and materials is a difficult enterprise which demands a kind of specialist who is, at the moment, in short supply. New practices need to be thoroughly tested. And when, at last, we have devised more effective methods, we must convince educators that they should be used. Extensive administrative changes must be made. (The changes required simply to permit the individual student to progress at his own rate are prodigious.) Teachers need to be retrained as skillful behavioral engineers. The common complaint that new materials do not work because the teachers are incompetent is not only unfair, it shows a failure to recognize another point at which the improvement of teaching might begin. Materials are good only if they can be used by available teachers. It is quite possible that materials can be designed which will permit teachers to teach well even in fields in which they have no special competence.

The Improvement of Teaching

Scientists are wary of being asked about their "values." They hesitate to speak of progress because they are likely to be asked, "Progress toward what?" They are uneasy in suggesting improvements. "Improvements in what sense?" The current fashion is to speak only of educational *innovation.* All that is claimed for a new practice is that it is new. We need a much more positive attitude. The efficiency of current methods of teaching is deplorably low. The change which occurs in a student as the result of spending one day in high school is discouragingly small. We need to improve education in the simple sense of making it possible to teach more in the same time and with the same effort on the part of teacher and student. It is a difficult assignment—possibly as difficult, say, as the control of population or resolving the threat of nuclear war, but there is no more important problem facing America today because its solution will advance all other solutions.

It is the sort of challenge that scientists are accustomed to accept. They, above all others, should appreciate the need to define objectives—to know, in this instance, what it means to teach science. They should be quick to recognize the weaknesses of casual experience and of folk wisdom based on that experience. They, above all others, should know that no enterprise can improve itself to any great extent without analyzing its basic processes. They should be best able to gage the importance of science in the immediate and distant future and therefore the extent of the disaster which will follow if we fail to recruit for science large numbers of our most intelligent and dedicated men and women. It is no time for halfhearted measures. The improvement of teaching calls for the most powerful methods which science has to offer.

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4. This article was prepared with the help of NIMH grant K6-MH-21,775-01.

The Experimental City

With components designed as an experimental system, new cities in open land will open up land in old cities.

Athelstan Spilhaus

A federal commissioner recently expressed an opinion typical of the "hopelessness approach" to city problems when he said, "We cannot, even if we would, dismantle the urban complex." I disagree completely. The overgrown urban complex must be selectively dismantled and dispersed if we are to cure the ills of the megalopolis.

The author is president of the Franklin Institute, Philadelphia, Pennsylvania 19103. This article is adapted from an address presented 27 December 1967 at the New York meeting of the AAAS.

Half of the people in the United States live on 1 percent of the land, and there is a continual drift to the big cities. Urban renewal encourages the increase in the size of the cities. Two- or three-story slum buildings are torn down, and sterile, high-rise, so-called low-cost housing brings more people into the center of the city than ever before, compounding the problem.

Secretary of the Interior Stewart Udall, in an article which appeared in the September 1967 issue of the *Saturday Review,* addressed himself to the fundamental problem, that of controlling the population, and took a stand that must be considered courageous for a man in his position. If we consider that *any* excess that is harmful to decent living is a pollutant, then the prime pollutant on earth is too many people. But until we have the sense to control population, something has to be done for all these people, and here I discuss the question of what is to be done.

In his article, Udall goes on to say:

> Our annual population growth of 4,000,000 people increases the physical and social pressures, causes us to seek quick remedies, leads us to waste too much wealth on quick-fix projects that provide at best a temporary respite from yesterday's mistakes. The razing of tenements, their instant replacement by high-rise slums, changes the facade—not the features—of the ghetto.

I agree completely, and propose, as a corrective, development of a system of dispersed cities of controlled size, differing in many respects from conventional cities, and surrounded by ample areas of open land. The proposed Minnesota Experimental City will be a prototype.

The initial group that planned the Experimental City project in Minnesota

consisted of Otto Silha, Wayne Thompson, Walter Vivrett, Max Feldman, and myself, representing local business leaders, the University of Minnesota, and industry. Three departments of the federal government—Housing and Urban Development (HUD), Health, Education and Welfare (HEW), and Commerce—together with ten leading industrial firms, financed the first year's study at the University. This first phase concludes this spring. The state legislature has endorsed the project.

