HOUSING AND THE HUMAN HABITAT: AN EXAMINATION OF THE UNIVERSITIES' ROLE POTENTIAL

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ABSTRACT

HOUSING AND THE HUMAN HABITAT: AN EXAMINATION OF THE UNIVERSITIES' ROLE POTENTIAL

By

Otto Frederick Krauss

Housing is a complex human need. It comprises much more than the often simple artifact commonly thought of. It is the environment, the human habitat, an important element of human ecology. Over time man has created institutions to satisfy his needs, in this instance to supply housing and also overcome housing problems which have existed through the ages, and which became intensified with industrialization, urbanization, population growth, migration and rising living standards.

In modern society housing is viewed more as a right than a privilege. In support of this principle ever more massive legislation has been enacted, in particular to provide fiscal and monetary means. The basic policy was expressed in the 1949 Housing Act: ". . . a decent home and a suitable living environment for every American family," and it has since been expanded upon. Programs

instituted to implement such a policy have fallen far short of targets pointing to inadequacies in the institutional arrangements. Causes of failure appear, among others, as resource deficiencies including knowledge, information and skills. This can in part be attributed to lack of incentives and neglect by the institutions which exist for the purpose of researching, developing, organizing and disseminating knowledge and to teach necessary skills. Enormous resources go into many kinds of research, but not into housing, the human habitat and human ecology. Problem areas range far and wide. They may be related to the humanities, technology, economics, law, health, education, politics or simply understanding the problems and comprehending what the human needs and desires really are. being so, begs the logical question: what about the centers of knowledge, the colleges and universities? Yet, these institutions have had only a negligible role. has fallen to the dominant interest groups which have traditionally controlled and operated the system of landownership and development, brokerage, construction, finance, property management and such institutions.

The wide-latitude and multi-disciplinary nature of the subject is not ready-made for universities organized around single disciplines. Multi-university approaches, indicated for many aspects of the problem, have been found cumbersome due to the structure and philosophies of these

institutions. That they can change, adapt and accommodate national needs is written in history.

No significant amount of research in housing has been or is being done by the universities. Related course content is substantial but scattered and is in need of coordination, packaging, expansion and of a mechanism which can be instrumental in the establishment of a meaningful program. The concept "human ecology" looks like a logical framework and should be used to integrate all of the related disciplines. The systems approach and the systems management concept are recommended as a most likely productive method. The faculties and administration interviewed expressed the opinion that the universities should be concerned with the subject because of the known effects on human development, health and well-being. The students appear to rate housing relatively high among national problems and express interest in the pursuit of study and careers in this field, but more inquiry is needed to support conclusions.

The future professionals in the housing field are seen emerging from an undergraduate curriculum which has provided them with a full range of liberal to professional education opportunities. He or she may be a generalist or specialist or both, depending on the program chosen, a program which would have included clinical experience.

Graduate study is for the scholar who will by his part aim

at developing the housing field into a viable discipline embracing all of the disciplines which play a role. Seen emerging from these graduate programs are professional specialists with a broad general liberal background, researchers, practitioners, leaders and teachers.

Agencies in the field strongly encourage the universities to get on with the task. Indications are that funding for research, graduate student support and other efforts can be obtained. Professional opportunities do in fact exist, but the field being in its infancy currently has aspects of unfamiliarity. Larger corporate enterprise has recently entered the sector creating demand for management-technical skills. Attending to the human needs as a primary goal is very important and new.

The national need unquestionably exists under a favorable public policy climate. Long overdue is a major thrust on the part of the universities accepting responsibility for developing a body of knowledge, teaching and supplying solid information to users and decisionmakers concerned with the macro-environment, human habitat and the micro-environment, which we call housing. Policy changes and careful, more detailed exploration, planning and program development are recommended.

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Ву

Otto Frederick Krauss

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ACKNOWLEDGMENT

This thesis is the outcome of a challenge originally posed by Dr. Robert R. Rice, Chairman of the Department of Human Environment and Design, and Professor Gertrude Nygren of the same department. The question was, how can the university take a greater part in solving housing problems through education and other university efforts. The author, while not wholly unfamiliar with the subject, was reimpressed by how complex the field really is and, as a consequence, how difficult it is for the university, as presently structured, to deal with the subject in a meaningful and productive way. Yet, this very situation provided an opportunity to learn a great deal.

Nearly one hundred people, deans, department chairmen, faculty, Extension personnel, plus a number of persons outside of the University interested or influential in housing affairs gave generously of their time and ideas.

It is not practical to mention all of the names here. Some persons, where it is appropriate, are identified through the references. A complete listing of university people who did contribute to the study is given in Appendices I and II. This thesis is in a large measure a reflection of the

thoughts and ideas expressed by them. For example, the original concept "housing" was enlarged into "human habitat" upon the suggestion of a substantial number of interviewees. This widened the scope of the project to a great degree.

Few will argue that the study of the human habitat is a worthwhile endeavor. But only the individuals, who make up society, can judge whether any effort to improve the environment has succeeded. On these grounds it is well to omit any presentations of bouquets. Many have contributed and helped, especially Jenny, the better half, through her good humor and infinite patience.

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LIST OF ABBREVIATIONS

AEC Atomic Energy Commission

AID Agency for International Development

AOMA Apartment Owners and Management Association of

America

BOCA Building Officials Conferences of America

CIT Civilian Industrial Technology Program

DOD U.S. Department of Defense

FFRDC Federally Funded Research and Development Centers

FHA Federal Housing Administration

FNMA Federal National Mortgage Association

GNP Gross National Product

GSA General Services Administration

HEW U.S. Department of Health, Education and Welfare

HHFA Housing and Home Finance Agency

HUD U.S. Department of Housing and Urban Development

MIT Massachusetts Institute of Technology

MSHDA Michigan State Housing Development Authority

MSU Michigan State University

NAHB National Association of Home Builders

NAHRO National Association of Housing and Redevelopment Officials

OTITCIAIS

NASA National Aeronautics and Space Administration

NIH National Institutes of Health

NSF National Science Foundation

OEO Office of Economic Opportunity

OST Office of Science and Technology

PO U.S. Post Office Department

PWA Public Works Administration

RA Resettlement Administration

R & D Research and Development

RFC Reconstruction Finance Corporation

TVA Tennessee Valley Authority

USDA U.S. Department of Agriculture

USDC U.S. Department of Commerce

USDI U.S. Department of the Interior

USDL U.S. Department of Labor

USDT U.S. Department of Transportation

VA Veterans Administration

WPA Works Progress Administration

WWI World War I

WWII World War II

INTRODUCTION AND DEFINITION OF HOUSING

Population growth and migration, the impact of technology, the decline of the central cities, aging of the housing stock, all combined with massive social change, have produced housing problems of large proportions. Associated phenomena have been only marginally understood, which is one of the major reasons why really satisfactory solutions have been so elusive. Society is in need of more and better housing. Man, over time, has created institutions to attend to these needs. But, as can be seen in the first few chapters of this thesis, the performance of these institutions cannot be given a high mark. How the colleges and universities might contribute to improvement in the performance of these institutions, and so better serve human needs in housing, constitutes the core of this inquiry.

The nature of the colleges and universities precludes direct participation in most of the decision-making processes which concern housing. However, they are in a position to acquire and also to disseminate knowledge and information for use by the people as individuals or groups through their institutions as they formulate policies and make decisions.

Because of the scope of the subject it was found impractical to resort to the customary routines for a master's thesis. This is not, therefore, a highly structured study with findings sufficiently conclusive to direct a full action program by a university. The subject as defined in this introduction is simply too large to deal with within the limits of a thesis. Several approaches were considered before it was decided that a broad, exploratory investigation appeared as the best method to illuminate housing issues relevant to the university and its clientgroups. The logical sources of information were thought to be university faculty and administrative personnel, students, officials in public administration, housing industry managers, professional organizations, government reports, newspapers and periodicals and the relevant published literature. These sources were drawn upon freely in order to bring together as much information as might be useful for the stated purposes of this thesis. While the information so collected ranges far and wide, it should be pointed out that conclusions lean more heavily on interviews with people who have concern or interest in housing, predominantly university people. Admittedly, the approach chosen does not follow a strict scientific research methodology, yet the report should be valid considering the limitations of a thesis. Hopefully, others will find this work helpful in determining the type of data required as a

basis for more comprehensive recommendations. For practical reasons this work is confined largely to Michigan State University and the State of Michigan.

The answer to the question, what should be the role of the university in housing, is, at the same time, simple and exceedingly complicated. The simple role is the traditional one of the Land-Grant University: research, education and public service. Unfortunately, housing problems as they exist in the real world are very complex and therefore have defied the simple role approach. Housing is shaped and produced by many institutions, most often long before the individual consumer enters the process. Housing values lie deep in the fabric of society and are bound by culture and other forces. The purpose of this thesis is to describe major factors affecting the current housing situation and to suggest a direction for further exploration in defining the role of the universities.

Housing, as it will be referred to, is the HUMAN HABITAT. This meaning extends far beyond thinking of housing as a physical artifact or a "container which packages people." HUMAN refers to individuals, families, social units and organizations, their experiences, sensitivities, values, aspirations and dreams. HABITAT means all of the physical, natural and man-made environment used by the people in the context of a cultural, institutional, ecological and biological framework, which may be political,

social, economic, technological and esthetic in nature.

HUMAN HABITAT is conceived of as a system comprising all of these elements. We can also call this the "human ecological system." The definition is obviously much broader than simply identifying housing as one of the three basic human needs: food, clothing and shelter. It is the human environment.

If housing were a strictly technological issue, there would be no point in writing this thesis. The colleges and universities, in fact, all of the institutions involved, have worked and over the years have developed certain housing technologies into strong disciplines. For this reason there is little to be gained by giving much time and space to this particular area. However, housing as defined, is not the exclusive province of technology. Recognizing that housing problems arise out of human needs and considering housing as an environment brings into play many aspects which must be dealt with if housing is ever to be substantially improved. A number of the problems and their relationships to professional and scientific disciplines, as well as to education and research, will be touched upon in this thesis. We are confronted with a complex system, which we have not yet learned how to manage. We can identify the system. How to improve the function of the system, that is, how to improve man's living habitat through a role of leadership assumed by the universities,

is an overriding challenge, a challenge not only for the universities, but for all of society.

CHAPTER I

HOUSING PROBLEMS AND FEDERAL INTERVENTION

Housing problems have existed since time immemorial. The pilgrims, when they first settled on these shores, encountered them. In the mid- and latter 19th century, that is, during the high tides of immigration, housing conditions in the eastern cities were described as horrible. These conditions fostered an awakening of a social conscience which brought pressures for reform and regulation. At the turn of the 20th century one could see signs of slow improvement. Dislocations caused by WWI and the Great Depression created additional housing problems so severe that during the early 1930's the Federal Government intervened for the first time by creating new institutions to ameliorate the plight of many people. These institutions provided for monetary and fiscal mechanisms and later during the 1930's, other newly created institutions

Catherine Bauer, Modern Housing (Boston: Houghton Mifflin Co., 1934), pp. 7, 20, ". . . the real problems of urban congestion were brought forth by the Industrial Revolution in the 19th Century. . . . during the 19th Century human environment was debased to about its lowest level."

provided for the beginning of a federally sponsored public housing program.

WWII made its own demands (as had been the case during WWI) on the Federal Government to take a hand in providing housing for war-workers as they migrated to the areas where military efforts and war production were concentrated. A return to peacetime conditions, high rates of family formation, rapid population growth, rising living standards, put new strains on the institutional arrangements which society had created to supply shelter. And so came the landmark Housing Act of 1949, when the Congress of the United States declared:

"... Realization as soon as feasible . . . of a decent home and a suitable living environment for every American family." Housing now had become a social, if not a political institution in addition to being an artifact, or simply shelter.

There was a limited body of knowledge, too meager to tell anyone how to achieve the goal legislated by Congress. It is not surprising then that the ensuing trial and error methods employed brought many disappointments at great cost, cost not only in money resources but also in human and social failures. One need name only Public Housing where the program produced only a fraction of the target number of units projected by Congress. This was fortunate in that many of the housing projects

turned out to be fiascos in an economic, human and social sense.²

Rising standards of living and commensurate upward scaling of expectancies further increased pressures for more adequate housing through more intervention by the Federal Government. Obviously this came about because other institutions had failed in this mission. And Government did try to respond generously with frequent revisions and amendments to the various housing acts enacted since 1937. The 1960's were a period of active experimentation and more legislation (Housing Acts of 1961, 1964, 1965, 1966) culminating in the Housing Act of 1968, which President Johnson called "the most farsighted, the most comprehensive, the most massive housing program in all American history." In this Act, referring back to the 1949 Act and the goal of "a decent home . . . ," one can read:

Congress finds that this goal has not been fully realized for many of the nation's lower income families; that this is a matter of grave national concern; that there exist in the public and private sector of the

²For an illustration see Detroit Free Press Editorial Section describing current conditions in Public Housing in Detroit. <u>Detroit Free Press</u>, March 28, 1971.

Remarks of the President at the signing of the Housing and Urban Development Act of 1968, as reported in the Membership Newsletter of National Housing Conference, Washington, D.C.: U.S. Government Printing Office, August, 1968.

Economy the resources and capabilities necessary to the full realization of this goal.⁴

For the first time Congress laid down quantitative housing goals, 26 million additional housing units by 1978, which could be used in measuring later performance.

It was the dissatisfaction with the performance of public and private housing programs which led to this legislation. HUD Secretary Romney's "Operation Breakthrough," authorized by the new legislation, may be viewed as a desperation move on the part of the Federal Government because the established institutions, left to their own devices, had failed in their mission. After all, the financial mechanisms to support housing production had been amply provided for by the Government. But things are no longer that simple. Whether the singly applied remedies will do the job remains to be seen. There are doubts. Yet, housing has come to mean much more than shelter, a place to live. It reaches into neighborhood and community as a living environment for human beings.

With these broadened considerations and pushed by a different administration, Congress last year produced the 1970 Housing and Urban Development Act which went still farther than the 1968 Act, and its abbreviated successor, the 1969 Act. The 1970 Act introduced new concepts for

Public Law 90-448, Housing and Urban Development Act of 1968, 90th Congress, 2nd Session, August 1, 1968.

dealing with the problem. This legislation will be dealt with later on in this thesis as it gives implied direction to the orientation and role of the university. Reading through all of the legislation mentioned is viewing the history of extensive social change and how we, as a society, view housing on a national scale. Yet, it seems that to close the gap between promise and fulfillment, more knowledge, more information, improved management, skills and administrative procedures are needed, as well as new philosophical perspectives. To better understand this, and to prepare for looking at possibilities for improving or modifying what is, one has to look at events which led up to the 1968, 1969 and 1970 Acts in more detail.

CHAPTER II

A CLOSER LOOK AT THE NINETEEN SIXTIES: THE POLITICAL FRAMEWORK FOR ACTION

After three decades of Government intervention and involvement in housing, from the 1930's to about 1960, new forces were emerging. These were to exert great influence on the shaping of public policy. Dissatisfaction with what had been accomplished was one of many manifestations. Growing social unrest was another. Government policy had encouraged, if not subsidized, the growth of middle-class suburbia to the detriment of the cities. Forced dislocation of families which were in the way of government projects had become a social and economic tragedy. gation, partly as an outcome of these programs, was increasing. Urban problems had become more visible and severe, while those affected became more vocal. Urban renewal, that is physical renewal, became looked upon with suspicion. Those who were supposed to have been helped often were worse off as a result of renewal. A new social concern for the welfare of all people, particularly the underprivileged, was emerging and housing had become central to these issues.

The outcome was that housing policies during the 1960's became a mirror of American values in conflict.

Very evident was the political process of bargaining, followed by accommodation and the pursuit of inconsistent ends, of bureaucratic units planning their interests above those of presidents and the nation as a whole. Some of these conflicts are described by the Committee of Economic Development in Toward a New Housing Policy:

- --Housing as the most visible confrontation between civil rights and property rights. "A man's home is his castle" is a deeply held belief in America. Running counter to this is the principle that everyone should have a fair chance at good jobs, schools and homes.
- --Urban Renewal was intended to "save our cities."

 From what? And for whom? It was during the sixties that resistance mounted to the displacement of poor families and disproportionate numbers of negro households to make space for commercial developments and apartments to be occupied by upper-income, and predominantly white families.
- --Public housing officials argued for the expansion of their program, convinced that segregation by income and race was not too high a price to pay for "better" shelter for the poor.
- --If suburbanites wanted to insulate themselves socially and fiscally from the inner city, that was not the business of the Federal Housing Administration. Theirs was a mortgage operation, self-supporting in its own right. Why change social custom?⁵

These were some of the inherited idiologies and programs of the housing policy makers under Presidents Kennedy and Johnson, who added their own ideas, responded to the

⁵Extracted from Morton J. Schussheim, <u>Toward a New Housing Policy</u>, the Legacies of the Sixties, <u>CED Supplementary Paper No. 29</u> (New York: Committee of Economic Development, 1969), pp. 2, 3.

political pressures, shaped policies and hoped to build a better record, and so came new directions. These were normally guided by available demographic and economic data, but more often by emotional, moral and ethical considerations.

The United States Department of Housing and Urban Development (HUD) was created through an Act of Congress after a number of tries and began its mission in 1966. Its predecessor had been HHFA, the Housing and Home Finance Agency, whose Administrator, Robert C. Weaver, became the first black man to hold cabinet office as Secretary of the new department. Housing and urban development had so been given a top ranking in national affairs, which was a mighty step forward.

For our purposes in this thesis one should go back about 100 years when the United States Department of Agriculture (USDA) came into being. Hand in hand with the event came the enactment of the Morrill Act, creating the Land-Grant Colleges. This marked the beginning of a new era when academic institutions became involved in serving national needs as a public service function. History has recorded the successes as well as some failures. In historic perspective it can be loudly said that these institutions have adapted to change as dictated by the times. 6

For an excellent history see Edward D. Eddy, Jr., Colleges for our Land and Time, the Land-Grant Idea in American Education (New York: Harper & Brothers, 1956).

One has to wonder why a similar beneficial relationship between the HUD concept and the universities was overlooked. And so perhaps was the giving of cabinet status to HUD only a lesser step forward.

Picking up the earlier thread, knowledge and experience useful for intelligently dealing with the housing issues was very limited. Research concerned with housing problems had long been neglected. To illustrate, federal expenditures for Research and Development (R & D) in 1966 were 15.3 billion dollars of which HUD spent about 323,000 dollars, obviously a tiny fraction of the entire research effort. This will be discussed in more detail in Chapter III.

Unrest, riots and general dissatisfaction spawned a situation so critical that President Johnson, among other efforts, ordered two major thrusts to develop information and goals for use as a basis for future legislative action. One such action created is what became known as the Douglas Commission. Its purpose was to study building codes, zoning, local and federal tax policies and development standards, to provide knowledge useful in dealing with slums, urban growth, sprawl and blight, and to insure decent and durable housing. The Commission went into operation early

⁷Statistical Abstract of the U.S., 1970 (Washington, D.C.: U.S. Government Printing Office, 1970), p. 520.
U.S. Budget for 1968 (Washington, D.C.: U.S. Government Printing Office, 1968), p. 276.

in 1967, did a most comprehensive job, resulting in a monumental document supported by nineteen substantial research reports. Forty separate research projects were undertaken.

The other major work was that of the Kaiser Committee commissioned to look into the question: How can private enterprise build housing for the urban poor, and how can the nation build and rebuild the city slums? The Kaiser Committee employed a large number of consultants and more than a dozen subcontractors in the performance of its task. It produced a number of recommendations underlining the complexities and highlighting the many unknowns. Both efforts played a major role in the writing of the 1968 Housing Act already mentioned. The numerical goals incorporated in the Act came out of the Kaiser Report.

It is interesting to note that in the same year a third and similarly monumental work, The People Left Behind,

A Report on Rural Poverty, was presented to Congress. It included sixteen major research papers and extensively

House Document No. 91-34, <u>Building the American</u>
City, Report of the National Commission on Urban Problems
headed by Senator Paul H. Douglas to the Congress and to
the President of the United States (Washington, D.C.: U.S.
Government Printing Office, 1968).

The President's Committee on Urban Housing, headed by Edgar F. Kaiser, A Decent Home (Washington, D.C.: U.S. Government Printing Office, 1968).

referred to housing problems in rural areas. 10 The Douglas and Kaiser Reports primarily dealt with the housing problem of the cities, while the Rural Poverty Report examined the two major social upheavals, the aftermath of agricultural industrialization and the results of helter-skelter outmigration to the cities.

There was yet a fourth major document: <u>Urban and Rural America</u>: <u>Policies for Future Growth</u>, ¹¹ which dealt with growth in the metropolitan areas, migration, Negro population, rural population, metropolitan disparities, population projections and economic growth. These elements were examined by local, state and regional areas while making assessments of potential consequences.

The 1970 Housing Act makes an attempt, among other provisions, to further improve the supply of housing through various incentives. It should be noted that in the fiscal year ending June 30, 1970, the government supplied enough funds to cover 58 per cent of the mortgage loans made in that year, an alltime high. 12 The 1970 Act

The People Left Behind, Rural Poverty in the United States, Report by the President's National Advisory Commission on Rural Poverty (Washington, D.C.: U.S. Government Printing Office, 1968).

Policies for Future Growth, Advisory Commission on Intergovernmental Relations (Washington, D.C.: U.S. Government Printing Office, 1968).

¹² Wall Street Journal, Feb. 12, 1971, pp. 1, 2.

dealt with many more aspects of housing than did any of its predecessors. Title VII of the Act should receive particular note as an innovation. The concept embodied in this Title ties housing into urban growth and community development.

Here is a rundown of the various titles contained in the 1970 Act:

- Title I. Mortgage Credit
 - II. Urban Renewal and Housing Assistance Programs
 - III. Model Cities and Metropolitan Development Programs
 - IV. Open-Space Land
 - V. Research and Technology
 - VI. Crime Insurance
 - VII. Urban Growth and New Community Development Act of 1970
 - A. Development of National Growth Policy
 - B. Development of New Communities including a Community Development Corporation
 - C. Development and National Urban Growth Patterns
 - D. Development of Inner City Areas

VIII. Farm Housing

IX. Liability of FNMA, Advice and Assistance with Respect to Housing for Low and Moderate Income Families, Administrative Powers of Secretary, Savings and Loan Associations, etc.

It was also during the 1960's that several states provided for institutional mechanisms to increase the supply of low and moderate income housing. Michigan Act No. 346 of 1966 creating the Michigan State Housing

Development Authority (MSHDA) is one example. At least twelve other states are now active, some more, some less. The state of New York is now involved on a large scale. 13

The local housing authorities and commissions must also be mentioned. Organized during and since the 1930's their primary function has generally been limited by law to administer public or special housing projects. During the 1960's, as a result of increasing demand and enabling legislation, these authorities and commissions became numerous, many of them big operations with large staffs and a wide range of responsibilities.

The above illustrates further how far we have come in government intervention in housing. The 1970-1971 United States Budget refers to the housing activities under the label: COMMUNITY DEVELOPMENT AND HOUSING. Proposed budget allocation amounts to 1.8 per cent of the total United States Budget. In 1961 it was .2 per cent. 14 Whether the capabilities and skills exist to deal with the problem on this expanded scale is another question, a question related to the subject of this thesis.

¹³ State Sources of Financing for Housing, from a paper delivered by Tom Forester Lord, Housing Program Director, Institute for Urban Studies, University of Houston at the Convention of the National Association of Homebuilders, Houston, Texas, Jan. 17, 1971.

Executive Office of the President, Office of Management and Budgets, The U.S. Budget in Brief, Fiscal Year 1972 (Washington, D.C.: U.S. Government Printing Office, 1971), p. 43.

The business community and especially non-profit organizations have also become more actively interested in housing during the 1960's. Non-profit sponsors of low and moderate income housing projects began to proliferate.

These were made up of church groups, labor unions and other voluntary organizations. They were often ill-equipped to plan, organize and particularly to manage the projects they were sponsoring. Consequently, they had to engage personnel or service agencies to perform these functions. However, such demands could not be readily met, because past education and training in this field had been a void. To overcome the problem, quickie-type training programs were organized by several interested organizations to at least provide for a minimum of the required skills.

Emphasis has been placed on the federal role in housing. This is not to say that the local scene can be passed over. In fact, it can be said, that government efforts to accommodate needs at the local level are of equal, if not greater importance, and perhaps they are even more difficult to achieve. Here is where we come face to face with ordinances, codes, regulations and the informally organized practices and conventions. In some cases state enabling acts are also a problem. While there has been some progress during the 1960's in improving the various restrictions and limitations on housing subject to local control, much more needs to be done. More knowledge and

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information along with greater degree of employed professionalism would help. For example, it is now generally conceded that performance codes would be far superior to the conventional specification codes governing construction. Unfortunately, institution of and the administration of performance codes requires skills of the kind which can only come out of higher education programs.

Policy makers during the 1960's began to face up to the realities of the functions and needs of central cities, the interdependence of developmental activities in metropolitan areas and the imperfection in the urban land market. At the same time, there was a recognition of the need to modernize the governmental machinery at all levels. 15

An attempt has been made in the foregoing questions, observations, statements and references to describe the political environment in which the university must find and define its proper role. Four decades of federal legislation have spelled out national housing policy through numerous housing acts and programs. Coupled with corresponding programs at state and local government levels we are now confronted with scale and complexity of large dimensions.

Frequency of revisions in these programs confound the problem. The programs require continuous and expert evaluation

¹⁵ Schussheim, op. cit., pp. 1, 2.

and interpretation of the information. Such information should be efficiently useful to public officials, non-profit or limited-profit sponsors, private developers, professional housing managers. It should also be readily available to students in urban affairs and housing, and finally, to concerned citizens, the housing consumers.

Success in federal and other housing programs will depend largely on the human resources engaged in the development of these programs and their effective implementation. In depth understanding of the problems is a prerequisite. These capabilities do not grow on trees. Much more thought and attention has to be given to the role of education in the development of these human resources.

While national policy has generally accorded strong support to education, specific allocation of resources to the study of housing, as broadly defined, is difficult to find.

CHAPTER III

THE SEARCH FOR MORE KNOWLEDGE

Some Historical Background

For most of us it is difficult to believe that there should exist a dearth of knowledge and information on the subject of housing. Such a response is conditioned by a situation where we all are "experts," expertise derived from direct experience and other often very non-academic sources. This comes about because housing touches everyone continuously at all stages of the life cycle. process we tend to see housing in the narrowest sense. stand ready to defend our own decisions, right or wrong, good or bad, be it from an ecological, technological or societal point of view. As already mentioned in this thesis, the material part of housing decisions is in fact in the hands of institutions. At both levels, individual or institution, most of the decisions made are based upon these personal subjective experiences and intuitions. obvious limitations are man's ultimate wisdom plus the state of available knowledge and information. argue that more of the latter would not bring about more enlightened decisions and actions.

Man has studied and theorized about his housing and the environment. Rarely have such studies been carried through to the point of building a comprehensive body of knowledge supported by empirical or scientific evidence. There are hypotheses which seem to indicate that housing may be the major determinant of man's attitudes, his life styles, his health and social well-being. The literature is abundant with all kinds of examples of such observations. They are generally done from the point of view of one discipline. Multi-disciplinary comprehensiveness is notably absent. There is no science of housing or the environment. For example, as we discuss new communities and new towns as a matter of national need demanding innovation and invention, we do it without recourse to a substantial body of knowledge. When our legislators, as described in Chapters I and II, have to deal with housing problems on a national scale, they have little more to go on but their wisdom influenced by opinions, convictions, prejudices and pressures from special interests.

One can only wonder when one discovers that all construction represents roughly 10 per cent of our Gross National Product (GNP), and residential construction is roughly 3 per cent, large components indeed, why there is such a limited scientific and technological base, why the "knowledge explosion" of recent times has not embraced housing. The answer to this question is probably as

complex as the housing issue itself. To better understand the problem of lagging research, understand why universities have made only marginal contributions, one should look at the entire history of inquiry, R & D, experimentation and demonstration as it pertains to our field of interest.

One can easily find agreement that to build a body of knowledge requires research and testing. It is necessary not only to the technology of building housing units and towns as artifacts and engineering systems, but also as a contribution to the process of building environments for human beings, assembling communities with concern for sociological, political, economic, esthetic, ecological and cultural considerations. Since the subject represents a huge system, there needs to be research in the application of systems science itself. Five decades of research experience in isolated areas tells us that we could do a great deal more by adapting methods employed in other large tasks where innovation and coordination have brought about such rapid progress.

"In 1940, the 20th Century Fund began a survey of the housing situation in the U. S. No authoritative study of the housing problem had ever been made . . ." one reads in the foreword to American Housing, by economist Miles L. Colean. 16 The survey completed in 1943 relates how

¹⁶ Miles L. Colean, American Housing, Problems and Prospects (New York: 20th Century Fund, 1949).

one of the first housing research projects was assigned to the National Bureau of Standards (now an agency of the United States Department of Commerce), which, as the name implies, set out to research problems of standards and These codes became the basis for many hundreds of municipal building ordinances and the like. It was then as now a problem of reconciling engineering with social ideals and economic realities. The exact wording of specifications was troublesome and there were problems in making allowances for regional differences such as Florida hurricanes, California earthquakes and northern New England snowloads to be reckoned with. The Bureau researched simplification of a variety of manufactured products and processes, as well as types of zoning laws and mechanics lien laws. Efforts by the Bureau to look into other areas foundered because of lack of funds, probably due in part to the Great Depression. The American Standards Association took over some of the Bureau's work, but these efforts were The advent of the federal housing agencies not extensive. during the 1930's and their administrative dependence on standards and codes brought the Bureau back into action. But the Bureau had no means with which to force adoption of standards or coordinate them on a national scale. Building Officials Conferences of America (BOCA) stepped in to take over some of this function.

By the latter 1930's it had become clear, however, that the central position of the Federal Government was an ideal clearing house for best current thought and practice in building. In 1935 the Division of Economics and Statistics of the then newly created Federal Housing Administration (FHA, later HHFA) saw the need for information in the house building industry. They set about to collect data on real estate transactions, housing construction activities and market factors.

It would not be correct, therefore, to say categorically that there has been no research in housing. What is true perhaps is that many diverse organizations and people have studied individual problems by bits and pieces without producing adequate payoffs in terms of the whole. The President's Conference on Home Building and Home Ownership held at Washington, D. C. in 1932 in various reports mentioned ". . . agencies carrying on housing research and education include the Extension Service of the USDA, Better Homes in America, American Farm Bureau Foundation, National Grange, and agricultural journals. 17

The Corporation of Housing Agencies in 1935 listed many departments. Some of those included were the FHA, Resettlement Administration (RA), Housing Division of the Public Works Administration (PWA), Reconstruction Finance

¹⁷ Reports were distributed by Better Homes in America, West Lafayette, Indiana.

Corporation (RFC), Tennessee Valley Authority (TVA),
National Bureau of Standards (Nat.Bu.Stds), Works Progress
Administration (WPA). 18 Most of the organizations dealing
with housing excepting the National Bureau of Standards and
the agricultural groups were new then. This prompts the
question, how could they have developed the needed extensive
research capabilities in a matter of a few years?

One event of note as it relates to housing research was "Greenbelt Towns," a project of the RA. Three such towns were actually built during the period following principles proposed by Ebenezer Howard around the turn of the century. These towns contained innovations in living accommodations, even though the primary motivation at the time was make-work for jobless construction workers.

The social stresses from 1929 on through the 1930's stimulated a flood of writings and reports on housing and related social conditions. For example, Davies lists 283 separate items in a bibliography. 19

The 20th Century Fund study by Colean noted that between 1935 and 1940 federal expenditures for research totaled 852,000 dollars, mostly for creation and operation

¹⁸ Corporation of Housing Agencies, National Association of Housing Officials, Bulletin No. 64, August 15, 1935, p. 3.

¹⁹ Joseph Earl Davies, Fundamentals of Housing Study, A Determination of Factors Basic to an Understanding of American Housing Problems (New York: Columbia University, Teachers College, Bureau of Publications, 1938).

of a Forest Products Laboratory. Research expenditures for the USDA 1938/1939 were given as 20 million dollars. ²⁰ The study makes a point of the inability to advance techniques on many fronts concurrently, that the components of the industry are too diffuse and too limited in their interests to undertake jointly the kind of research needed. A few independent organizations, Purdue University, the John B. Pierce Foundation and the Bemis Foundation are mentioned as having made some contributions. ²¹

World War II and its aftermath seems to have left housing research as an orphan when one considers the technological and other advances of the era. The landmark Housing Act of 1949 already mentioned was to provide for research in housing (in addition to research in metropolitan growth and urban problems), but the politically powerful building construction and real estate interests managed to sandbag it as they later did the Civilian Industrial Technology Program (CIT) of the Department of Commerce (USDC). 22, 23 Beyer commented in 1965 "that recent development of building materials shows a bright future but leaves

²⁰Colean, op. cit., p. 165. ²¹Ibid., p. 164.

²²Glenn H. Beyer, <u>Housing and Society</u> (New York: McMillan Co., 1965), p. 212.

²³Civilian Technology, "Opposition in Congress and Industry Leads to Major Realignment of Program," <u>Science</u>, CILIII (February, 1964), 660, 661.

much desired from the standpoint of improving livability and reducing costs." He went on to say "few are willing to risk funds on long-term research." "Firm by firm research and product development have meant that new, better and less expensive approaches have not been developed for the structure as a whole. Advances in one group that might hurt the other group precludes combining research effort." 24

Few of the complex problems of housing fall neatly into scientific disciplines; most, if not all, are multidisciplinary and overlap diverse fields of knowledge.

Beyer names nature, technology, money, law, man, design and construction in a single statement. 25

The "home" building industry, through the National Association of Home Builders (NAHB), did make some effort to incorporate new building technologies by sponsoring the building of demonstration houses. These were to bring in new designs, materials and methods. Various universities (architecture departments), notably the Massachusetts Institute of Technology (MIT), handled the individual projects. One such house was built in Okemos, Michigan, together with Michigan State University (MSU). Whether any worthwhile benefits came out of these ventures has never been determined.

²⁴Beyer, op. cit., p. 490. ²⁵Ibid., pp. 211, 212.

In 1960 Dr. Robert C. Weaver, the Administrator of the HHFA asked Resources For The Future, a non-profit corporation for research and education in the development, conservation and use of natural resources, to examine urban research needs and to suggest an approach to the establishment of a national program of research in housing and urban development. The Director of the Regional Studies and Urban Economic Program of Resources For The Future did such a study. The report covered four topics: (1) Needed: A National Program of Research, (2) The Scope of Urban Research, (3) Organizing a Nationwide Program of Research, and (4) Implementation.

The study declared, that

. . . there is no satisfactory research base and urges an extensive national program of urban research. If the latter is to contribute substantially to the nation's efforts in housing and urban development, it must have a scope of activities comparable to the significant research programs in agriculture, health and space technology.

These proposed steps are listed in the study:

- 1. A full system of research ranging from basic to applied.
- 2. Improvement of existing data and development of new data.
- 3. Support of training programs to meet evolving manpower needs.
- 4. Support of experimental projects to try out promising ideas in housing and urban development on a small scale.

5. Encouragement of urban extension service. 26

Further conclusions drawn were that

. . . leadership and financial assistance from the Federal Government are needed in urban research because of the nationwide character and severity of urban problems. A truly national program of research should be designed to assist all levels of government, as well as private groups. Three foci are called for: (1) assist metropolitan research units with metrowide or local problems, (2) assistance to the states for statewide research and urban extension service, and (3) a federal government program covering policy research, improvement of nationally collected data, national framework studies and projections, grants to assist university research and training programs, and finally, major research efforts in transportation and construction.

Specifically recommended are

(1) basic research to USDA and the National Institutes of Health (NIH), (2) training and manpower development with fellowships and scholarships to researchers, (3) "central" research, (4) applied and problem-solving research, (5) data services, (6) extension and demonstration, and (7) experimentation.²⁸

The report spoke of how the local government and private groups would be encouraged to establish metro research units (200-odd), how the states would establish research units and extension services and how the HHFA would set up a semi-independent "National Urban Institute" to direct programs of grants to universities for basic research and training and to carry out "framework research." The

²⁶ Harvey S. Perloff, A National Program of Research in Housing and Urban Development, The Major Requirements and a Suggested Approach, a Resources For The Future Staff Study (Washington, D.C.: Resources For The Future, Inc., 1961), p. 1.

^{27 &}lt;u>Ibid.</u>, pp. 1, 2. 28 <u>Ibid.</u>, pp. 8, 9.

whole program was recommended to be conducted in stages and guided by an advisory committee appointed by the Administrator of HHFA. The program was to be funded at 1 1/2 per cent of expenditures for urban renewal and public housing, as had then similarly been the practice in the United States highway program. Further funding was to be derived from extending Section 701 of the Housing Act (providing for planning grants) to cover research. These additional proposed responsibilities were used as an argument to give HHFA cabinet status. 29

In the context of this writing one must again ask the obvious question: Why were the colleges and universities not given a greater role in these plans, especially the Land-Grant institutions? The question arises when thinking of efforts like agriculture, health and space programs. Or, why were the National Science Foundation (NSF) and other government agencies not tuned into it?

At any rate, nothing much happened for several years. In 1964-1965, in line with President Johnson's "Great Society" philosophy, Weaver with MIT Professor Robert C. Wood (later Undersecretary of HUD under Secretary Weaver) and others proposed a "Demonstration City" program to Congress. The program originally contemplated designating a small number of cities, perhaps six to eight, in

²⁹Ibid., p. 2.

which to test the effect of a "total attack" approach. As recently reported,

The Johnson White House, familiar with the workings of Congress, saw only political disaster in such a limitation, and presented a program that would affect many cities. This won enactment by a narrow margin during the fall of 1966.30

"Demonstration," after the urban explosions of the time, became "Model" and the Model Cities program became a vehicle to pump resources and hope into 150 pockets of urban misery. What was intended for research, experimentation and demonstration became something else. Research was again left unsupported.