Dispersal

People like to live in cities. *Dispersal* does not mean that the whole United States is to become a single sprawling suburb, such as California is becoming. *Dispersal* refers to cities big enough to offer the advantages of city living yet small enough not to be subject to unplanned overgrowth. Each, with its surrounding reserved land, would be a separate unit. According to the Minnesota plan there would ultimately be many of these units, spread across the United States.

If the present 200 million people in the United States were living in 800 cities with a population of a quarter of a million each, and if these cities were scattered evenly across the United States, we would not have the pollution, the traffic congestion, the riots, and many of the other ills that develop when cities become too large.

In industry we already see trends toward dispersal. Industries are leading the way, by seeking small-town locations away from the large cities. Unfortunately, this migration has created a competition between Chambers of Commerce to retain industry or attract it to their present jurisdictions. Chambers of Commerce are strongest in the great overgrown cities. They are, therefore, a powerful force against urban dispersal. In large urban complexes two Chambers of Commerce may operate within one metropolitan area, with divided municipal responsibilities. Thus, if the competitor across the river brings in something big, the other side must do likewise, and the result is continual growth of the oversized city.

Buckminster Fuller, architect and imaginative member of our Experimental City Steering Committee, feels that industry of the future, largely automated, will be located outside the cities, and that the many functions of the city which in the past were directed toward facilitating the exchange of physical goods will in the future be directed toward the exchange of what he calls metaphysical values—ideas, learning, and culture.

Building from Scratch

Planning, constructing, populating, and managing a dispersed city highly suitable for industry, commerce, and human occupation will require the leadership, imagination, and enthusiasm of scientists, industrialists, and educators alike. We must be prepared to discard convention and to experiment with new and radical ideas. We must utilize the most advanced methods of construction, transportation, communications, waste removal, and city management.

The project simply could not be accomplished through any attempt to rebuild a present city, regardless of its size or location, for, without exception, our cities are bound by tradition, outmoded building codes, restrictive legislation, and the consequences of unplanned, unhealthy growth.

For these reasons the Experimental City Steering Committee has begun to work on the organization and financing of a scheme to build an experimental city from scratch, to house a quarter of a million people and the industry and commerce needed to support them.

The need for an experimental city was first impressed upon me after the year-long discussions conducted by the Committee on Pollution of the National Academy of Sciences–National Research Council, of which I was chairman. In the final report, "Waste Management and Control" (*1*), the first recommendation was:

> That a full-scale experimental residue-control system be planned, designed, and constructed in a new city—this system to embody the newest and best principles of recycling, re-using, and recovering residues, and to serve as a demonstration model.

If this was necessary for waste management, why not for other new technologies in transportation, communications, and total city services? I was in Minnesota at the time and found staunch supporters there for the idea of an experimental city (*2*). As a result, the Experimental City Project in Minnesota came about. However, the need for experimental cities of this kind is a national need, and the Minnesota experiment must be considered only the prototype.

Urgent Need

Suppose we built an experimental city in every one of our 50 states. If each such city were populated by a quarter of a million people, we could care for only 12½ million people, barely the predicted increase of population in the United States in 3 years. Yet, according to our most optimistic estimates, just the building of an experimental city will take longer than 3 years, and if we merely keep up with the increase in population we will do nothing to alleviate the problems of overgrowth in our existing cities.

The problems of our large cities indicate an urgent need to move toward the dispersal concept immediately. If the need is urgent in the United States, it is even more urgent in the world as a whole, especially in those countries where the birthrate is much higher than ours.

Let us look ahead and suppose that the world population, if we do nothing about population control, reaches 15 billion by A.D. 2068. And let us assume that our technology permits us to build cities on any solid land, from Antarctica to the tropics, from desert to rain forest. The area of all the continents is about 2.3 billion acres. If we built cities of controlled size, dispersed throughout the world, there would be 60 thousand cities of a quarter of a million people each, and each such city would be surrounded by 40 thousand acres, or 64 square miles, of open land. The alternative of allowing the present big cities to grow unplanned, or to accelerate their growth through so-called urban renewal, would mean that vast tracts of the earth's surface would be uninhabited and the urban complexes would be intolerable.