The earliest Budget Message by the President with real emphasis given to housing-related research is one presented to Congress on January 24, 1967 for fiscal year 1968:

One of the most serious difficulties in solving city problems is our inadequate knowledge about the root and nature of these problems. I urge that sufficient funds be provided the Department of Housing and Urban Development to start a systematic research effort to acquire needed information on the causes and possible solutions 31 for the housing and urban problems which we face today.

The 1970 Housing Act does provide for research and demonstration as did the 1968 Act:

³⁰ Monroe W. Karmin, "A Not-So-Model Cities Program," Wall Street Journal, Editorial Page, February 26, 1971.

The Budget of the U.S. Government, Fiscal Year ending June 30, 1968 (Washington, D.C.: U.S. Government Printing Office), p. 26.

. . . to encourage large-scale experimentation in the use of new technologies, methods and materials with a view toward the ultimate mass-production in housing and related facilities, . . . subject to (1) local building regulations, or where (2) necessary variations can be granted.³²

To carry out this program, Section 504 provided for an experimental Housing Allowance Program to underwrite differences between 25 per cent of low-income families' income and a fair market rental value of the experimental units. There is no provision for monitoring or for the study of the experiences resulting from the arrangement. The ambiguity of some of this legislation is demonstrated in another section of the same Act, where one reads:

. . . will (1) help maintain a diversified, local home building industry, (2) increase the capability of all segments of the home building industry, including both small and large producers, to participate through an increased supply of building sites at reasonable costs and through improved technology, in producing a large volume of well-designed, inexpensive housing, and (3) encourage broad participation by the home building industry, particularly small builders. 33

On the one hand we try to rationalize mass production, on the other hand we talk about preserving the "small builders." We are trying to have the best of two worlds.

³²Public Law 91-609, 91st Congress, H.R. 19436, Dec. 21, 1970, Housing and Urban Development Act, Section 501 and Section 502 a) and b).

³³ Ibid., Section 722.

The Current Situation

Progress is being made in that there are increasing research activities. For 1966 and 1967 respectively, the United States Government R & D Reports Indices list one project each year under the heading of Housing. the referred-to index lists 73 projects, in 1969 105 projects and in 1970 195 projects. 34 HUD in June 1970 reported 465 ongoing research projects in the following categories: User Needs and Design (47), Production (31), Materials (142), Codes and Standards (22), Labor (5), Planning and Land Development (14), Utilities (16), Institutional and Economic Aspects (26), Legal (2), Structural Design and Foundations (190). The projects were given to federal government agencies, universities (most often engineering colleges), non-profit institutions including state and local government, their agencies and housing authorities. 35 It should be pointed out that research, even on this relatively small scale, is noteworthy in that activity has accelerated since 1968.

^{34&}lt;u>U.S. Government R & D Reports Index</u>, U.S. Department of Commerce, National Bureau of Standards, Institute of Applied Technology (Washington, D.C.: U.S. Government Printing Office, 1966 through 1970).

Research and Technology, U.S. Department of Housing and Urban Development (Washington, D.C.: U.S. Government Printing Office, 1970).

Federal government agencies supporting research projects in housing are the USDA, Atomic Energy Commission (AEC), USDC, United States Department of Defense (DOD), Office of Economic Opportunity (OEO), General Services Administration (GSA), Department of Health, Education and Welfare (HEW), United States Department of Labor (USDL), Post Office Department (PO), Veterans Administration (VA). Coordination currently is in the hands of an ad hoc Interagency Committee on Housing Research and Building Technology, Office of Science and Technology (OST). Its report mentions

. . . now that national attention has been focused on the availability of housing, housing costs, building systems design and the efficiency of the building industry in general, the growing demand for improved performance, higher quality and increased output throughout the housing and building construction sector is the currently primary reason for the increasing federal commitment to housing research and technology. 36

But it is well not to lose sight of the relationship of these recent housing research efforts to all R & D
activities. The National Science Foundation has, as one of
its responsibilities, to collect and publish data on R & D
and scientific activities for the entire nation. Review of
such data shows that expenditures for the account of our
subject, namely housing, are insignificant. What little was

³⁶ Housing Research and Building Technology Activities of the Federal Government, Executive Office of the President, Office of Science and Technology (Washington, D.C.: U.S. Government Printing Office, 1970).

reported was either classified with something else or lumped into a miscellaneous category. For example, the USDA for many years has spent a tiny fraction of its budget on housing, family living and ancillary problems, and yet this does not show in the reports.

There are four performers of R & D and scientific inquiry: (1) the Federal Government, (2) the universities, (3) private industry, and (4) non-profit institutions which include, for our purposes, state and local government and their authorities, agencies and commissions. Sponsors are (1) the Federal Government, (2) the universities and colleges, (3) private business and industry, (4) foundations and other non-profit groups, and (5) the state and local government, their authorities, agencies and commissions.

R & D in the United States runs currently at about 2.7 per cent of GNP, lowest since its peak of over 3 per cent in 1964. Annual growth in R & D expenditures has been about 4.6 per cent for the 1966-1971 period against a growth in GNP of 6.9 per cent. Federal dollars spent on R & D have been declining, while non-federal dollars spent have been rising (see Appendix SF-1, a graph which displays R & D funding patterns). The outlook through 1980 is shown on a chart, Appendix SF-2, indicating maintenance of, if not accelerating growth, in R & D funding. 37

³⁷ National Patterns of R & D Resources, Funds and Manpower in the U.S. 1953-1971, National Science Foundation, NSF 70-46 (Washington, D.C.: U.S. Government Printing Office, 1970).

Full-time-equivalent scientists and engineers employed in R & D by sector have been tabulated and may be referred to in Appendix SF-3. This table shows that the number of people engaged in this effort has been continuously rising, from 236,000 in 1954 to an estimated 555,000 in 1969. Of special note is the increase in the number of full-time-equivalent graduate students receiving stipends and engaged in R & D efforts rising from 4,800 to 18,000 during the same period (absolute numbers are substantially larger). 38

One may refer to Appendix SF-4 for other highlights on colleges and universities. Here can be seen that total expenditures for institutions of higher learning have enjoyed continuing accelerated growth, while R & D performance by these institutions has had a diminishing growth rate. Three-fifths of the funding for R & D performance for colleges and universities comes from the Federal Government. Major sources have been HEW, the NSF and DOD, with three-fourths of the R & D funds. The three largest recipients were MIT, Stanford and Harvard Universities. Of particular note is that during the 1966-1971 period education expenditures rose at a 13 per cent annual rate while R & D performances at the colleges and universities rose at an only 6 per cent rate, which is negative growth

³⁸ Ibid.

considering the rise in costs.³⁹ For our purposes here it is important to realize that almost all education-related funding comes from HEW or NSF, while HUD in principle engages in or funds research endeavors connected with the building and construction technologies. Only Congress could change this policy.

The distribution of federal research funds for R & D and other scientific activities may be found in National Science Foundation publication, NSF 70-38.40 Appendix chart SF-5 explains that 10 per cent is done by colleges and universities plus an additional 5 per cent by the thirty-seven federally funded R & D Centers (FFRDC's) administered by universities. The same chart also shows that 90 per cent of the federally funded research is sponsored by DOD, National Aeronautics and Space Administration (NASA), AEC and HEW, the latter includes the National Science Foundation. Developments in federal R & D funding are explained by Appendix SF-6. Here one can see how federally funded R & D as a per cent of the total federal budget in 1940 was 0.8 per cent, rose to 12.6 per cent in 1965 and now stands at 8 per cent. How current funding is

³⁹ Ibid.

Federal Funds for Research, Development and Other Scientific Activities, Fiscal Year 1969, 1970 and 1971.

Survey of Science Resource Series, National Science Foundation, NSF 70-38, Volume XIX (Washington, D.C.: U.S. Government Printing Office, 1970).

divided for basic research, applied research, development and research-plant can also be seen in Appendix SF-6.

Exactly where housing research could be fitted into these categories would have to be investigated in further detail.

"Operation Breakthrough" would no doubt be classified as "development." How nine agencies obtained 98 per cent of the federal research dollar can be seen in Appendix SF-7. These agencies are DOD, NASA, AEC, HEW, the United States Department of Transportation (USDT), NSF, USDA, the United States Department of Interior (USDI), OEO, USDC and the VA. Appendix SF-8 illustrates federal R & D funding by states for the year 1969. Michigan ranked twenty-second, while ranking seventh in population, seventh in personal income and fourth in federal taxes paid. Housing does not appear among the major performing agencies and their sources of federal funds as can be seen on Appendix chart SF-9. Then finally HUD does show up, see Appendix chart SF-10 where we note commitments of 26.2 million dollars in total R & D obligations for Fiscal Year 1970. This is about 1 per cent of the HUD budget. The R & D allocation divides 83 per cent for applied research and 17 per cent for development. research is listed as performed by industry 52 per cent, other 23 per cent, non-profit institutions 11 per cent and federal intermural 9 per cent. The "other" means largely colleges and universities at roughly 6 million dollars. 41

⁴¹ Ibid.

Since HUD is primarily concerned with housing, it may be well to take a look at the HUD budget situation in recent years. This is illustrated on Table I. Clearly, Congress is increasing federal commitments to housing research. As explained elsewhere, Congress and the federal system limit expenditures by HUD to mostly technology-related fields.

The federal establishment engages 275,000 people in R & D and scientific activities. These are classified as scientists, engineers and technical personnel. Of this number HUD lists 2,275. If the categories are limited to scientific personnel and engineers only, then 161,000 are so classified, of which 900 belong to HUD. 42

As we look at the distribution of the nation's R & D by performers we see that in 1968 it was divided as follows: industry 69 per cent, the federal government 14 per cent and colleges and universities 10 per cent. Federally Funded R & D Centers (FFRDC) administered by universities and other non-profit institutions took the remainder. Note, Michigan is not among the states which have FFRDCs. The sources of funds which finance R & D throughout the nation are: federal government 60 per cent, industry

⁴² Scientific, Technical and Health Personnel in the Federal Government 1969, National Science Foundation, NSF 70-44 (Washington, D.C.: U.S. Government Printing Office, 1970), Tables on pp. 2, 10, 12, 13, 14. See Appendix SF-11 through -15.

TABLE I

FEDERALLY FUNDED HOUSING RESEARCH THROUGH HUD

Budget Authority in Millions of Dollars (Appropriations)

Model Cities Programs not included.

| FY | 1963 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 |
|--------|-------|-------|-------|------|------|-----|-----|-------------|-----|-----|
| '65 | .375A | .387E | 1.5E | | | | | | | |
| 66 | | .387A | .387E | 1.5E | | | | | | |
| 67 | | | .397A | .75E | .75E | | | | | |
| 68 (1) | | | | .75A | .5E | 20E | | | | |
| 69 (2) | | | | | .5A | 10E | 20E | | | |
| 70 | | | | | | 10A | 11E | 25E | | |
| 71 (3) | (4) | | | | | | 11A | 23E | 55E | |
| 72 (4) | | | | | | | | 10 A | 51E | 45E |

The U.S. Budget in any one year lists yearly amounts for a three-year period. This is shown horizontally opposite the year a new Budget is presented. The earliest figure is actual and designated 'A'. The two figures following are estimates and designated 'E'.

1963 - 1966 data is HHFA, 1967 on is HUD

- (1) now includes Urban Studies along with Housing Research
- (2) now called Urban Technology and Research
- (3) figures used by NSF differ. They are 1969 A = 18.2, 1970 E = 26.2 and 1971 E = 26.2 Million dollars
- (4) Major part accounted for by OPERATION BREAKTHROUGH estimated at 17 Million dollars for FY 1971

SOURCES - U.S. Budgets and their Appendices for the FY's shown,

- National Science Foundation, Federal Funds for Research Development and other Scientific Activities, FY's 1969, 1970, 1971, Vol. XIX NSF 70-38, p. 108

36 per cent, colleges and universities 3 per cent. Funding of R & D by industry has been rising for many years. Companies now finance over 50 per cent of their R & D themselves with the federal funding declining. Whatever effort may be related to housing does not show up on any listing by industry category, because it is relatively small. 43

ence where 50 per cent of the R & D is concentrated in two areas, Health and Hospitals. Other areas are natural resources, highways and education. If defense, space and atomic energy are excluded, activities of the states parallel the federal ones. Michigan is again not a leader with only 2 per cent of the national total. Housing is not mentioned, some housing expenditures, if any, may be buried in "other" category. In 1968 R & D expenditures by the states were 155 million dollars with 9 per cent performed by colleges and universities. 44

Research and Development in Industry 1968, Funds 1968 Scientists and Engineers, National Science Foundation, NSF 70-29 (Washington, D.C.: U.S. Government Printing Office, 1970), Charts pp. 2, 5, 7, 17, Tables pp. 25, 26. See Appendix SF-16 through -21.

Agencies, Fiscal Years 1967, 1968. National Science Foundation, NSF 70-22 (Washington, D.C.: U.S. Government Printing Office, 1970), Table p. 2, Chart p. 3, Table p. 4, Charts pp. 5, 7, 8, 10, Table p. 18, Chart p. 20, Table p. 22. See Appendix SF-22 through -31.

Federal support for academic science which includes R & D enjoyed continuous year-to-year increases until 1966, when it leveled off. Since costs have been rising, this means a decline in absolute terms. Support for the federally financed R & D Centers at the universities has also been declining. As mentioned before, none of these Centers are in Michigan. The principle agencies which are reported to do 97 per cent of the funding are the USDA, DOD, HEW, USDC, USDI, AEC, NSF and NASA. Three per cent only comes from a remaining group made up of HUD, USDL, OEO, USDT and the Agency for International Development (AID). It can also be seen that in a listing of federal support to the one hundred colleges and universities receiving the largest amounts in Fiscal Year 1969, the University of Michigan ranked third, Michigan State University twenty-ninth and Wayne State University thirty-second. By far the largest amounts came from HEW. 45

A good deal of space has been taken in trying to relate all past and current research and scientific efforts in the nation to that which goes for housing and the human habitat. The objective was to illustrate how the search for new knowledge in housing has been a negligible affair when compared with research in other fields. One would

Federal Support to Universities, Colleges, Fiscal Year 1969, National Science Foundation, NSF 70-27 (Washington, D.C.: U.S. Government Printing Office, 1970), Graph p. 3, Tables pp. 4, 16. See Appendix SF-32 through -34.

prefer to make a case in a more direct way, but no one really knows what the relatively small expenditures actually amount to. Much of it is hopelessly clouded by poor definition and scattering of industry segments throughout the various R & D expenditure accounting systems. Guesses are that probably 300 to 400 million dollars per year are currently devoted to building—and construction—related R & D, virtually all of it by manufacturers and producers of primary building products. More information is simply not to be had. HUD or the NSF should be directed by Congress to assemble such information and report on it periodically. Only in that way would we know that progress is being made, if any.

One can conclude that, considering the housing problem, the size of the industry and the fact that on the average more than one-fourth of the family lifetime expenditures go into housing and household operation, housing is being shortchanged. The colleges and universities in particular may be singled out by the evidence, so may the State of Michigan, and so Michigan State University.

Research and scientific inquiry are assumed to be a good part of the teaching and learning process and so it would follow in logic that the present effectiveness of the

⁴⁶Gerald M. McCue, William R. Ewald, Jr., and the Midwest Research Institute, Creating the Human Environment, a Report of the American Institute of Architects (Urbana, Ill: University of Illinois Press, 1970), p. 170.

process can be questioned as long as there is a dearth of research opportunity. This is particularly true in the housing field where practical experience concurrent with study appears most essential.

The nature of the housing system, its huge dimensions, the many diverse effects on all kinds of people and their varied environments, make it a compelling reason that the search for more knowledge be organized, as we have done with other large national-level missions and tasks. Recognized must be that because of the conditions described, there is a shortage of institutions, researchers and teachers to do the job. This points to quality and efficiency problems as the hopefully foreseen build-up occurs, underlining a role for education. The universities should be able to organize and coordinate a large part of the task. Only they can process the products of research for maximum utilization and dissemination. Defining and understanding the problems has to come first and here is where the universities are ideally situated. The thrust has to be toward an ever improving living environment for all people where other interests are subordinated. All this, admittedly, is no small chore.

CHAPTER IV

ONE PROBLEM: THE ECONOMICS OF HOUSING

In testimony before the Banking and Currency Committee of the United States House of Representatives on March 3, 1970, Secretary Romney of HUD said that "80% of the American people can not afford to buy and maintain a new home at today's prices." This is a most serious indictment of a society, which has over time created institutions to provide housing for its people. There are many known causes of the failure, and much more that we simply do not understand. The same section from which Secretary Romney was quoted goes on to say that:

. . . it is found that federal programs aggravated the situation, that for example, farm subsidy programs threw hundreds of thousands of small farmers and share-croppers out of work, that federal farm programs as well as highway, urban renewal and other programs have accelerated the need for housing.

In another part of the same section one reads:

. . . too often the federal housing programs appear to be aimed at reviving a lagging construction industry rather than serving the needs of ill-housed families.

⁴⁷ Promises to Keep, Housing Need and Federal Failure in Rural America, Select Committee on Nutrition and Human Needs, U.S. Senate (Washington, D.C.: U.S. Government Printing Office, 1971), p. 7.

According to the official national goal, every American household which does not enjoy "a decent home and a suitable living environment . . . " has a housing problem. Indications are that there exist many such problems, yet we have little good comprehensive data to go on. When we inventory numbers of units, as a part of census operations, we crudely differentiate by very inadequate measure between standard and substandard. In doing so, we often fail to convey the appalling living conditions, filth, degradation, squalor, overcrowding, personal danger and insecurity, which millions of housing units are causing in both our cities and rural areas. Concealed also may be spaces where children are attacked by rats, suffer mental retardation from eating leadpaint and become ill from the unhealthy conditions brought on by crowding. Failure of landlords to provide adequate heat and keep plumbing in working order is rarely accounted for. 48

While interest in these socio-economic problems of housing has increased substantially since about 1930, fueled by the human miseries of the Great Depression, one can seriously question why there should not have been a great deal more progress. The most confounding factor has been the continuous rise in living standards and associated expectancies.

⁴⁸Anthony Downs, <u>Urban Problems and Prospects</u> (Chicago: Markham Publishing Co., 1970), pp. 115, 116.

There have been substantial amounts of literature used in support of some proposed government action, but most of it, like the census data, has been based on narrow and subjective observations. Much less has been organized around systematic analysis. The root source of any housing problem is misunderstanding its cause. For example, we have never come to grips with the question: what respective part of the nation's and communities' resources and what respective part of personal resources should be allocated to housing. These are macro-economic issues versus the microeconomic problems with which individuals and families are confronted. The latter problems come in two parts. One is cost of the housing in the market place, that is, cost of occupancy, whether owned or rented, plus cost of operation including depreciation. The other part is ability of occupants to afford these costs, that is, to have adequate means for the allocation of resources to provide a family unit with "decent" housing. This premise assumes that "decent" housing is wanted in preference to other forms of consumption; different priorities would create different sets of conditions. It appears that the equation of the two parts: cost versus purchasing power, needs a great deal more study, especially for the informed consideration of subsidies.

In 1937 Chawner, writing on the subject of building costs, had this to say:

. . . gradually rising prices of building materials, and even greater increases in wage rates in the building trades, over long periods of time, have substantially increased building costs during the last two or three decades. 49

This situation appears unchanged if not worsened by 1965 when Beyer wrote: "One of the most serious housing problems is the constantly rising cost of construction" and he cited two cost indices. One was the E. H. Boeckh Construction Cost Index for single family residences rising from 107.7 in 1950 to 139.7 in 1960 (1947-1949 = 100), and the Consumers Price Index for housing rising from 106.1 to 131.5 during the same period. Beyer goes on to show that indices for food, apparel and highway construction rose at a far lesser rate and asks the question whether our homes are that much better than our food, clothing or highways. In other words, has the quality of what we buy for our housing dollar increased so much more than what we buy with other dollars? He doubts it. 50

If Beyer were to look at these indices again today he would be shocked to see that housing costs have continued to rise disproportionately. Using 1957-1959 as 100,

Lowell Chawner, Jr., "Economic Factors Related to Residential Building," American Academy of Political and Social Sciences, The Annals, Current Development in Housing, Vol. 190 (March, 1937), 30.

⁵⁰Beyer, <u>op</u>. <u>cit</u>., pp. 490, 491.

the 1970 index for Homeownership Cost stood at 154.4, while the index for all items was at 135.3.⁵¹

When HUD Secretary Romney in 1970 said, 80 per cent of the people can not afford decent housing, he was not telling the people anything new. He merely underlined by public statement a situation of long existence, a situation perhaps getting worse. To illustrate, Mayer, Wright, and Mumford in 1934 said:

Prior to 1929, a new dwelling, which barely met decent standards, was a luxury which one third of the population could not afford; today (1934), such luxury is beyond the purchasing power of at least one half of the population. 52

In 1937 another writer, Shire, said:

. . . two-thirds of the population can not afford new homes and must live in the "hand-me-downs" of the upper third. 53

One could go on and draw many parallels between the 1930's and the present. The gap between cost and purchasing power appears to be widening, that is, if Mr. Romney's statement can be taken as valid appraisal of the situation.

⁵¹ The Consumer Price Index for December 1970, U.S. Department of Labor (Washington, D.C.: U.S. Government Printing Office, 1971), p. 14.

⁵²Albert Mayer, Henry Wright, and Lewis Mumford, "New Homes for a New Deal," The New Republic, February 14, 21, 28, and March 7, 1934, p. 23.

⁵³A. C. Shire, "The Industrial Organization of Housing, Its Methods and Costs," American Academy of Political and Social Science, The Annals, Current Development in Housing, Vol. 190 (March, 1937), 37.

This is not because people are allocating a smaller portion of personal consumption expenditures to housing and household operation. Unfortunately, we do not have good timeseries data on this phenomenon. The per cent of personal consumption expenditures going into housing in 1950 was 27.2 and in 1960 it was 29.5. The 1960-61 survey was a benchmark survey, none has been made since. In 1967 the United States Department of Labor surveyed a small sample of four-person families and a sample of retired couples. 54 One can reasonably suspect from an examination of housing costs contained in these latter survey data that the share of housing and household operation expenditures out of total personal consumption expenditures has further How much personal choice people have exercised increased. must be assumed as unknown.

The average lay person sees housing production costs made up of land, materials, labor and money, when in fact they are a part of a large system in which costs accumulate from a great many components. This is well illustrated by a systems diagram, Figure I, taken from a

⁵⁴ Handbook of Labor Statistics 1970, U.S. Department of Labor, Bureau of Labor Statistics, Table 133 and Tables following (Washington, D.C.: U.S. Government Printing Office), pp. 321-330.

report which accompanied the Douglas Commission Report. 55, 56.

⁵⁵Elsie Eaves, How the Many Costs of Housing Fit Together, Prepared for the National Commission on Urban Problems, Research Report No. 16, 1969.

⁵⁶House Document No. 91-34, op. cit.

Local Government Real Estate LAND Permits, Recording Land Developers Zone, Code Variances Legal Services FINANCE Banks: Government, direct - bonds appropriations Commercial Savings Mortgage Companies Mortgage insurance, guarantees Subsidies: interest rates, land Savings & Loan Assns. Tax abatement Insurance Companies Other Accelerated Depreciation DESIGN Manufacturers **Architects** Prefabricated Houses, Mobile Homes **Engineers** PRODUCTION & MANUFACTURE Turnkey CONSTRUCTION Contractors Materials - Equipment - Supplies Contractors Developers DISTRIBUTION - Local Dealers Materials - Equipment - Supplies Home Builders (Own Forces - Subcontracts) **Building Contractors** (Own Forces - Subcontracts) LABOR **Building Brokers** (Subcontract - Limited O F) On-Site : Off-Site Subcontractors **OPERATION** Site Improvement, Excavation, Foundation **Plastering** Steel Erection Renter Owner Concrete Painting & Decorating Precasting Flooring Prestressing Taxes Ornamental Metal Masonry **Debt Service** Sheet Metal Brick Stone Fuel - Heat Tile Electrical Blocks Water - Sewers Plumbing Gas Carpentry & Millwork Electricity Heating & Ventilating Glass & Glazing Air Conditioning Repairs & Maint Roofing **Elevator** Services

FIGURE 1. How Housing Costs Accumulate

FROM: EAVES, ELSIE. HOW THE MANY COSTS OF HOUSING FIT TOGETHER Prepared for the National Commission on Urban Problems Research Report #16. 1969. p. 10.

As comprehensive as the diagram Figure I is, it does not show all of the functions necessary to house a community. Yet, it is the most thorough analysis of the elements contributing to housing costs which has been found to date. Miss Eaves' work could be the beginning of a useful textbook in housing economics.

In addition to these factors, local conditions have to be taken into consideration as they vary from one place to another. To stress this point, Senator Douglas states in the foreword to the Eaves' report cited:

There is surprisingly wide variation in housing costs from one part of the country to another, from one type of housing to another, and from one builder to another.⁵⁷

With the advent of industrialized housing this process is likely to become more complicated and more difficult to analyze.

Family housing represents both a major long-term investment or commitment as well as a consumption good. In education, economics has traditionally been dealt with in the context of consumer information only, often as a part of Home Economics curricula. There are many texts in this area and housing is usually dispensed with in one chapter. 58

⁵⁷Eaves, op. cit., Foreword.

⁵⁸ Arch. W. Toelstrup, The Consumer in American Society, Personal and Family Finances, 4th ed. (New York: McGraw-Hill, 1970), devotes one chapter out of nineteen to housing: Chapter 10, A Home For Your Family.

Leland J. Gordon and Stuart M. Lee, Economics for Consumers, 5th ed. (New York: American Book Co., 1967), devotes one out of twenty-seven chapters to housing.

Housing decisions have all kinds of implications and errors may be costly or impossible to rectify. The decisions also affect a great deal outside of the sphere of the individual or family unit. There are economic, as well as other impacts on neighborhood, community, transportation and education.

It would appear then that this is a subject which could receive more attention from the education industry. Since family housing decisions are made over almost a lifetime of the individual, there ought to be constant access to information from sources free of bias. The real estate, housebuilding and homefinancing industries cannot help but be prejudiced by their particular motivations and interests which are in conflict with those of the housing consumers.

A Housing Specialist raised the question of why there are so few single family houses for rent. Is it because such units are a poor investment to begin with, or, is rising abandonment of rental housing property "due to being non-profitable" as reported by the Center for Community Change of the National Urban League a manifestation of similar problems? 59, 60 We don't know very much about what

⁵⁹Carlton M. Edwards, Extension Specialist in Housing, Agricultural Engineering Department, College of Agriculture, Michigan State University, verbal communication.

Hugh L. Morris, The State Journal, Lansing, Michigan, April 30, 1971.

kind of management practices have to be present for satisfactory operation of this type of housing. We should also research and study residential housing conservation practices, as we have done for many years in agriculture and forestry. There are no "residential conservationists."

"A housing stock once created is a community resource of great importance, and, in one way or another, is managed as a whole by the community," says Professor Smith. One unit affects another.

In a similar vein one can raise another point related to education. Why do we not have housing economists as professionals with the skill and capabilities to study and deal with resources utilization in housing? Included in this subject could be land, land use, real estate, production, marketing, distribution, services, finance, insurance and for the great variety of housing configurations, taxation and family expenditure patterns. This by itself is indeed a large field and an ideal one for a university. Housing economics is an obvious necessity to guide any R & D effort. There are no known structured programs in "housing economics," relating either the micro- to the macro-economic approaches or to determining the most beneficial utilization of resources. The recently published

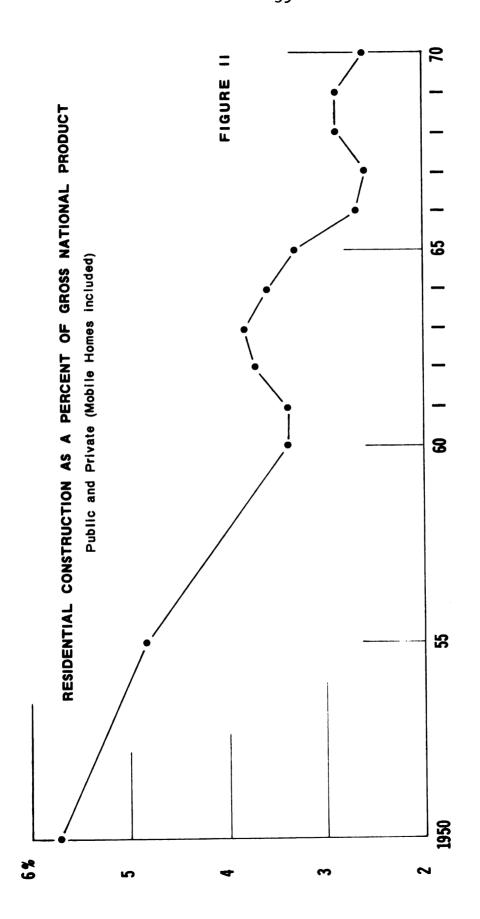
⁶¹Wallace F. Smith, Housing, the Social and Economic Elements (Berkeley and Los Angeles: University of California Press, 1970), Preface.

work by Smith mentioned above, Housing, the Social and Economic Aspects, 62 discusses legal, social, financial and technological elements in housing. It represents one of the few theoretical treatments of the subject but requires prior preparation in economics.

The role of inflation, as it affects housing, needs much more study. Its impact may prove to be more of a negative factor than is recognized. Offhand it would seem that the demand for large public and private investment makes acceleration of housing construction activities dependent upon low money costs and therefore low rates of inflation or economic stability.

As previously mentioned, referring to the macro level of the problem, and important from the point of view of the United States economy, there is the longterm decline in the percent share of Gross National Product contributed by residential construction. After World War II this share peaked out in about 1950, and from then on it declined. See Figure II on the following page. It is rather difficult to understand, in view of the housing shortage on the one hand, and ever increasing activities on the part of the government on the other hand, that there should occur the phenomenon of a relatively diminishing production effort.

⁶² Ibid.



DEPT. OF COMMERCE, CENSUS BUREAU, CONSTRUCTION REPORTS C30-71-1 1969 HUD STATISTICAL YEARBOOK U.S.

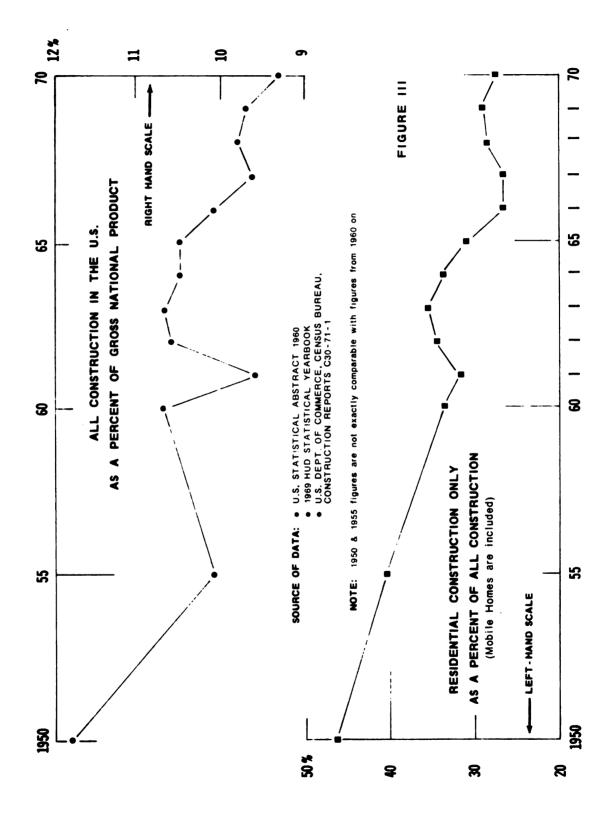
U.S. STATISTICAL ABSTRACT 1960

SOURCE OF DATA:

1950 & 1955 figures are not exactly comparable with figures from 1960 on.

NOTE:

'True, all construction also declined over the period since 1950, but clearly at a much lesser rate than residential construction. See Figure III on the following page.



Here is cause for searching questions. Can the United States economy handle an increase in the residential construction share of Gross National Product to over 5 per cent by 1978, required in order to meet the housing goals for the 1970's, a total investment of 654 billion dollars? Downs thinks we can if defense spending is significantly curtailed. 63

Land costs have been rising at a phenomenal rate.

If scarcity of land is a factor contributing to inhibition of development, then new and better ways of dealing with land-need are to be researched and found. This falls into the related field of land economics.

Most of the new residential construction is being financed over very long terms, longer than ever before. This has the effect of tying up enormous amounts of capital for these long periods. What are the broad effects of this development on the economy and particularly on the future of housing as broadly defined?

The impact on the economy occasioned by residential construction activities, plus construction, installation and maintenance of supporting services is dynamic. Lagging residential construction and simultaneous unemployment are irreconcilable for a modern society. Make-work schemes do not make sense in the face of a positive national policy

^{63&}lt;sub>Downs</sub>, op. cit., p. 128.

for building a better human habitat. Necessary manpower skills needed are an obvious handicap in that it takes time to train and educate. The problem is aggravated because the present work force in construction is older and being depleted through retirement at a rate which may be considered higher than normal. But, as in other areas, there are only scant data on this. 64

Economic development and progress are strongly tied to investment and thereby to opportunities for employment. The scope widens considerably when one includes environmental or ecology demands, which, as a matter of policy, have become an overriding requirement for any development activities. All of these factors as they relate to economic well-being need much more study. Many of the problems on the surface appear to be economic in nature. They are most likely associated with many other segments of our society. Housing economics by itself may well be a large enough part to merit professional specialization within the framework of the housing system.

Discussing the subject of United States housing and poverty, Downs declares: "There are more 'housing-poor families' than there are 'food-poor families'." The universities, particularly the Land-Grant institutions, have long been involved with food, food production, food

⁶⁴ Ibid., p. 132.

^{65&}lt;u>Ibid.</u>, p. 122.

science, institutional feeding and nutrition. More recently the Extension Service through its "Expanded Nutrition Program" is reaching into areas of urban poverty and starvation. There, housing is found to be a parallel, if not more difficult problem. Why should housing not receive the same or more attention than food? Who else would research housing problems in depth and over time but the universities?

CHAPTER V

ANOTHER PROBLEM: HUMAN NEEDS IN HOUSING

Housing is one of three basic human needs: food. clothing and shelter. As mentioned in the last chapter, the universities have considered food and nutrition worthy of support in that this field has developed to where it holds an eminent place among the scientific and academic disciplines. Clothing, textiles and fibers have long held a prominent place in home economics and other university curricula. What the universities have done for human shelter is obscure and indistinct. The schools of architecture have been concerned with the physical artifact. reality, the architect has to do with only a tiny fraction of the residential housing numbers produced. Design outcomes in terms of environmental and human ecology factors, that is, satisfying human needs, leave much to be desired. City or urban planning colleges or departments look upon housing as a sort of chesspieces to be manipulated in the planning process. Engineering colleges have traditionally dealt with the engineering disciplines as they may be related to housing, i.e., mechanics, structure, civil and electrical engineering, visual or graphic display. Some colleges handle building technology subjects in a manner

bordering on vocational education. Little more goes beyond the areas mentioned. Even community resource development as a discipline has seldom included housing as an important community resource. Housing simply has not been accorded emphasis at institutions of higher learning, particularly as it is related to human needs.

The reasons for this neglect are difficult to define. It is probably due, among other things, to the complexity and nature of the subject, especially when one thinks of the intricate relationships between human beings and their physical environment over long time spans. More intensive study of the phenomenon appears essential if we are ever to improve on the institutional arrangements through which we, as a society, try to meet the needs for housing.

Ever more legislation, greater reliance on technologies and the present economic system cannot alone be expected to provide for both the quantity and quality in housing for the American people. Some reordering of the fundamentals appears to be indicated. The central task is to provide "decent" living environments for individuals, families and social units, not to reward political ambitions, speculation in land, technological feats or superficial and damaging manipulation of the environment. Ideally, housing should not be used for any purposes of economic gain other than those derived directly from efforts which truly serve

the needs of people. And here is where we come face to face with the present outlook, which is, that quantity of housing units alone, meaning numbers of people put behind corresponding numbers of doors, is not likely to do the job for the long run. It may well be a self-defeating exercise.

True, we should have an ample quantity of housing to go around, to make a fluid market, but commensurately there must be the quality and the adequacy, "the decent home and suitable living environment." And this is what we clearly do not seem to know how to do. People must be given opportunities where they can make wise and prudent selections, where they do have choices. This they cannot do without knowledge and free access to such good information as may be needed. One of the larger securities' brokers has a motto: "Investigate before you invest." This wisdom should apply to housing. After all, housing decisions represent most always a major long-term commitment.

When one reviews the literature of the 1930's one finds all these needs written about and discussed. Today's literature still mentions pretty much the same things, showing that there is much more rhetoric than action. A study by Davies (in the 1930's) stated that people ranked values related to individual and family welfare as follows: 66

⁶⁶ Davies, op. cit., p. 11.