(There is no magic in the figure of a quarter of a million. It may be that a city of half a million would better provide the choices that people want, or it may be that cities of different sizes would be needed. The important thing is that the size be controlled and that the cities be kept within a small area, with bounds, so that they would remain surrounded by open land.)

The advent of atomic power opens up the possibility of building verdant cities even in desert areas, if these areas are near the sea. An atomic plant which would generate a million kilowatts of electricity could distill half a billion gallons of freshwater from seawater and, from the residue, make enough fertilizer to grow the food to feed the entire

populations of ten cities the size of the proposed experimental city.

We must try these schemes and others that will emerge. The place to try them is in new experimental, dispersed cities, such as that envisioned in the Minnesota plan.

The Minnesota Experimental City

Early in planning the Minnesota Experimental City we set some guidelines. (i) The ultimate maximum population would be a quarter of a million. The community would be (ii) economically viable as a unit of the U.S. economy, (iii) truly experimental, (iv) at least 100 miles from any major existing urban center, and (v) a densely populated center surrounded by open land. This surrounding land, which would have an area perhaps 100 times that of the densely populated center, would be used for forests, outdoor museums, recreation, or agriculture, or just left as a rural area.

The idea would be to populate the experimental city in the shortest possible time by attracting people from the overcrowded urban complexes, in contrast to the past practice of letting the city slowly grow by drawing people from the immediately surrounding region. We must get away from what Fuller calls the "local focus" situation, wherein the city relates itself specifically to the needs, resources, and desires of people in its immediate vicinity.

Plans for building the Experimental City differ in many respects from plans for building other kinds of cities. Conventional cities grow above the ground, and as they grow, and as people demand transportation, power, water, gas, and sewers, the ground and rock underneath the city are tunneled for subways or the streets are dug up and the utility lines are buried. In the Experimental City the whole substructure will be planned and excavated, and the power lines and utility lines will be installed, before the city is built. Knowledge that the city is to be of a certain size will make this possible.

Costs of all city services will be part of the rental, occupancy charges—the "hotel bill"—for individuals, businesses, or industry in the city. Much of the equipment for servicing the city will be invisible and inaudible underground. Water and building materials can be stored there. Heating plants and cold-storage facilities can be located there. Underground pipelines can carry out solid wastes conventionally carried by trucks. Snow or rainwater from the streets can be channeled to underground reservoirs.

Pollution-producing vehicles can come in underground, and fume sewers can take the gases out to scrubbing and processing plants in the surrounding open-land area. Air-burning vehicles that connect the city with the rest of the nation can be parked underground. Police, ambulance, and emergency vehicles will all have underground throughways. By eliminating the need for some service vehicles, restricting those that are needed to the substructure, and providing a free above-the-ground transportation system (discussed below), we hope to eliminate all vehicles from ground-level streets.

A lawyer at one of our planning sessions asked whether the Experimental City might not eventually disintegrate and become merely a more modern, but no more effective, city complex. "If Chicago, Minneapolis, New York, and St. Paul are willing to allow smoke to billow from new factories," he said, "if they permit automobiles to crowd their streets, and if they do not restrict building construction from occurring in illogical patterns, why should we expect anything different in the Experimental City?"

The answer is simple. Industries, before they are selected or approved for participation in the Experimental City, must agree to abide by the city's building programs. They will be required to conform to certain waste-disposal methods. Presumably they will be willing to do so because they will benefit from the City's central waste-processing facilities, smoke sewers, and other underground disposal facilities.

Construction and Disassembly

All the buildings in the Experimental City will be constructed of the newest light-weight materials, and modular techniques of assembly will be used. Thus buildings can be easily erected and quickly disassembled as we learn what is needed, and as needs change.

The average useful life of a building has been estimated to be between 20 and 30 years. All buildings in the Experimental City will be designed with this in mind, and methods of construction that leave permanent outmoded monuments or later require the services of the wrecking crew will be abandoned. We will get away from the idea of building forever and, instead, will build for living, recognizing that people have continually changing desires.