- --Physical health
- --Experience of freedom resulting from plenty of room
- --Privacy
- --Creative expression of growth, individuality and personality
- --Economic serenity
- --Cleanliness and sanitation
- --Convenience
- --Safety
- --Opportunity for recreation
- --Good character and morals
- --Esthetic satisfaction
- --Peace, quietness and tranquility
- --Pleasant family relationship
- --Comfort
- --Decency
- -- Rest and relaxation
- --Economy and energy

At the same time Davies, in the same study, reported values related to neighborhood and community welfare, which good housing should provide for as:

- --Stability of property values
- --Stimulation of employment and industry
- --Steady and reasonable growth rather than boom
- --Better distribution of wealth
- --Ability of neighborhoods to be self-supporting
- --Even geographical distribution of population rather than congestion
- -- Economy in community and human values
- --Efficiency in the building industry
- --Opportunity for harmonious social contacts
- -- Economy in community financial resources
- --Community pride and loyalty

If one were to make a similar comprehensive study as of today, it is unlikely that the expressions would be greatly different. The forty-year-old writings referred to, defined "good housing" thus:

. . . good housing is shelter, with its equipment, furnishings and environment, which promotes the realization of life values held by its occupants and which contributes to the stability and progress of that society to which those occupants belong. . . Progress

of a society or community is here defined as increasing the ability to provide an environment in which individual life values can be realized. 67

During recent times there has been increasing preoccupation with standards, not alone those concerned with
health, safety and public welfare already mentioned in this
thesis, but also environmental standards. The latter
encompass more than the physical arrangement of the environment and include human, social, cultural and esthetic considerations. However, little mention is made for the need
of continuously revising and upgrading these standards in
line with changes in living patterns and expectancies. The
human environment is a dynamic phenomenon, a subject in
need of continuous research, study, education and subsequent adaptation to enhance the developmental processes.
Standards are an important building block.

Specifically, there is the problem of esthetic design standards which have man in mind. The Committee of House Design of the President's Conference held in 1932 went on record by saying they "believed that the average small American dwelling is seriously defective in design." ⁶⁸ It is difficult to find much improvement in the intervening years. All one needs to do is look around and observe.

^{67&}lt;sub>Ibid.</sub>, p. 14.

⁶⁸ The President's Conference of Homebuilding and Homeownership, V, House Design, Construction and Equipment (West Lafayette, Ind.: Better Homes in America), p. 7.

Most colleges and universities have art and design departments which may also include industrial design. extent to which housing, as broadly defined, is a part of the curriculum is quite limited. The schools of architecture, contrary to some of their lofty ideals, limit efforts in housing to glamour projects, designs for wealthy clients or large projects where employment of architects is dictated by law or the people who do the financing. Human needs are submerged in the broadbrush approaches where "architectural design" dominates. After all, the architect works for a fee which has to be large enough to make the effort worthwhile, a fee usually made up of a percentage of total project cost. There is no criterion which measures human satisfaction on the part of occupants. Since the architect is involved only in relatively small numbers of housing units, a good question is how one might rationalize design costs in a way where all units might gain the benefits of improved esthetic considerations. Incidentally, similar observations can be made for departments of interior design where the graduates are prepared to work in establishments serving the more wealthy. Relating the artifact housing to the environment is not new. Utopian architects and designers such as Frank Lloyd Wright and Richard Neutra expounded long ago on the total environment concept. ever, they thought more of the physical aspects in these relationships than of the basic human needs factors involved. Relationships between housing and physical health are well enough documented. There are a number of known pathologies associated with the physical condition of the human habitat. Scantly available evidence speaks for a similar situation with respect to mental health. Home environment appears to influence social traits of individuals, the family or social groups. Since neighborhood and the larger community are simply aggregations of housing units and occupants, they may also be affected by the state of physical and mental health of the citizens. Some reorientation in public health programs with more emphasis on housing and related living conditions could well bring some better payoffs.

Further, there are safety and security requirements which demand more consideration. The National Association of Housing and Redevelopment Officials (NAHRO) is in the process of designing a training program on safety and security in the city, which they feel should be rated even above health. 69

Trends in our urbanizations are toward increasing living densities. Far too little is known about related phenomena. How to arrange spaces to accommodate higher densities without impairment of health and well-being, but

⁶⁹E. S. Sessions, Director/Professional Development, National Association of Housing and Redevelopment Officials, Washington, D.C., verbal communication.

rather to enhance it and to improve family life and social relationships, is no small challenge. It could stand much more research and study.

There is some evidence that growth and development of children can be promoted or inhibited by environment. Their well-being seems to require opportunities for both privacy and community. Growth in individuality and personality appears to be affected by housing. Poor housing itself can depress any natural ambition for improving living conditions. Families who have lived in slums for generations tend to lose their desire for better things and lean toward staying on in slums and hovels, rather than an improved living environment among strangers. 70

Homeownership can foster economic security. But one must carefully note that many homeowners, either through faulty judgement or having simply been oversold, are in situations where they find more insecurity and the familiar result is all kinds of stresses. Encouraging homeownership as we have done through legislation and otherwise, can have disastrous effects if people are for one reason or another unable to live up to ownership obligations and responsibilities. This happens to be a particular problem needing attention from the education and information dissemination systems.

⁷⁰Bauer, <u>op</u>. <u>cit</u>., p. 169.

Inconvenient location of housing with respect to work and other personal and family activities can produce certain kinds of difficulties interfering with human well-being. Too few studies have been made and applied to locational arrangements. Location is closely related to environmental health conditions like foul air, noise and non-access to nature.

What are the effects of poor housing upon character and morals of people? Poor housing conditions seem to be in part associated with crime, vagrancy and juvenile delinquency with its tremendous social costs. Even citizenship may well be affected. Without evidence of progress people may become embittered leading perhaps to deviant behaviors.

Then there are a whole series of hypotheses associating the living environment with family relationship and development. In this sense the home is a social unit of space, a social center. How well it functions may to a large measure depend upon physical design arrangements. Judging from the small number of family sociologists in the United States it is hard to believe that the subject of family sociology has been accorded sufficient attention by the colleges and universities. A cursory look at research done in this area indicates that it has been minimal.

Another consideration is the whole world of life styles. We see these evolve all around us. Mobile Home living may be taken as an example. It raises the question

of how permanent housing and housing settlements should be planned and built. "The conception of something that lasts forever in an instant gratification culture has as much relevance today as budget books do." This relates to a similar point made by Banfield in generally discussing the mass of "lower class people" in the cities. He says in effect that their time horizon is too short, its capacity for self-discipline too weak, its ability to defer gratification too underdeveloped. Or, could it be that more travel-type accommodations would be preferred provided they could be placed in environments organized for that purpose, planned, landscaped and managed as communities, neighborhoods or parks? To find out would call for some experimentation.

The basic human right to "a decent living environment . . ." has to be provided for and satisfied somehow.

The "how" is the question to which we must find more and better answers. As soon as we do, we will be in a position to take better care of human needs in housing. There are many factors crossing many disciplines which play a part in this. Much is unknown and as a result the road ahead is

⁷¹ Mortimer R. Feinberg, Professor of Industrial Psychology, Baruch College, quoted in New York Times, April 11, 1971, Business Section, p. 3.

⁷² Edward C. Banfield, The Unheavenly City (Boston: Little, Brown & Co., 1968).

quite unclear. The colleges and universities no doubt could do much more toward understanding how to better satisfy human needs in housing.

CHAPTER VI

THE UNIVERSITY

Instrument of National Policy?

Chapters I, II, IV and V gave an overview of growing national housing problems, how they are being recognized, how the remedies being resorted to are increasing doses of government intervention and, how national policy reads in effect: let us as a nation get the job done. Decisions are being made in important areas without a sufficient knowledge base to reinforce such decisions, without established methods for gaining the knowledge required to fulfill the obligations incurred and, without the communications mechanisms to disseminate such knowledge to the various segments of the housing system. If research is lagging in any sector of the national economy it is in housing related fields. Chapter IV outlines some of the problems in the economics of housing. Chapter V attempted to establish that all human needs are not being accommodated in the design of the human environment. Incomplete definitions of shelter have produced still more incomplete definitions of adequate housing. Often the consequences are expensive blunders, not only in an economic sense, but also through ill effects on human beings. Consideration of other

housing problems had to be omitted because of thesis limitations. We now come to the central question of this study, namely, to examine the role of the university.

First a brief word about what is meant by the term "university" in this study. It is the Land Grant College idea as originally conceived and proposed by Morrill over one hundred years ago and as it has evolved over time into the great Land-Grant University of today. It has been guided from the beginning by the philosophy:

. . . teaching such branches of learning as are related to agriculture and the mechanic arts--the latter as absolutely as the former . . . classical studies were not to be excluded . . .73

It is the institution which set about to apply knowledge on an ever broadening scale while it has undergone many changes. It is the university which has grown enormously in its tripart public service mission, education, research and extension, while interweaving learning and living. It is the university of which former Michigan State University President John A. Hannah said

. . . it must be cultivated and fertilized, cultivated through continuing services and fertilized with new ideas, new programs, new developments, to meet the ever changing public need. 74

In 1970 President Nixon claimed that in "almost every field of concern, from economics to national security,

⁷³Eddy, <u>op</u>. <u>cit</u>., p. 38.

⁷⁴Dr. John A. Hannah, quoted in <u>Ibid.</u>, p. 273.

the academic community has become a central instrument of public policy in the United States." This is no doubt true for many fields, but certainly not for housing. Such policy is shaped by other much more powerful forces with special interests, and which generally show little concern for the needs of those who seek a "decent living environment."

For evidence regarding who is shaping public policy in housing one merely needs to look at the organizations whose representatives appear to testify before congressional and legislative committees. We will use the hearings preceding the enactment of the 1970 Housing and Urban Development Act as an illustration. Many of those who testify are accompanied by a staff including legal counsel, economists and the like. Not a few of the prepared statements represent elaborate preparations for their respective arguments. Senators, representatives, governors and state legislators also testified, but are not listed:

American Academy of Pediatrics American Bankers Association American Institute of Architects American Institute of Planners American Insurance Association

⁷⁵U.S., Congress, Senate, Hearings before the Sub-committee of Housing of the Committee on Banking and Currency, and U.S., Congress, House of Representatives, 91st Cong., 2nd sess., Subcommittee on Housing of the Committee of Banking and Currency, Housing and Urban Development Legislation of 1970 (Washington, D.C.: U.S. Government Printing Office, 1970).

American Society of Consulting Planners Boise Cascade Recreational Communities Boston Housing Inspection AFL-CIO Consultant on Urban Social Problems Consulting Engineers Council of the United States Contractors Organized to Lobby Council of Housing Producers Council of Limited Profit Mutual Housing Companies Franklin Plaza Cooperative and Mitchell-Lama Action Committee (New York) Homebuilders (Stiles from Grand Rapids) House and Home Magazine Various housing authorities and commissions of the larger cities Department of Housing and Urban Development: The Secretary The General Counsel The Assistant Secretary for Production and Mortgage Credit The Assistant Secretary Model Cities The Federal Insurance Administration Limited Profit Mutual Housing Companies McKissick Enterprises Metropolitan Washington Planning and Housing Association Mortgage Bankers Association of America National Apartment Association National Association of Counties National Association of Homebuilders National Corporation for Housing Partnerships National Association of Mutual Insurance Agents National Association of Mutual Insurance Companies National Association for Non-Profit Retirement Housing National Association of Real Estate Boards National Association of Real Estate Brokers National Council of Negro Women National Housing Conference National League of Cities and United States Conference of Mayors National League of Insured Savings Associations National Rural Electric Cooperative Association National Rural Housing Coalition National Tenants Organization National Urban League New York State Development Corporation Pipe Trades Industry Program of Arizona

Riverside Neighborhood Assembly House (New York)

Rouse Corporation (Columbia, Maryland)

Re-Location Agencies

*Rutgers University, Center for Urban Social Science
Research
State Departments of Community and Urban Affairs or of
Housing and Community Development
Tenant's Association
United Housing Foundation
United Nations Development Corporation
United Tenants for Collective Action
*University of Louisville, Urban Studies Center
Urban Institute
Urban Renewal Authorities
United States Chamber of Commerce
Woodward Iron Company (Birmingham, Alabama)

Several of the witnesses represent pure lobby groups organized for influencing housing legislation, among those, the National Housing Conference founded in 1931 and which has played a significant role in shaping housing legislation. Some of the organizations have well-staffed lobbying departments as is the case with the National Association of Homebuilders. Notice the absence of citizens or spokesmen for consumers, the ultimate users of the homes and home environments to be helped in construction or otherwise through the proposed legislation.

Other observations of note are that the testimony of HUD officials is generally in accord with that which is expressed by the various interests making appearances.

Under the given circumstances political expediency dictates compromises. The process results in the pursuit of objectives which are in conflict with one fundamental goal,

^{*}As can be noted, there are only two universities listed. In the case of Rutgers testimony was from a Professor in Urban and Regional Planning concerned with his field. University of Louisville was represented by a political scientist.

namely, to serve human needs in housing. No organization seems to speak for human ecology, or, for that matter, the environment which is invariably affected by the policies and decisions. Considering all of the individual and family activities, housing is probably the largest consumer of the environment. Only independent institutions under multiple perspectives, like colleges and universities, could possibly bring these issues into proper focus in order for them to be dealt with in the broad interest of the people. Those who do make some commendable efforts, say candidly that the main reason for their being at all is that the universities have failed to do the job. 76

In many other areas the universities have become an instrument of public policy, often by utilizing and modifying their full resources. This of course has produced all kinds of stresses on the university structure as it has tried to serve out the traditional roles of education, research and public service. It has adjusted to the three demands especially in times of crises. When new problems came into focus such as national concerns for the protection of natural resources, conservation practices and recreation, it has not been a question whether the university should act, but how it could make use of its not unlimited

⁷⁶Verbal communication with National Rural Housing Alliance staff members during personal visit at their head-quarters in Washington, April 23, 1971.

intellectual resources for the new tasks while preserving its teaching role. Particularly affected by the question were general liberal education where between two-thirds and three-fourths of today's students in higher education happen to reside. In most of these developments the university could not help but become enmeshed in the weaving of the public policy fabric.

The Academic Institution and the Professional College

The future professional in the housing field could logically be assumed to have acquired basic skills in a program of education with professional goal orientation.

However, because of the nature of the housing system a firm base of general liberal education, which would include the natural and social sciences and the arts, appears essential. In other words, one sees academic education combined in a continuum while acquiring professional competence. Traditionally, most of the professional colleges have tried to do this as they have dealt with the problems of society operating at the interface of society and the sciences.

(See Footnote A.) To function in this manner requires a body of knowledge upon which a particular professional

Footnote A: This concept is different from the idea of combining liberal arts and science in a college undergraduate level program, Lyman Briggs Residential College at Michigan State University, for example. Here professional orientation is either left out or deferred.

field is built and also a variety of skills for use in finding problem solutions. The largest areas of scientific inquiry and education efforts of recent times are the result of offering knowhow to meet a public demand. Modern colleges of medicine, law and agriculture came into being by this process. More recently new ones have been added. They do tie in with the colleges of liberal arts as defined above, for example medicine with life sciences, engineering with the physical sciences, law with humanities. Now consider housing, it needs them all.

the body of knowledge to deal with the problem is at hand. In this case the usual approach is to form centers or institutes which generally are non-teaching and purportedly "interdisciplinary." Since a center or institute commonly revolves around one man, his particular interests tend to become dominant and so emerges a single-disciplinary bottleneck. Some of these institutes do finally mature as teaching units if their subject is of large enough concern and if true leadership becomes a visible and accepted shaping force. Michigan State University currently has seventeen Institutes and sixteen Centers. 77

Most universities are hesitant to consider new problem-oriented areas as they wish to avoid basic conflicts

⁷⁷ Verbal communication from William H. Coombs, University Archives, Michigan State University, May 10, 1971.

between the goals of government agencies and those of the university. Concern is not as much education versus research, but education versus public service. It creates a particularly thorny problem in housing. On one hand there are government agencies whose goals do include having or developing an informed public (from the political point of view), and increasing the body of so needed knowledge through research fund allocations. The university, on the other hand may acknowledge the need for research to guide action programs but often chooses more basic and personally rewarding areas of research including faculty-aided graduate student projects. Any choices may be influenced by the degree of controversy potential.

Public service work on behalf of problems with national dimensions such as housing could be developed through expanded extension and continuing education programs. However, if the university were to do a great deal more in this one area, something else would likely suffer, perhaps undergraduate education. This need not be, if the approach to solutions for problems of national scope were to be brought more effectively into undergraduate courses as has been the practice in a limited way in some professional education programs. A most ideal situation would be achieved by modifying and expanding general liberal higher education made up of humanities, social science and natural science to specifically include areas such as the urban

complex, housing, conservation, transportation, communications and pollution. This approach would help to bring young people into society's growth problems, demonstrate where science is so little understood and inadequately applied to human concerns, define where knowledge does not exist and at the same time understand how complex the influences are which eventually shape solutions. Under an arrangement of this type the humanities faculty, as an example, would have an opportunity to critically review the impact of a technological development upon the intellectual and spiritual dimension of man.

Whether this kind of an admittedly utopian plan is possible at all or has sufficient merit would require intensive study. A perhaps more practical ideal would be to merge general liberal and professional education where orientation is toward professions rather than general. But here again do we have a mighty challenge calling for innovation. As a first move in exploring that direction one might apply what we know about systems and the systems approach to solving complex problems. The university does have capable people engaged in the study and development of systems (true for Michigan State University).

Once important issues have been allocated a place within the university structure, the everpresent danger is compartmentalization. While initial enthusiasm and support may be at high levels, the issues as well as the

communications among disciplines tend to fade as a natural process. Housing as a professional discipline may have sufficient staying power to sustain itself since it is easy to predict that housing problems will persist as long as there is man in search of shelter. This statement assumes of course that the field can meet other educational criteria mentioned in this thesis. As we discuss professional specialization it must be remembered too, that any professional field is subject to rapid change and occasional obsolescence. History is strewn with examples to teach us this lesson. Therefore, structuring of any kind of a program must take this into account and provide for prevention of professional obsolescence over the long term. requirement goes hand in hand with avoiding compartmentalization, be it in a department, in an institute, a center, a school or a college. One way to counteract the tendency to compartmentalize is to organize the cores of the various national or large problem concerns as a nucleating force which would attract specialists out of the various disciplines. The force would have to be strong enough so that the pull is always toward the problem; in other words, maintain problem orientation rather than discipline orientation.

These remarks are not made without realizing how difficult it is for the university to alter its organization and methods of operation. That an accelerated rate of

change is needed is widely recognized and much discussed among university people themselves. Two such expressions from academicians of Michigan State University are picked at random for illustration. Agricultural Economist Bonnen writes under the title "The Colleges of Agriculture: Old Bottles, New Wine?" and concludes that "Colleges of Agriculture (as most professional schools) run the risk of becoming publicly supported institutions devoted to improving the balance sheets of already affluent private firms" instead of servicing "the public interest." He goes on, "The present organization of many of the colleges and the mind sets of their faculties are inadequate to the challenge of the next decade" (the 1970's). 78 Sociologist Sower writes under the title "Obsolete Universities, They Can Be Upgraded" and argues that a positive external power must challenge the entrenched status quo forces which exist within the vast educational establishment. 79

⁷⁸ James T. Bonnen, "The Colleges of Agriculture: Old Bottles, New Wine?" (paper presented to annual meeting of National Association of State Universities and Land-Grant Colleges, Columbus, Ohio, Nov. 13, 1967).

⁷⁹ Christopher Sower, "Obsolete Universities, They Can Be Upgraded (unpublished manuscript, Organization Research Unit, Department of Sociology, Michigan State University, Dec. 1, 1970).

Multi-Discipline

Another point to be considered is that because of its nature study and research in the housing field has to be broadly multi-disciplinary. This conception is also held for other fields by people who make important funding decisions. For example, in its departure from funding only research ventures in the pure sciences, the National Science Foundation just recently rearranged its funding program to include a new effort named RANN (Research Applied to National Needs). One of the qualifying requirements is that such research be broadly multi-disciplinary or even multi-university. If so presented, the chances are good that soundly based housing projects would be funded. 80 This immediately creates a problem for the university system with its organization by disciplines. Graduate student research, theses and dissertations normally come in single discipline packages as partial fulfillment for a degree. At best there may be a major in one field plus a minor in another. But when the graduate is confronted with problems of the real world, such as housing, they are found truly multi-disciplinary in nature. Yet, the educational experience had not been organized in this way. If the universities would elect to support housing education,

⁸⁰ Verbal communication with NSF staff members while making a personal visit at their offices in Washington, April 19, 1971.

a rearrangement of the present approaches would again be called for. One suggestion made was for a college of Interdisciplinary Studies. This would be broader than housing and human habitat and could include a number of other areas where interdisciplinary combinations would make sense, management of public affairs, as one example.

True, even in multi-disciplinary effort everyone has to be expert in his particular discipline. It can be likened to a symphony orchestra or an opera company where each and every player has to perform his part with expertise, but at the same time in tune and coordinated with all others to produce a harmonious and balanced whole. What a mess it would be if it were otherwise.

As the basic relationship between man and his environment gains in interest and attention, scientists and administrators increasingly stress that the consequences of new knowledge be carefully weighed. If technology is to serve human needs more efficiently, the effects of changes and innovations must be more thoroughly assessed. This situation also leads to increased emphasis on multidisciplinary approaches to public problems. 82

⁸¹ Suggested by David L. Armstrong, Director Resident Instruction, College of Agriculture and Natural Resources, Michigan State University, during interview March 26, 1971.

⁸²These observations are from: National Patterns of R & D Resources, Funds and Manpower in the U.S., 1953-1971, National Science Foundation, NSF 70-46 (Washington, D.C.: U.S. Government Printing Office), p. 10.

Whether the universities can gear up for multidisciplinary work at all is being questioned by many. Speaking of research in urban issues, Downs makes the point that "the topics must be multi-disciplined." He goes on to say "the real world pays no attention to the intellectual straight-jackets of academic departmentalization." He has "long been a non-believer concerning the ability of universities to perform team-oriented, multi-disciplined research. The intellectual atmosphere of universities had in the past attracted mainly individualists, as perhaps it should. Hence most academic researchers do not like to immerse themselves into larger teams."83 For how long can the universities continue on the present track and still expect general public support? The academic intellect do see the need for becoming more multi-discipline oriented in order to better serve public demand. However, at the same time they point to the present reward system which does little to encourage stepping outside of their own established disciplines. The universities should examine ways by which this could be changed so that public interest would be accommodated and public support enhanced.

⁸³Anthony Downs, "Some Suggested Directions for Urban Research" (from a paper delivered at a Conference on Urban Research sponsored by the Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University, June 6, 1970).

Multi-University

To attack massive problems it would make sense for the universities to join together in common efforts. coalitions have in the past come about under a number of conditions, often crises. Therefore it would not be an innovative development. Sponsorship, direction and management of consortiums have generally originated from agencies outside of the universities. One effort of interest for our purpose is the cooperative work carried on in housing, family living and other subjects under the sponsorship of the Agricultural Experiment Stations and the United States Department of Agriculture. These activities were organized on a regional basis using the United States Department of Agriculture Regions as a framework. The projects began in about 1951 and are still being carried on, although with the recent decline in USDA funding they function on a reduced scale. An example of the coordinative efforts is the Regional Project NC9 (North Central Region) which was organized around "Utilization of Materials to Meet Housing Needs of Rural Families." Various colleges mutually agreed to carry out research projects limited to certain areas while coordination was achieved through periodic meetings of the principal researchers involved. There was some interesting work done, but in terms of overall needs it was on far too small a scale. One could call it an engineeringhome economics effort, rural orientation, men and women

working together, yet pursuing objectives employing their own particular strengths. Since this work has a twenty year history, a closer examination of this experience in terms of its usefulness, its methods and its possibilities is suggested.

Another example on the same track would be North Central Research Committee, NC54, activated in 1966. Its mission was designated to the "economic, esthetic and environmental aspects of family housing" and to make recommendations to give new direction to housing research by home economists and others associated with Agricultural Experiment Stations. By March 1971 NC54 had produced a draft of an annotated bibliography: Residential Environment Studies Relevant for Research Programs. The intent was excellent, the results, though quite meager, are commensurate with the tiny resources available for such endeavors.

In as enormous a field as housing and human habitat it is only reasonable to expect that all the interests and capabilities necessary for a comprehensive program do not exist at any one college or university. This happens to be

⁸⁴ For illustration see: Farm House Requirements and their Application in the Improvement of Farm Housing, a Summary of Research Studies Under Regional Project NC9 etc., 1951-1962, North Central Regional Research Publication 164 (West Lafayette, Ind.: Purdue University, Agricultural Experiment Station).

⁸⁵ See: North Central Regional Research Publication No. 931.

particularly true when one thinks about research, experimentation and demonstration. Through its very nature the subject is bound to a geographic location. Other than dealing with the few purely technical aspects, many educational activities have to occur where people actually live in real life situations. Long periods of time for study and observation may be required, over many years in some cases. Research opportunities will have to be taken advantage of as they arise, necessitating being in close contact with local situations, with local public agencies, planning officials, development operations, public and private, demanding all kinds of interpersonal relationships. Further, there is the important need for active and intensive student involvement in real world experiences. These and other factors dictate some geographic area boundaries around the institutions. Such boundaries are also indicated for management control over whatever field operations are carried on and also for effective communications.

How a multi-university effort in this subject area can be organized, coordinated and controlled should be a study by itself. The question of how to utilize the multi-university concept is closely tied to how to make the multi-discipline concept work within a university. Likely solutions demand innovation and testing, experimental projects to learn how to bring needed disciplines together. Potentials for financial support of such research and experimentation should be investigated.

CHAPTER VII

MICHIGAN STATE UNIVERSITY

Search for Information

In an interview, Dean Boger, College of Agriculture, "This university has much more to offer for housing than it has delivered."86 It is a statement which to a large measure characterizes the substance of the information derived from conversation with deans, chairmen, faculty and administrators of Michigan State University (MSU). In Chapter VI some philosophical questions relating housing, housing education and research to colleges and universities were discussed. This chapter describes the inventory and analyzes more specifically what the universities have to offer as a contribution to the improvement of housing and the human habitat. To do this fairly and comprehensively would mean an examination of a cross section of all colleges and universities in the United States. Obviously, this would constitute a very large task, unthinkable for the scope of a master's thesis. The only practical choice was to pick one university as a sample and

⁸⁶Personal interview with Lawrence C. Boger, Dean, College of Agriculture at Michigan State University, East Lansing, Michigan, March 18, 1971.

to implement the findings through specific inquiries from other institutions and organizations.

The path of least resistance led to choosing MSU. There were several reasons. One was, that this happens to be homeground. Another was, that a group of faculty, in a challenging way, expressed more than passing interest in an investigation of the universities' roles in housing and housing education. A third reason was, that there is actually a long history of preoccupation with housing-related subjects in a number of departments at MSU. While the degree of emphasis is difficult to establish, the presence of interest was considered significant by itself. In other words, here at MSU one could find people interested in doing more than is being done to implement the already described national housing policy. This then could be considered fertile ground for an investigation of interest, competencies and capabilities.

The plan for such an investigation was first outlined to a group of thirteen faculty members and administrators known to be interested or involved in housing.

The meeting was held on September 29, 1970. A listing of names and affiliations can be found in Appendix I. A number of suggestions were made. No one spoke against the project. It was agreed that a university-wide inventory be made, the results of which could become a building block for a housing program. The participants in this meeting offered

their help. The approach decided upon was to interview as many administrators and faculty as possible who could make a contribution, who have or have had some relationship to the subject or who could refer to others who were in possession of some information. The purpose in doing so was to obtain as much data as possible to construct a profile of relevant content at MSU, which may be or may have been in the past related to housing. Ascertaining prevailing attitudes toward housing education was also a part of the purpose. Seventy-seven interviews were carried out between September 1970 and April 1971. Those interviewed were generous in giving their time. There was only one refusal of an interview. The sample may be called a biased sample in that the people seen had some, though often quite remote, interest in or relationship to housing education activities. Since the objective was to collect bits of information related to housing and the university, there was no point in making inquiry with parties which could be assumed as disinterested. The people interviewed can be classified as shown in Table II, Breakdown of Interviews by Department and College at MSU. Also see Appendix II for a listing of people interviewed, their names and affiliations.

The interviews were unstructured except for these questions:

1. Should the university be concerned with housing?

TABLE II

BREAKDOWN OF INTERVIEWS BY DEPARTMENT AND

COLLEGE AT MICHIGAN STATE UNIVERSITY

| · | ADMINISTRATION | FACULTY |
|---|----------------|-----------------------|
| COLLEGE OF HUMAN MEDICINE | 1 | 5 |
| COLLEGE OF BUSINESS Hotel, Restaurant and Institutional Management Economics Management Marketing Accounting and Financial Business Research | 1 1 | 1 1 1 1 1 |
| COLLEGE OF AGRICULTURE AND NATURAL RESOURCES Agricultural Economics Agricultural Engineering Natural Resources | 2 | 6 5 |
| School of Packaging Resource Development Parks and Recreation | 1 1 1 | 2 1 1 |
| EXTENSION SERVICE | 4 | |
| COLLEGE OF SOCIAL SCIENCES Urban Planning and Landscape Architecture Social Work Sociology Police Administration and Public Safety Geography Psychology | 1 1 1 | 3 2 1 1 |
| COLLEGE OF ENGINEERING Metallurgy, Mechanics and Materials Science Electrical Engineering and Systems Science Engineering Research | 1 1 1 | 2 1 1 |
| COLLEGE OF COMMUNICATION ARTS Audiology and Speech Sciences | 1 | |
| COLLEGE OF EDUCATION Secondary Education and Curriculum Administration and Higher Education | | 2 1 |
| COLLEGE OF HUMAN ECOLOGY Human Environment and Design Family and Child Sciences | 1 1 1 | 1 |
| COLLEGE OF ARTS AND LETTERS Art | | 2 |
| INSTITUTE FOR URBAN AFFAIRS | 2 | |
| INSTITUTE FOR COMMUNITY DEVELOPMENT | 2 | |
| UNIVERSITY PUBLIC SERVICES | 1 | |
| UNIVERSITY ARCHIVES | 1 | |
| UNIVERSITY ADMINISTRATION President's Office Research Administration Institutional Research | 2 1 1 | |
| TOTAL | 33 | 44 = 77 |

2. If yes, why, and where should it be within the university structure and who should do it?

The answer to (1) was 100 per cent yes (considering the bias of some respondents this may not mean much). However, nearly one-half of the respondents qualified their answer by insisting that the concept housing as normally thought of would have to be expanded for this purpose into a much broader concept, e.g., human environment or human habitat.

The "why" part of question (2) generally elicited responses like "housing is closely tied to human development, one of the main concerns of the university." The question "where . . . " brought forth four different responses about evenly divided among the four categories: (1) a center, (2) an institute, (3) a separate department subordinated to certain offices in the administration of the university, e.g., the president's office, the provost's office, and (4) no idea. There was a surprising lack of any innovative ideas. Three respondents suggested that housing belongs in the domain of human ecology (respondents were not associated with the College of Human Ecology). Only one respondent mentioned Urban Planning (respondent not associated with the School of Urban Planning). The "who" part of question (2) turned out to be the most difficult in that few of those interviewed had any ideas, nor were any number ready to make positive suggestions, much less a commitment. Respondents seemed tightly bound by existing

convention and the reward system ("What would be in it for me?" "It is a good idea, but let someone else do it").

Other informal findings of importance can be summarized and loosely grouped under the headings:

- History of housing-related activities leading up to current situation
- 2. What the interviews disclosed regarding
 - --inventory of housing-related curriculum content
 - --interest, current and potential future
 - --research

Add to this external factors:

- 3. View from the outside
- 4. Status at other universities

History of Housing Activities at MSU

Michigan State University and its institutions have had substantial interest and some successes in housing going back for many years. Standing committees have functioned to coordinate work centered in the College of Agriculture; the concern: housing for farm animals and farm structures. Farm housing for humans was a minor sideline. After WWII there was some preoccupation with housing students, veterans, married students, then a new phenomenon. During the early 1950's interest in rural housing perked up to some extent.

It was then that one became more aware of the relationship between the farmer's enterprise and his home environment. Research coordinative with other experiment

stations in the North Central Region has already been mentioned. The Agricultural Engineering Department led in these efforts and by the mid-1950's was actively engaged in research work, developing structural components and house plans primarily for rural housing. Courses were introduced to the undergraduate program, some joint with Engineering Drafting and Design, some with Forest Products to complement the Home Economics and Agricultural Engineering curricula. Practically all of this work was oriented to physical layout and design. The information so developed was made available to the public through the Extension system (now under Family Living) which included a house plan information service. Parallel with these activities were research and extension efforts of the Department of Forestry coinciding with their fundamental interest in the utilization of forest products. There was a busy laboratory devoted to development of new and improved techniques in home construction. Light building construction and technology went hand in hand and there were courses to teach these skills to students wishing to work in the residential house-building industry.

However, these activities were not unique to this institution alone, but were carried on by many sister organizations in other Land-Grant colleges as well as by the USDA. Primary financial support came from USDA and its various agencies. There were a few grants from other

sources. It is worthy of mention that the home economists in the extension service were involved in these programs largely to disseminate the design and product information available and thusly the College of Home Economics had a part in these efforts. As already pointed out, the orientation was rural, except for the utilization of forest products and the construction technology phase, which of course was applicable to all kinds of housing and structures. Support for these programs declined during the 1960's. This is difficult to understand, as two-thirds of the nation's substandard housing is in rural areas. Could it have been the influence of the university, where attitudes toward how-to-do-it education was viewed to be of less value than more intellectual pursuits?

Housing problems continued to occupy the attention of some of MSU faculty. A committee project was undertaken between 1962 and 1964 to look into the possibilities of a major thrust on the part of MSU. The project was largely sponsored by the Extension Service under Director N. P. Ralston, who gave this work some of his personal interest and attention. This attempt was to bring together some departments within the College of Social Sciences—Community Planning and Development, the College of Agriculture—House Structure Design for Families and the College of Home Economics—Family Living Environment. The committee used the services of an architect—consultant who prepared a

proposal which even by today's measure was quite forward looking. It dealt with concepts such as "organic housing," "housing function," "living space design" and "housing education," the latter oriented to distinct career possibilities. The education phase was to be reinforced by research. It had a 5-year program development timetable. The project died for lack of released time for committee members to devote to the development of programs. A change in administration resulted in a re-orientation of the Extension Service at MSU.

An ad hoc housing committee was formed in 1969 under the leadership of Dr. Robert Summitt, College of Engineering, Department MMM. Periodic meetings by the group were held for about one year when a proposal was made to the University Administration. For unexplained reasons no action resulted and the effort died.

During the lifetime of the above committee, the Center for Environmental Quality was formed under the direction of Dr. John E. Nellor. Within the framework of this Center a housing committee was formed made up of people different from the Summitt group. This committee is now also non-operational. Reason given by Dr. Nellor:

". . . they have accomplished nothing."

Remark made by Dr. John E. Nellor in conversation while at his office, Feb. 10, 1971.

When the forest products department within the College of Agriculture was broken up, the forestry people joined the Department of Natural Resources and the light construction activity was placed into the School of Packaging, also a department of the College of Agriculture.

The orientation became one of construction technology and management, dealing with the production phase of the system, apparently with outstanding results considering the imposed limitations and the activity's location within the university hierarchy of priorities. The Director of the School of Packaging expresses a long-time deep sense of commitment to the field of housing as a discipline. 88

The College of Engineering has always had traditional preoccupation with some of the technical aspects of housing, civil engineering, materials, etc. But the emphasis has always been quite minimal in the context of the entire engineering curriculum. The division of Engineering Instructional Services has been teaching a number of engineering drafting, design and graphics courses which not only serve students in engineering, but also students in the College of Human Ecology, Building Construction, Agricultural Engineering and other fields where such skill is required. At this point it should be mentioned that there are reported problems in adjusting courses and course content to meet the increasingly diverse needs as well as

⁸⁸Personal interview with Dr. James W. Goff, Feb. 15,
1971.

student interests from outside of the Engineering College. Some of the courses are labeled "Architectural Drafting," although MSU does not have a School of Architecture. In 1957 a registered architect was appointed to chair this department with the presumed objective of establishing a school or department of architecture, a goal which never materialized.

The College of Home Economics (now College of Human Ecology) has long been concerned with some housing-related subjects. Under nutrition one could find food storage, meal preparation and consumption. Household equipment was taught as a subject covering the basis of selecting many of the life-support facilities in the home as well as their maintenance. The former Department of Clothing, Textiles and Related Arts concentrated upon furnishings and planning within a major in Interior Design. Home Management and Consumer Economics deal with time and economic factors involved in housing. The Family Living phase of course is also related to families and their near environment.

In the recent restructuring and reorientation of the College of Home Economics into Human Ecology, the new emphasis was to bring into focus the relationship of man and his near environment which would naturally include housing. The corresponding change from Department of Textiles and Related Arts to Human Environment and Design is to deal with the study of the family and its near

environment, clothing and shelter. But this is conceived of as only a part of the total system, specifically the micro-environment. 89

Human ecology considerations in housing were brought into the School of Urban Planning curriculum in 1968 with the inter-disciplinary course "Man And His Shelter" (UP-433), an inter-disciplinary course between Urban Planning and what is now College of Human Ecology and its Department of Human Environment and Design.

Extension has had a nominal part in these activities. An extension specialist in housing has been attached to the Agricultural Engineering Department for about ten years. His concentration has been centered on housing economics, Mobile Homes and modular factory-built housing as an economic answer to housing problems. He has become a national figure as an expert in that field. Landscape Architecture has tied into extension work concerned with housing. A Home Furnishings Extension Specialist is attached to the Department of Human Environment and Design, focusing on programs for adults and 4-H providing counsel and assistance for selecting furnishings and interior designs.

In 1967 the Rural Manpower Center with Agricultural Economics, Agricultural Engineering, Home Economics and

⁸⁹From the Department of Human Environment and Design description of course major as revised Feb. 18, 1971.

the Cooperative Extension Family Living Program produced the report A Housing Quality Measuring Scale. The intended use was for determining actual quality of farm labor housing, or migrant labor housing.