With new building materials and freedom from obsolete codes and building practices, both public buildings and commercial structures can be made extremely flexible, with adjustable floors, curtain-walls, and ceiling heights. It may even be possible to use inflatable buildings, which can be instantly deflated. Housing units may be precast, even prefurnished, in the manner of Expo's Habitat, with units put together like building blocks and arranged and rearranged as desired. Practical application of this idea is no dream. Precast rooms were used months ago in building San Antonio's Hilton Hotel.

The disassembly of buildings will resemble the disassembly of an erector set. Reusable components of the building will be swallowed by the city's substructure. There will be no cluttering of streets with cranes and other moving equipment. An obsolete building will disappear like ice cream that melts and drains out through the truncated bottom of the cone. In building new structures, the process will be the reverse. Materials will be lifted from the substructure into the middle of the site, and adjacent activities will not be disturbed.

Certain parts of the Experimental City probably will be domed, so that the advantages and disadvantages of totally enclosed cities can be determined. It is our current view that not all of the city should be domed. Doming only a part of it will enable us to determine the extremes of climate under which total enclosure is economical and acceptable.

In the domed portion of the Experimental City, which may enclose a medical complex, we can undertake experiments on allergy control, and studies of acoustics, ventilation, and maintenance of a clean atmosphere.

A dome 2 miles in diameter, made of glass, would cost an estimated $80 million, but it would eliminate the need for snow removal and would make heating more efficient and less costly. Savings equivalent to the cost of its construction could be achieved in a 10-year period.

Waste Collection and Recycling

With a controlled city, savings can be realized, too, through new methods of waste collection and through use, reuse,

and recycling of wastes. It may not be possible to achieve complete recycling immediately, although the objective would always be borne in mind in our planning. Total recycling is the ultimate answer to the waste problem for a closed-system earth.

One step toward recycling is the collection of waste at the source, whether or not it is reused. Another is the redesign of many systems, so that there is less waste. For example, a sterile pneumatic system for delivering foods might reduce the vast quantities of wrapping paper and containers that are now needed.

The very things we do today in our cities to dispose of wastes constitute pollution. Garbage cans litter the sidewalks, garbage trucks clog the streets, dumps of solid wastes insult our nostrils and esthetic sensibilities. The burning of land fills in municipal dumps pollutes the air, and green slime grows on the sewage- and detergent-filled waters.

In the pollution-free Experimental City the utility tunnels would carry away the liquid and gaseous wastes, and many of the solid wastes, to the processing plants. New systems for moving wastes may be used—pneumatic, hydraulic conveyors or unitized trains. If we can reduce the bulk of solid wastes and package them suitably, deadheading trains and trucks can take them away from the city to the open-land area, where they can be processed and then stored or reused, perhaps to build ski slopes, arenas, or other recreation facilities. Wastes that are not immediately reused can be sorted and stored in "mountains," to be mined when reuse becomes economically desirable.

In water-rich areas, water can be used first for drinking and then reused at least twice, for cooling and then for purposes of recreation. But if the Experimental City is to show the way for cities in arid areas, complete recycling of part of the water should be attempted.

Transportation

One of the most pressing problems of our urban living is transportation and the use, care, parking, and garaging of the private automobile.

Doxiadis recognizes that it is a tragedy when our city buildings are primarily designed to accommodate cars, both stationary and moving, and to destroy the "human scale." Lewis Mumford recognizes that the private car no longer performs the role of "facilitating meeting and sociability" and that its "assumed right" is a "license to destroy a city."

How can we provide people with a transportation system that facilitates the desirable social relationships which constitute the joy of city living yet does not have undesirable side effects?

We must remember not to force people into what is technologically easy but to find a technological solution which is practical and closely meets their desires. What people basically like about the private automobile is the fact that it is a small pod and gives them a sense of privacy in a world where any kind of privacy is becoming a scarce luxury. They also like the automobile because it takes them from where they are to where they want to go without stopping where everybody else wants to stop. But when so many automobiles crowd the streets that we cannot move because of traffic jams, and when our average speed in a pollution-producing, many-hundred-horsepower vehicle is 8 miles an hour, it is time to look at the alternatives.