More recent has been the formation of an ad hoc committee under the leadership of the Cooperative Extension Service to again look into the housing program. A series of meetings have been held but no firm plan had evolved as of the date of this writing.

The Inventory As Summarized From the Interviews

The mass of detail collected in the form of notes during the interviews is summarized in this section.

Inferred or otherwise indirect but relevant bits of information are mentioned in author's notes or comments. Identifiable existing courses with housing-related content are shown underlined. Such courses are not necessarily in useful or even adaptable form. Potential course content modification to suit the requirements of a housing education program would hinge on a number of factors, among them demand, budget allocations and level of interest on the part of administration, faculty and students. In the aggregate the problem does not seem to be insurmountable.

⁹⁰ Annette Schaeffer and Carlton M. Edwards, A Housing Quality Measuring Scale, a Report on the Development and Use of a Scale to Measure Quality in Family Housing Units, Report No. 8, Michigan State University, East Lansing, Mich., May, 1967.

Information gathered through the interviews permits construction of a profile describing what is a formidable array of substance. A significant defect is that the interviews did not tell what does not exist, or, what is needed for a comprehensive university program in housing. A few of the major missing elements at MSU will be examined in the next chapter. The interview summary follows:

College of Human Medicine:

- --Housing and human health relationships are now well documented and recognized. Substantial experience can be found in the work done by Michigan Health Surveys, a joint venture between the Michigan State Department of Health and the College of Human Medicine.
- --Trends are to shift away from dealing with pathological problems alone to the environmental sources of mental and physical health problems and their significance in prevention. This means a better understanding of human ecology and the human habitat and a change in thinking and practices related to the expanded concept of housing.

--Related are:

--the environmental ecology portion of the seminar

Medicine and Society, a three-term sequence,

Ecological Psychology, environmental psychology and
the uses of space,

- --courses related to Principles or Biological Systems,
- --clinical experience in housing-health relationships through Michigan Health Surveys. Measuring and qualifying health factors related to housing,

--excellent materials for seminars on the subject.

College of Business:

School of Hotel, Restaurant and Institutional Management:

- --Has subjects which are similar but not the same as courses which might be required in a program centering on the professional management of housing.

 Examples, Service Industries Equipment and Utilities,

 Service Industries Maintenance, Evening College course in Apartment House Management.
- --General orientation is hotel, motel, resort and restaurant operation, concerned with transients as opposed to residents in housing.

Department of Accounting and Financial Administration:

- --Has courses in accounting, accounting systems, insurance and taxation. Some of it applies to professional housing management and other phases of building and construction management.
- --Course Principles of Urban Real Estate Administration deals with subject from investment point of view.

--Other real estate courses had been included in program at one time.

Department of Economics:

- --Courses are in Micro-economic Theory, Money, Credit and Financing, The Price System, State and Local

 Finance and Urban Economics. All relate to the subject of housing and are in various degrees needed in support of the decision-making processes in Government, Politics, Finance and Households.
- --Micro-economic Theory and Economic Analysis dealing with the price system and quantity-scarcity relationships, principles which apply to housing.
- -- Economics of Construction is a related special subject.

Author's comment: Anyone seeking a career in the housing field should be at least friendly with urban and housing-related economic issues, particularly as basis for consumer and housing economics. More in depth study is indicated for the scholar in housing. See Chapter IV dealing with housing economics.

Department of Management:

--Mostly <u>Business Management</u>, but also <u>Personnel Management</u>, including personnel behavioral problems, organizational behavior, human relations, sensitivity training, conflict-confrontation and resolution of

conflict. Some of this would apply to professional housing management, as well as the management of construction and maintenance operations.

Author's note: These courses are now reported overloaded and the situation would need careful examination before bringing in students interested in housingprofessional careers.

Department of Business Law and Office Administration:

--Some course content in business law is distantly related to housing, for individuals as well as for
professional operators in housing.

Author's note: Housing comprises many legal aspects; see next section of this chapter for more on this.

Department of Marketing and Transportation Administration:

--There are several courses in marketing covering strategy planning, profitable operation and control.

One of the major tools is market analysis and development of strategies. While the generalist view is taught, it would be applicable to several aspects of housing. The planning of living spaces is tangentially related to these factors.

Author's note: What has been said above under the heading of Department of Management also applies here. The present courses are now reported as overloaded.

Suitable arrangements would have to be made to accommodate students in the housing field.

Author's general comments for all of the Business College:

- (a) Business college orientation may be in conflict with social and human needs goals to be achieved in housing.
- (b) A combination of the MBA program and housing could be beneficial (see Figure IV). Develop concepts at MBA level around a core of accounting, finance, marketing, management and housing, combined with human ecology.
- (c) Generally speaking, all social programs including housing programs are in dire need of better management.

College of Agriculture and Natural Resources:

Department of Fisheries and Wildlife:

- -- Resource Ecology and Man
- --Conservation Education

Department of Forestry:

--Natural Resources and Modern Society

Department of Resource Development:

- --Land Economics
- --Location Analysis
- --Public Direction of Landuse

--Community Resource Development

Author's note: Community Resource Development at MSU has not been much concerned with housing as an important community resource.

Department of Parks and Recreation Resources:

- --Leisure and Recreation Resources
- -- Parks and Recreation Area Design (recreation spaces)

Department of Agricultural Engineering:

- --No longer active in housing, at one time had courses in House Planning, Maintenance of Structures and Equipment. Was engaged in housing research.
- --Extension Specialist in housing is located in this department.

Department of Agricultural Economics:

- --Proposed major in <u>Community Systems Management</u> would be a parallel to apparent need for a major in Professional Housing Management.
- --Two Ph.D. candidates now working on dissertations with housing as subject. This is not a new occurrence in this department. 91
- --Department has done considerable amounts of work in the area of housing for migrant workers, mostly under outside sponsorship.

⁹¹ See Ermand H. Hartmans, "Some Economical and Physical Aspects of Farm Housing in Selected Areas in Michigan" (unpublished Ph.D. dissertation, Michigan State University, East Lansing, Michigan, 1950).

School of Packaging:

- --Provides for major leading to a B.S. and also an M.S. degree in <u>Building Construction</u> which includes housing.
- --The shift to industrialized housing poses new challenges.

Extension Education:

-- Has not been concerned with housing.

Author's note: How diverse an originally single-discipline college can become, that is, how over time it can broaden its scope by taking on other fields, is illustrated by current enrollment data in the College of Agriculture and Natural Resources. Two-thirds of the students are majors in non-agricultural programs. 92

College of Engineering:

Department of Civil and Sanitary Engineering:

- -- Has several housing-related, technical courses.
- --Several courses contain the technology required in the design and administration of Building or Construction Performance Codes.

Department of Electrical Engineering and Systems
Science:

⁹²From David L. Armstrong, Director Resident Instruction, College of Agriculture and Natural Resources, Michigan State University, East Lansing, Michigan, interview March 26, 1971.

- --Major current research project is Design and Management of Environmental Systems
- --Has capability to develop the systems approach to better understand and to help solve housing problems.
- --Brings social problems into systems science as demonstrated in the Regional Medical Program. 93 , 94
- --Chairman of the department is interested in application of the systems approach to the study of housing and human habitat, coordinating and managing multi-disciplinary effort.
- --Several courses contain the technology required for Building Performance Codes.

Department of Metallurgy, Mechanics and Materials
Science:

- --Mechanics
- --Color Technology, useful for seminar purposes in color, texture, optical perception related to environment (also involves psychology).
- -- Technological Assessment. The relationship of technology and the human environment. There are numerous

⁹³ See Regional Medical Programs, Methodology of a Health Survey in a Public Housing Project, College of Human Medicine, Michigan State University (East Lansing, Mich.: 1969).

⁹⁴ See Regional Medical Programs, A Model of Health Service Utilization and Resource Allocation, College of Human Medicine, Michigan State University (East Lansing, Mich.: 1969).

- environmental issues in the design, construction and ultimate use of housing.
- --Several courses contain the technology required for Building Performance Codes.

Department of Mechanical Engineering:

- --Courses in <u>Residence Heating</u>, <u>Refrigeration</u> and <u>Manufacturing Processes</u>.
- --Several courses contain the technology required for Building Performance Codes.

Department of Engineering Instructional Services:

- --Structural Drawing
- --Architectural Drafting
- --House Planning
- -- Architectural Perspective Drawing

Author's note: Some of these courses are currently being changed to try to accommodate various demands from other colleges as well as student interest.

College of Communication Arts:

Department of Audiology and Speech Sciences:

--Department is uniquely concerned with sound and noise as it affects human beings as opposed to engineers who deal with vibration and energies. Can demonstrate, provide readings and handle seminars on noise and the human environment.

--Other departments in this college have course content which touches the subject of housing to some degree, depending on the area of emphasis.

College of Social Sciences:

Author's comment: Every department in this college deals with subjects into which housing overlaps in one form or another. Human social activities occur within the environmental framework, housing or habitat.

School of Urban Planning and Landscape Architecture:

- --Urban Planning is concerned with the macro-environment in which housing units are, in part, the pieces which make up this environment, neighborhoods, communities, cities and regions.
- --Landscape Architecture looks mostly after man-made esthetics of the landscape, the environment for housing.
- --Course content for both majors in some measure has to do with housing, the human habitat and people.
- --Courses specifically related to the subject of housing are <u>International Housing Developments</u>, <u>Man and His Shelter</u> (see College of Human Ecology for explanation), Ecological Basis for Planning.

Author's comment: The human habitat probably needs more attention from the point of view of the relationship of

the human being to his environment using the ecological (systems) approach. Relationships of this macro to the micro (as in Human Ecology) should be considered by anyone interested in the housing subject or in urban planning.

Department of Sociology:

--This department has a substantial number of courses where content relates to housing at various levels, among them: The Family in Contemporary America,

Urban Sociology, Rural Sociology, Comparative Urban Sociology, Social Sociology, Human Ecology, Urban Theory, Social Survey Methods.

Author's note: (a) The Sociology Department does not have a family sociologist, nor courses in family sociology, an essential element in the study of housing.

(b) The impression gained during the interviews was that housing is too mundane a subject for this department with its currently high-academic orientation as opposed to practical application of knowledge. The attitude was expressed in remarks like: "... who is interested in housing, there are so many causes these days," "... there is so much more fundamental work we can do." Obviously, these remarks may not reflect the attitude of the entire department since some members seem to disagree with the philosophy in general.

Department of Psychology:

--Department lists a large number of courses. Their content relationship to the subject of housing is difficult to establish. We know that there are many factors of a psychological nature which point to a relationship between the individual and his physical environment. Needs more detailed attention to establish what interest and content is present. The investigator should be grounded in psychology.

Department of Political Science:

--Courses do not consider housing specifically or that housing is, in a large measure, a political issue.

Author's note: Needs treatment of government and housing policy questions as brought out in this thesis.

Department of Police Administration and Public Safety:

- --Course <u>Industrial Security Administration</u> may have some relevance to housing.
- --Can provide independent study opportunities. Fertile area for graduate students as there is practically no knowledge base on the subject of living environment and security.

Author's note: As mentioned elsewhere in this thesis, safety and security for individuals and families in our urban settlements have become a high-priority issue.

School of Labor and Industrial Relations:

- --Under this heading could come the problems of tenantlandlord confrontation, a new phenomenon which needs study. Currently no consideration is given to the problem by this school.
- --Labor relations problems in professional housing management are similar to those found in any business and industry. Apparently this has not yet been considered.

Author's note: It is the similarity between what this school has to offer and problems in multiple housing which point to this school as a possible place for study and teaching of the subjects referred to in these notes.

Department of Geography:

- -- Urban Geography
- --Housing studies have been included in <u>Techniques of</u>
 Field Research.
- --There are other courses where content relates to human habitat, rather more under the heading of community and not limited to housing.

Department of Anthropology:

--Has courses like Environment, Technology and Culture which go into the interdependence of social organizations, technology and the environment.

School of Social Work:

- --Involved in housing through question of concern in social work: "How does a family get along?"
- --For multi-family housing, social work has a great deal to contribute, inter-personal service, access to services, work with low-income occupants, migrants, help in plain living.
- --Course Field and Agency Experience could include housing.

College of Education:

Author's comments: As a general statement it can be said that the interest in housing was found to be marginal. The situation is not unique for this college. It seems to persist throughout the education industry, the State Department of Education as well as HEW. To illustrate, health education seems to look past the environmental importance of housing. This poses some serious questions. The scope of this thesis does not permit going into them.

Department of Secondary Education and Curriculum:

- --There are no suitable courses related to our subject, housing.
- --Vocational and agricultural education has over time passively related to home environment and community

- improvement. Future Farmers of America have recently sponsored more progressive work at secondary education level. 95
- --There have been scattered vocational education efforts in house construction and the like without direct involvement of this college.
- --Industrial Arts education within this college is not concerned with housing. Objectives of Industrial Arts education are stated as: (1) exploration of industry, (2) avocation, (3) esthetic appreciation, (4) consumer knowledge, (5) guidance, (6) safety education, (7) critical thinking and creative expression, (8) social relationships, and (9) skill in basic industrial processes.
- --The Mott Institute for Community Improvement, a part of the College of Education, does not embrace housing, the human habitat or the environment. 97

⁹⁵U.S., Department of Agriculture, Farmers Home Administration, Build Our American Communities, a Development Program for High School and Young Adult Groups (Washington, D.C.: Government Printing Office, June, 1970). This project includes housing.

⁹⁶ As found under National Goals in Wilbur Penderet, et al., Industrial Arts in General Education (Scranton, Pa.: International Textbook Co., 1967), pp. 53, 54.

⁹⁷ Mott Institute for Community Improvement, Programs for Change in Education (pamphlet), Michigan State University (East Lansing, Mich.: n.d.).

Author's comment: A part of the answer could perhaps be found by monitoring the already referred to efforts of Future Farmers of America and Farmers Home administration, USDA, in promoting a community development program which would include housing and the environment for highschool and young adult groups. 98

--College of Education Faculty say that ". . . progress could only come through commitment from other colleges and departments of the University in providing the education system with knowledge and information which is worth placing into the education process and which should be accorded higher priorities."

Author's comment: This is one of the challenges for those interested in housing and the human habitat at MSU.

College of Arts and Letters:

--Department of Studio Art courses in <u>Graphic Design</u>
and <u>Industrial Design</u> relate to the subject, particularly the latter, when considering the fact that housing production is becoming more and more industrialized.

⁹⁸Build Our American Communities, op. cit.

College of Human Ecology:

Department of Human Environment and Design:

- Textiles, Clothing and Related Arts and is to include housing along with the subjects of its former emphasis: Clothing, Textiles, Clothing and Textiles
 Retailing and Merchandising, Apparel and Homefurnishings Accessories, Interior Design, Dress and Textiles
 Design, Weaving, Crafts, Housing and Homefurnishings,
 Man and His Shelter (multi-disciplinary with Urban
 Planning), and at graduate level: Psycho-Social
 Cultural or Economic Aspects of Clothing, Textile
 Research, Problems in Clothing Construction and
 Design, Research and Development in Family Housing,
 Generalization and Concepts for Teaching Family Housing,
 ing, Housing for People with Special Needs, Clothing
 and Human Behavior.
- --The "Human Environment" in this context was conceived of as Clothing and Shelter, a micro- or near-environment. It is to follow the "ecological approach to the study of interrelationships between family and the near environment." Shelter is conceptualized as "the housing (home or habitat), the spatial environment in which man exists and interacts. . . "99

See Department of Human Environment and Design, Human Environment and Design Major, as revised to Feb. 18, 1971.

Author's comments: (a) The boundaries of the spatial human environment are left in an unclear state of definition. For purposes of developing multi-disciplinary housing programs clarification would be needed.

(b) A separation between clothing and shelter would also be desirable, if not essential. (c) The concept "human needs" should be defined. (d) It would also appear that "human ecology" should be all-inclusive. The boundaries are prescribed by the human ecological system. (e) The "design" phase in Human Environment and Design also needs clarification, for example, with respect to Studio Art or Engineering Instructional Services. Who "designs" what? (f) Thinking about housing, new undergraduate programs in Human Environment and Design need broader backgrounding in human behavior and development and some degree of concentration on economics, urban planning, political science, social science, communications and perhaps other.

Department of Family Ecology:

- --These courses contain relatively small parts concerned with housing: 100
 - --Analysis of Family Income
 - --Consumer Economic Problems

 $^{^{100}}$ Also mentioned in Chapter IV, The Economics of Housing.

Institute for Community Development:

- --It is part of the Continuing Education Service at Michigan State University.
- --No programs directly involved in housing.
- --One man is part-time specialist on planning, zoning, codes and landuse regulations, which does have a relationship to housing.

Continuing Education Service:

Evening College: 101

- -- Has well-attended courses in:
 - --Build, Buy or Rent
 - --New Life Styles
 - --Residential House Planning

Conferences:

- --Percentage of conferences held on housing-related subjects is relatively small. Among them:
 - --Mobile Homes
 - --Sewerage and Disposal
 - --Motels

Author's note: It would be interesting to catalogue and so find out who does the job of continuing

¹⁰¹ From Evening College Schedule, Winter Term 1971 and verbal from Administrative Staff.

education in housing. Other sections of this thesis give some clues.

Institute of Urban Affairs:

--Concentration now is on high-density urban settlements and their underprivileged, underachieving and ethnic related problems.

Author's note: Since rural areas have one-half of the nation's poverty plus two-thirds of all substandard housing, why not an Institute for Rural Affairs?

- --Housing of concern only as it is affected by such contemporary urban problems as:
 - --Poverty
 - --Race
 - --Discrimination
 - --Social Relationships
 - --Citizen Participation
- --It was pointed out that under poverty conditions few people are interested in environmental design, ecology, pollution, etc., even the future for that matter.
- --Thinking about sponsoring a three-course sequence:
 - --Housing and Social Policy
 - --Housing and Poverty
 - --Housing and Discrimination
- --Teaching is of course done within other colleges with partial fund support provided by the institute.

- --Would like to do research to better understand and solve urban problems.
- --Important consideration of program is the "Transitional Phase." Land-Grant originally dealt with mostly natural resources. As we moved from rural to urban the problems went with it (or were so created), but we, as a society, never really came to grips with redirecting these resources. In other words, the creation of the "agricultural machine," in which Land-Grant Universities, Experiment Stations and Extension had such a strong hand, inadequately considered the effects on the byproducts of this agricultural industrialization, the effects on human resources and communities. 102

Author's comment: One can point out that the Smith-Lever Act, Extension's original charter, had not specified rural or farm people, but "the people of the United States . . . not attending or resident in said colleges." While cooperative extension in most states has reached into urban communities to meet growing demands, urban work has been very small in relation to rural work. The Institute's program therefore seeks

 $^{^{102}}$ See Robert L. Green, "The University and Society" (unpublished speech to new University faculty, Sept. 15, 1970).

¹⁰³ Eddy, op. cit.

a better balance between rural and urban. No matter which way our thesis' subject, housing and human habitat is in both and so is human ecology.