Now in the process of design are many systems that can move people in motorless, driverless, noiseless, semi-private pods, computer-controlled so that the passengers travel from where they are to where they want to go without stopping. If you want to go to the store you don't go to the station and then walk to the store; your pod is sidetracked right into the store. The various systems have a common denominator: they are driven by a propulsion system built into the track. The pods are inexpensive, thus many of them can be used at the same time. Moving sidewalks, moving platforms, and other wheelless systems are all technically feasible. One important concept that has emerged in our discussions is this: if we are to use mass transportation in the Experimental City it should be free, like elevator service. You don't pay a fare to ride vertically in an elevator. Why should you pay a fare to ride horizontally? The cost can be embodied in the service costs of the city.

Eliminating the automobile by means of a modern transport system of this kind does away with the need for freeways and traffic control, eliminates smog, saves lives, lessens stress, and saves valuable space. Making the transit system free saves the costs otherwise associated with ticket-selling and ticket-taking. Because free transportation would reduce or eliminate the sale of automobiles, the parking-lot business, and other businesses basic to the economy of older cities, it can be introduced readily only in a newly planned, centrally governed city such as the Experimental City.

Communications

Among the greatest innovations that can be tried in the Experimental City are the new technologies in communications that have been developed but not yet put to practical use.

The current view is that radio frequencies should be reserved for purposes, such as communication to or from a vehicle in motion, where wires are not feasible. The substructure of the Experimental City would be wired, and coaxial cable would reach to every point where, conventionally, there would be a telephone. These wires and cables can be planned and located in the substructure even before we have a clear-cut idea of what terminals, picture-phones, computers, facsimile machines, and the like may ultimately be needed. (Because broad-band communications open up so many uses, the magnitude of the prospective network may be much greater than that required for ordinary telephone service. Consequently, special attention will have to be given to connection with the normal communication channels outside the Experimental City.)

Such a communication system can provide access from any point to large highspeed digital computers, for purposes of city management (on the basis of real information), crime prevention through the use of video monitors, and maintenance of up-to-the-minute data banks for the social experiment that the city constitutes. The same lines, in conjunction with smaller computers and other video terminals, can provide a means of decentralizing schools and hospitals and of bringing together electronically the now separated functions of shopping, charging, banking, credit, and business. Video terminals can even provide "tele-babysitting." The advanced system will provide an ideal laboratory for determining how to insure privacy of computer use yet insure that computers are used to the maximum benefit of society.

In the Experimental City we will

have a large pilot plant in which to develop a modern library along the lines suggested by M.I.T.'s Project Intrex. The medical extensions of the advanced system may make it possible to set up a series of care centers providing different degrees of medical care, and thus to make available appropriate care at minimum cost. The various care centers would be in touch with each other through a communications system insuring instant access to specialists in case of emergency.

Populating the City

How will the Experimental City be populated? Politicians say you can't move people. Many sociologists who are more interested in studying what is happening and predicting doom than in taking the steps necessary to avert it, agree. But the fact is that, with our existing legal and governmental structure, we do move people. We push people around everywhere, always with the excuse that it is for their own good. We move them in wars; we displace them when we build highways; and we move them when we clear slums and build much larger buildings than were there before. We move them, but often in the wrong direction, into the already overgrown cities.

Urban renewal in its worst manifestations is the construction of the slums of the future. Many people in the present overgrown cities might like to move out into new complexes which provided the advantages of city life without the physical and social distress. Many others whom the authorities say they cannot move have never contemplated moving because they have been trapped, lacking the opportunity to go anywhere else. The fact is that most of those who can afford to do so have already fled the cities, to suburbs that will become the slums of tomorrow.

We must build a city for today's city-dwellers and suburb-dwellers to go to. We must provide people with a different choice, not just that between life in a dirty overgrown city with suburbs or a completely rural existence. We can provide a middle choice—clean cities of controlled size, with plenty of space and an exciting new environment.

Population balance for the Experimental City will be achieved through careful selection of the type of industry that will be invited to participate and of the commercial operations that will be established.

Management and Cost

Now for two most important decisions: (i) Who will manage the Experimental City? (ii) How much will it cost?

The management of a typical city involves thousands of individuals. Many students of political science and law feel that this spreading of authority is basic to the democratic government of the city. There is, however, reason to believe that, with the changes in size of our cities and their merging together in huge complexes, this arrangement is no longer workable. For example, if one jurisdiction allows pollution, it will affect its neighbor. To resolve this conflict it has been necessary to establish federal standards and controls.

It would seem that the idea of running a city as a public utility by a quasi-public, quasi-private corporation should be tried. Present-day hotel complexes, with their associated shops, restaurants, transportation facilities, and so on, are growing larger and larger. Many of them are run very well. It is not much of a jump to think of experimental cities of controlled size as huge hotels. It seems to me that management of the city-hotel-corporation type should be tried.

Daniel Moynihan, director of the Harvard-M.I.T. Joint Center for Urban Studies, says realistically that the government cannot do everything well, and that many public services are best contracted to private enterprises. In the Experimental City, contracts for many such services would be let on a performance basis.

The federal government, too, is beginning to move in this direction. Agencies have let contracts to private enterprise for carrying out social work programs. Why not go the whole way and have responsible corporations provide all the services needed in the Experimental City?

As to the cost of building facilities for an Experimental City of a quarter of a million inhabitants, some simple arithmetic provides a reasonable estimate.

If we take 2.5 people as an average family unit, we will need 100,000 units. Taking $20,000 as the average cost per unit, we arrive at a figure of $2 billion. But because this city will be planned from scratch and have a large substructure housing all the equipment for city services, and because it will be experimental, we should probably double this figure. So we arrive at a guess of $4 billion.

It is important to stress that these costs are not an additional burden on the national economy. New housing and new factories and businesses will be built in any case, somewhere. We will merely concentrate the activity by attracting them to the Experimental City. The city must be built as any city is built. The plan must prove attractive to the industries that will come to the city to build new plants. If they are attracted to the Experimental City, they will bear part of the costs of construction and operation.

But it is realistic to recognize that a large sum of money is needed for planning and building the services substructure, which will utilize new technologies involving costly experimentation and research. Part of the construction costs could legitimately be funded by an FHA mortgage. Part of the costs of experimentation and research would be met by the private sector. Imaginative American industry needs a place, a city laboratory, in which to try out new technologies of waste management, communication, transportation, and construction. Industries are at present investing large sums in elements of these areas. Our plan for the Experimental City must show that it is the best place to do this research and to try out new developments.

At present, new systems for urban development must be tried piecemeal—a new transportation system here, a sewage system there, a communications system elsewhere. But a city is a complex system, and everything one does has an impact on other parts of the system. If we clean up the noise, take the waste heat out of the city, and control the filth of factories at the source, there will be no need for zoning. Factories, schools, and homes will all be in one complex. This will reduce the need for transportation. Reduced transportation further reduces pollution, and the combination of these technological improvements will have a profound influence on the city systems for health care, education, police surveillance, and other services.

I would expect that the Experimental City will be of interest as a laboratory to those of our industries that are getting heavily into the urban problem.

Other Approaches

Other approaches to the problems of today's cities are being tried. The government's Model City program, an

urban renewal program administered by the Department of Housing and Urban Development, is an attempt to alleviate the overwhelming problems of the overgrown cities. The objective is a most important one, but, in general, the means used are the tearing out of slums and their replacement with new construction. The government is becoming the new slum landlord.

Worthwhile experiments in the building of new cities are being made by private enterprise. Examples are Columbia, Maryland; Disneyworld's experimental prototype city in Florida; and Westinghouse's community proving ground in Florida. More than 200 "new cities" are either in the design stage or are under construction in the United States.

Some of the new towns are being built exclusively for the "senior citizen." In this country we are working hard at the problem of integrating people of different races, yet we segregate people of different ages. We must integrate people of all ages, income levels, and interests, to achieve the total mixture which makes up the stimulating society of a city.

These government-financed and privately financed "new cities" are similar to the Minnesota Experimental City in one respect: they are built from scratch. On the other hand they are, in the best meaning of the term, real estate developments, and consequently they tend to be satellites of existing urban complexes—communities where people live and from which they commute to work. That this is the case may be seen from the fact that almost all of the "new cities" are growing along the coastlines — East, West, and Gulf — where the overgrown cities already are. Generally their size is not controlled, and one can anticipate that even the best of them, such as Reston (Virginia) and Columbia, will be swallowed up as the nearby urban complexes—in this case Washington and Baltimore—expand. Because they do not have sufficient reserved open land around them, even the best of the "new cities" will become engulfed; moreover, since they are close to existing huge cities, they cannot develop with enough independence to try novel technologies.

Conclusion

It is obvious to me that we must use all of our land for living, not just tiny fractions of it. To do this we must look at solutions that envisage urban dispersal, and if we are to disperse into new planned cities, a national experimental cities program is an urgent must.

References and Notes

1. "Waste Management and Control: A Report to the Federal Council for Science and Technology," *Nat. Acad. Sci.–Nat. Res. Council Pub. 1400* (1966), p. 26; *Science* **152**, 329 (1966).

2. I am most grateful for the support that I found in Minnesota, particularly from Mr. Otto Silha, who worked on organizing and financing the Experimental City from the outset.

NEWS AND COMMENT

NIH: Heightened Concern about Choosing Shannon's Successor

Anxiety over the appointment of a new director at NIH has mounted sharply in the wake of the White House announcement on 25 January that John W. Gardner was resigning as Secretary of Health, Education and Welfare (HEW). Leaders of the National Institutes of Health have confidence in Gardner's ability to exert a constructive influence on the choice of a successor to James A. Shannon who retires on 1 September. They fear for the future of NIH if the new director is not appointed before Gardner leaves office in 2 weeks.

Gardner makes it perfectly clear that he is very interested in the choice of a successor to Shannon. In an interview with *Science* on 6 February, he emphasized his feeling that "NIH is a distinguished research organization; it is just essential that this distinction be kept." Gardner adds that "It is immensely difficult to mount a distinguished research organization from a government base. . . . There have been few successful examples in the past 25 years and a very large number of failures."

But what Gardner does not feel he can do at this time is to give assurance that a new NIH director will be selected before he leaves HEW. After all, Gardner does not have the final say in this matter; this power lies at the White House. At this moment, the President is understandably preoccupied with an ever-expanding military conflict in Asia. Also, it is believed that the President's annual health message and the long-delayed unveiling of the reorganization of health services in HEW will be announced before a new NIH director will receive official appointment.

Last summer, Gardner convened an informal advisory committee to advise him on the future of NIH. (Committees are often assembled in government by officials who want to insure that their own values are not ignored in the formulation of major decisions.) After asking the group to discuss the mission of the organization, he also asked them to comment on each individual who was being seriously considered as the new director. Members of the distinguished committee, many of whom are oriented toward basic research, include the presidents of the National Academy of Sciences, the Carnegie Institution of Washington, the University of Chicago, Yale, the provost of M.I.T., and the deans of the medical schools at Stanford and Duke Universities. Clearly, the hope in HEW is that prospective candidates for the directorship of NIH will be cleared through this committee, even when Gardner is no longer around to submit names to the group.*

*The members of the HEW Secretary's advisory group on NIH are: W. G. Anlyan, Dean, School of Medicine, Duke University; George Beadle, President, University of Chicago; Kingman Brewster, Jr., President, Yale University; Robert J. Glaser, Dean, School of Medicine, Stanford University; Sidney Farber, Director of Research at The Children's Cancer Research Foundation in Boston; Caryl P. Haskins, President, Carnegie Institution of Washington; Charles A. Le Maistre, Vice-Chancellor for Health Affairs, The University of Texas; Walsh McDermott, Cornell University Medical College; Don K. Price, Dean of the John F. Kennedy School of Government at Harvard University; Henry W. Riecken, Vice-President, Social Science Research Council; Frederick Seitz, President, National Academy of Sciences; Donald W. Seldin, Southwestern Medical School at Dallas; Wendell Stanley, Director, Virus Laboratory, University of California at Berkeley; Cornelius H. Traeger, New York City; Jerome B. Wiesner, Provost, Massachusetts Institute of Technology.