Other Elements Needed For a Housing Program at MSU

At the beginning of the last section it was mentioned that the interviews unfortunately did not tell us what does not exist, nor what is needed for a comprehensive program. Some such elements have already been mentioned in this thesis, housing economics and family sociology. To identify others would take considerable study except for those elements which stand out clearly. There are three such elements, education, architecture and housing law. In addition there would be need for facilities and services of which the more important ones will be mentioned.

In the same section, under College of Education, the marginal role of the institution in housing education was referred to. One may ask, who in reality is doing the job? To illustrate, look at who educates the professional managers in housing. Here one finds the National Association of Home Builders (NAHB), the National Association of Housing and Redevelopment Officials (NAHRO), the Urban Coalition, the Apartment Owners and Managers Association of America (AOMA), the Institute of Real Estate Management, the National Association of Housing Cooperatives and so on. Their programs are short-short. Who trains the instructors?

They are generally resources people internal to the particular interests involved. The content is very specific, aimed at developing only the necessary minimum of skills to perform selected tasks. Continuity is often not provided for. The education system has been left out, in some cases purposely so.

For a field as complex as the one under discussion here much more breadth and depth is actually needed and the education system is the logical mechanism to provide it. However, this point is a large field by itself in need of more study. Included in such study would be ways to find a workable system of cooperation between public education, the private-public housing enterprise, and the ecological interests. In other words, what role should the education system play in environmental education as a broad concept with housing included, from the kindergarten level through adult programs?

Architecture is another element to be considered. Some of the people interviewed observed that it may be a good thing that there is no school of architecture or architecture department at MSU. At the universities which do have an architect school there has been a tendency for these schools to dominate any housing effort. It has had the effect to inhibit interdisciplinary work. Another factor is that in the United States the architect generally has had little to do with most of the residential

construction. On a per unit basis, the way housing has been built, there has been insufficient incentive for the architect to bother with much of it. Only large developments and residences for the wealthy are sufficiently attractive. More recently the share of residential construction going into multiple housing has been growing. This has tended to increase the participation of architects in residential housing. Substantial projects with corporate or public sponsors will as a rule employ architect-engineering services. It may be required by law or through controls set up by lending institutions. Public housing has always been required to be designed by architects. As mentioned elsewhere in this thesis, failures in human terms have been monumental (Cabrini-Green in Chicago, Pruitt-Igoe in St. Louis and Baber Village in Washington are examples). ditionally, the architect has been little concerned with human needs in housing, human ecology or the human environ-He has dealt with his designs of physical artifacts ment. in an independent and at the same time subjective manner. 104 Research done by architects has been insignificant. 105

¹⁰⁴ For an excellent treatment of this particular subject see: Constance Perin, With Man in Mind, An Interdisciplinary Prospectus for Environmental Design (Cambridge, Mass.: MIT Press, 1970).

^{105 &}quot;Within the last ten years there have been less than 350 architects who have been or are now involved in research to some degree . . . somewhat less than 1% of the registered architects in this country are active in research. . . The 49 agencies (universities, centers and institutes) covered list research projects over the last 8 years

Industrialized and factory-built housing, the newcomers in the field, have tended to become the domain of the industrial designer and not the architect.

As housing becomes more and more institutionalized and industrialized, the role of the housing professional is likely to increase in importance. Exactly where the architect will fit among these housing professionals remains to be determined. He will have to become part of a team. well he can perform as a member of multi-disciplined groups will have a bearing on the outcome. Some kind of a merger between industrial designer and architect may be indicated (if such a thing is possible). Better control over environmental, esthetic and public interest elements will be one of the reasons for the growing professional involvement. In most European countries it is a requirement that all residential construction as well as major alterations be handled by a registered professional. Building permits are contingent upon plans having been professionally prepared and approved. As settlement densities increase, and also to overcome some of the broader urban problems, one can look for similar arrangements in the future. Hopefully it can be done on an interdisciplinary basis, where the architect-engineer does not alone prevail. The point made

involving just over 5 million . . . 1/2 million dollars per year for the entire profession." Benjamin H. Evans, AIA Research Survey (Washington, D.C.: American Institute of Architects, April, 1965), p. iv.

here is simply that the architect should not be left out of any housing program. This issue is tall enough by itself to demand more inquiry and study.

The other important element which must be looked at is housing law. The lawyer has become as important as money, carpenters and bricklayers in any housing venture. First, there is the whole world of property rights along with all the rules of society pertaining to these rights. Second, there are the enormous bundles of legislation alluded to in Chapters I and II. Add to this legislation by the states and local government units, all of it together makes a second world. The housing codes of cities are tomes. The average lawyer couldn't possibly be well enough informed, not even mentioning the housing consumer.

A good illustration to show both magnitude and complexity in housing law can be had by reviewing the Handbook of Housing Law recently prepared by the Earl Warren Legal Institute. 106 It is a massive volume intended to support Legal Services attorneys and community organizations in housing law and related matters. Its mere size well makes the point that law cannot be left out of any housing program. Added to this can be other new events, such as

National Housing and Development Law Project, Earl Warren Law Institute, Handbook of Housing Law, A Guide to Federal Housing, Redevelopment and Planning Programs, University of California, Berkeley (Englewood Cliffs, N.J.: Prentice Hall, 1970).

changes in landlord-tenant relationships and conduct, condominiums, where ownership of land and structure are different, and the role of administrative agencies as they affect housing and communities. Enforcement of codes, safety and security are also a part of the legal domain. Many who cannot economically avail themselves of legal aid on an individual retainer basis must be given opportunities to become well enough informed from unbiased sources. In the context of this thesis one can merely hint at the needs in this area. What emerges is a profession of legal specialists who have housing expertise, and at the same time there is the need for any housing practitioner to be reasonably well informed on the existing rules.

As a part of inventory considerations there are two other items which should be mentioned. One is space and facilities, the other is library-resource material. Space allocation to teaching, study and research in housing is at present very scanty. This becomes particularly evident when viewed in terms of comparison with other disciplines. To illustrate, one office in the Human Ecology building is specifically given to housing while the remainder of the entire building is given to food, nutrition, clothing, textiles, interior design, family living and institutional management. Or, look at the underused (and perhaps obsolete) laboratory facilities in the College of Engineering or the little space given to housing-technological research in the College of Agriculture.

A similar case can be made for the library collections at MSU. There are special groupings of materials, as for example the Community Development section which includes Highway Traffic and Safety. But Community Development does not now include housing. The Document Section in the Main Library devotes one hundred times more shelf-space to nuclear energy than to housing. The entire library situation as it embraces our subject should be carefully studied. A combination of the Community Development and Urban Planning material plus some other smaller scattered collections could bring greater efficiency and usefulness, and at the same time make a home for a much needed collection made up of the subjects: housing and the human habitat. The acceleration in the development of new knowledge concerned with housing as mentioned elsewhere in this thesis should be recognized and a depository for it provided.

View from the Outside of MSU

The Land-Grant university as an institution lives in a world of other institutions and clients whom it is supposed to serve. An examination of the university's role in housing and housing education must therefore include a study of how the outside groups perceive the university's role. To do such a study in a manner where the outcome would be sufficiently conclusive as a basis for decisions could be a large task, again far bigger than can be handled

in the context of this thesis. All that could be considered practical for our purposes here was to make a few sampling inquiries. The results were positive and encouraging in that the need for the university to come into housing was more strongly expressed than it was by university people themselves.

These were the outside organizations interviewed along with their abbreviated comments:

Michigan State Housing Development Authority: 107

- --State involvement in housing is new phenomenon.
- -- Housing becoming more tied into community development.
- -- Need for a chronicle of events.
- --Many pressing questions to be researched. Needs

 multi-approach. Now must rely mostly on consultants.

 Few universities in this work.

Author's comment: Experience has been that these consultants use the universities as resources in fulfillment of their contracts. Students generally do not benefit.

- --Are in position to finance research, Ph.D. work and the like.
- -- Can hire both graduate and undergraduate students.

¹⁰⁷ William G. Rosenberg, Director, Michigan State Housing Development Authority, Lansing, Mich., interview on March 17, 1971.

- --Large suggested research project: Impact of Housing
 Industry on Michigan and the United States.
- --Would be amenable to work out a cooperative program with MSU. See need for representative small group of action people from the University to do some joint planning.

Author's comments: (a) Multi-discipline program. This spells timely opportunity for MSU and its students.

(b) What suggests itself here is perhaps an independent agency or outside center, MSU joining MSHDA. Michigan Housing and Community Development Corporation or some vehicle like it would make sense. Arrangement between Cornell University and New York State Development Corporation might be studied.

Michigan State Department of Commerce

Office of Economic Expansion: 108

- --Interest is to get more research going to further housing industry and economic development.
- --Think university should do more research. Have been cooperating with and providing support at the University of Michigan, especially in the area of industrialized housing. Sponsored seminars.
- --Would help in any way possible to move MSU into housing.

¹⁰⁸ David M. Poxson, Michigan Department of Commerce, Office of Economic Expansion, Lansing, Mich., interview on Feb. 17, 1971.

Levitt Building Systems, Battle Creek, Michigan: 109

- --Growth of Building Systems, not home building, but production.
- --Levitt has been cooperating with universities. Cite distance problems and say Battle Creek location ideal for relationship with MSU.
- -- "Walls between industry and universities need to be removed."
- --Want not only student involvement, but also faculty involvement on interchange-program basis, day-to-day working relationship, share information, give and take.
- -- Now support graduate students.
- --Work needed on consumer relations, consumer education related to housing.
- --Initiating steps for a program must be taken by university (MSU).

Lansing Housing Commission: 110

--Management of public housing is difficult, accountability is to many. Profession has not yet developed a knowledge and scientific approach base.

¹⁰⁹ Charles L. Biederman, President, Levitt Building Systems, Inc., Battle Creek, Michigan, visited with Professor Gertrude Nygren on March 24, 1971.

Marcel Elliot, Director, Lansing Housing Commission, Lansing, Michigan, interview on March 30, 1971.

- -- Must build "environment" with resident involvement.
- --Planning systems research.
- --Think higher density works better than lower. Calls for research.
- --Great need for mixing academics and experiences, working with people toward better response to the environment and property management.
- -- Must understand poverty situations.
- --Where should housing be located to best serve people, subordinate to interest of others? Research needed.
- -- Problems created by Michigan laws. Needs study.
- -- Need to get at motivation, value structure of social and ethnic groups.
- --University should teach why is, what is and how it can be improved.
- --Need continuing seminars on property and housing management.

Author's comment: A task for Extension?

- -- Need sources of information.
- --Have all kinds of ideas on how students can be involved toward their education and development.

Social Services Branch, Region IV of HUD: 111

- --See beginning of good work at Universities of
 Wisconsin and Minnesota. University of Illinois concerned with low-income housing in southern Illinois.
 - --In Wisconsin, four regional seminars held in April,
 1971 in management of Public Housing for the
 Elderly. Organized under Home Economics and operated
 by the Extension Service.
 - --In Minnesota, model pilot-project, combined effort
 by School of Architecture, Home Economics, Extension
 and Social Sciences in four-county area around
 Duluth with Duluth Housing Authority cooperating,
 housing for the elderly and senior center. Focal
 point is University of Minnesota Medical School at
 Duluth.
 - --Excellence of Cedar-Riverside Project in Minneapolis mentioned as another model.
 - --Experimentation in several states with garden plots, greenhouses for older folks.
- --Known Michigan activities are considered below level of those states mentioned. Cannot explain why.
- --Failure of universities in training of teachers in housing professionalism has forced agencies to do

¹¹¹ Doris E. Mersdorf, Chief, Social Services Branch, U.S. Department of Housing and Urban Development, Region IV, Chicago, Illinois, verbal communication on March 23, 1971.

their own, short and quick to suit their own particular purposes within their means. Illinois State Housing Board for example is running training programs for local housing authorities (4 1/2 days each).

--Michigan is not mentioned.

Status of Housing Programs at Other Universities

Housing content is found predominantly at the larger Land-Grant universities. The catalogues of the Schools of Architecture or Departments of Architecture refer to their programs in terms like these:

Architecture is concerned with shaping of man's environment. In accomplishing this, the architect has the responsibility and opportunity of providing for the optimal physical, psychological, and social well-being of man. Consequently, the education of the future architect must include a clear understanding of the function of architecture in society and must be directed towards the acquisition of all professional skills necessary to effectively achieve this. Architecture is both an art and a science, requiring of its practitioners penetrating insight accompanied by creative imagination and an ever expanding knowledge of contemporary technology.

The Department of Architecture currently offers two undergraduate curricula in architecture, a continuing five-year and a new four-year. Each endeavors to provide that educational environment that will foster scholarship, research, and competence for the practice of the profession. They are designed to impart a basic understanding of man and society, visual fundamentals, structural theory and structural systems, building materials and methods of construction, systems of environmental control, comprehensive architectural design, and a fundamental understanding of the

ecological, social, and economic factors that relate to environmental design. 112

Nobly spoken, but as brought out elsewhere in this thesis, the architect under present arrangements has only a small part in housing. This is not to belittle the work which has been done over the years at the University of Illinois for the development of small homes, much more than elsewhere, except perhaps at Cornell. At the University of Illinois housing is concentrated in Architecture and Agricultural Engineering.

Iowa State University is one of the exceptions in that it provides for a major in housing. It is a combination of Art, Architecture, Economics, Family Environment (a curriculum in Home Economics), Landscape Architecture, Urban Planning and Sociology.

At Ohio State University we find housing in the College of Agriculture under Home Economics with one course labeled Management, Housing and Equipment.

Pennsylvania State University has a similar situation where housing is a major in Housing and Interiors with three courses, one, Introduction to Housing and Living Space, the others, Housing Issues and Policies Related to Living Patterns, and, Special Problems.

¹¹² From University of Illinois at Urbana-Champaign, Undergraduate Study Catalogue, 1970/1971.

From a crude appraisal made during a one-day visit to Cornell University it can be said that the College of Human Ecology there plus their Extension System are no doubt in leadership position in housing education. There are more courses listed, more faculty and students in the housing program than at MSU. There is also some housing-related research being done, while such activity is almost zero at MSU. Not only that, the impression was gained that the Cornell people are moving ahead quite rapidly and this would include Extension work in this field. There is some apparent cooperation between the College of Human Ecology and the College of Architecture, Art and Planning. Cornell is a much smaller university than MSU.

It must be remembered that these are only indicators. In 1969 the Education Committee of the American Association of Housing Educators surveyed a number of institutions via questionnaire and subsequent tabulation and analysis. 113

There were twenty-nine responses. While some of the information collected is very interesting, it is insufficient for our purposes. It does not however indicate a general housing education activity level higher than exists at MSU today.

American Association of Housing Educators, Education Committee, Housing Education Survey (unpublished, Oct. 15, 1969) (analyzed and tabulated by Susanne Lindemood, Cornell University, Ithaca, New York).

It is recommended that a more systematic survey be made which would include the planning for higher education and research activities on the subject, Housing and the Human Habitat. It should be done with the objective in mind to ascertain more specifically the strengths, interests and capabilities for the purpose of eventually organizing more multi-university work and cooperation.

It is not clear why housing is found in colleges and universities under names other than Housing or Human Habitat. For example, at Cornell University, College of Human Ecology, one finds housing in the Department of Consumer Economics and Public Policy and in the Department of Design and Environmental Analysis. At Purdue University it is in the College of Home Economics, Department of Equipment and Family Housing. Here at MSU, College of Human Ecology, it is in the Department of Human Environment and Design. Often the term "Family Housing" is referred to apparently to designate that it is not architecture, not residential construction, not business or economics. Although one has difficulty finding it spelled out, "Family Housing" seems to mean house planning, interior design, some reference to human needs in housing, home equipment and furnishings, history of housing and so on. Home economics has traditionally included these subjects in its curriculum. The reason one can suspect, is, that the multi-disciplinary nature of the subject housing has not been recognized (or

not wanted to be) by these institutions. Further study of this situation would also help to show the way to more comprehensive housing education; that is, through a truly multi-disciplinary or systems approach.

Housing Research at MSU

Some of the research experience at MSU has been mentioned in the section, History of Housing Activities at MSU. The number of projects has been so few and their impact so insignificant that a further recitation of detail would be of little interest to anyone. It should come as no surprise and should not be considered unusual after reviewing data presented in Chapter III, "The Search for More Knowledge."

This is not to say that interest and capability for housing research is absent. The Experiment Station at MSU recently allocated funds for a 20 per cent faculty research appointment plus support for one graduate assistantship plus a small operating budget for the College of Human Ecology. What is apparently lacking is broad sponsorship of research from the Research Administration of MSU, active pursuit of outside support and encouraging the development of ideas. Historically, the star performer in research at MSU over the years has been the College of Agriculture through its Experiment Station. Interestingly enough, some of the research work has ranged outside of the domain of

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agriculture. While there may be a good deal to be learned, no adequate parallels can be drawn between agriculture and housing. Agriculture is merely mentioned to illustrate that research can be a part of the successful education process and resulting progress. If one looks at the rapid occurrence of change over the last decade, one can ask the question whether the university has kept up with this change. Research activity and results obtained therefrom should be a good tell-tale indicator. Is it not up to the universities to provide for the opportunities?

MSU Philosophy

An attempt has been made in this chapter to establish that MSU has in fact resources and other characteristics to support more direct involvement in the field of housing as broadly defined in the Introduction to this thesis. A question that may be raised concerns the philosophies and objectives of the institution and whether they are compatible with the suggested program. In a large academic organization representing so many different interests one has difficulty finding a direct answer. An examination of guidelines to aid in the review of current programs and assessing new proposals may be helpful. Such guidelines were developed and published in 1967 by the

Committee on Undergraduate Education in the form of five questions: 114

- a. Does the applied field of study depend upon or bear relationship to one or more of the basic disciplines in such a way as to insure that students engaged in it will be required to weigh evidence and make judgments on matters of some substance and complexity?
- b. Does the applied field of study promise to deal seriously with important social problems or needs?
- c. Are other institutions within the state or region currently engaged in teaching programs similar to the proposed program and, if so, will there be needless duplication?
- d. What physical and human resources will be required to conduct the teaching program, not only in the applied field itself but in the ancillary fields it will hope to call upon?
- e. How narrowly conceived is the proposed professional field? Is it designed to equip the student mainly with those skills required at the entrance level of the profession or does it attempt to equip him with the understanding of principles upon which future innovation will depend?

The author wishes to add a sixth question: What is the outlook for professional opportunities in the field, such as employment?

In connection with ideas elaborated on in this chapter and the entire thesis, all of the above questions can be answered in a positive sense. True, as the Committee suggested, there are other questions and criteria, but those listed above are by far the most important. A more intensive study of this particular subject as a part of planning and program development is an obvious recommendation.

¹¹⁴ Committee on Undergraduate Education, Report of the Committee, Improving Undergraduate Education (East Lansing, Mich.: Michigan State University, 1967).

CHAPTER VIII

PROFESSIONAL OPPORTUNITIES

Any worthwhile opportunity structure can be expected to attract. For the university this would mean students, talent in faculty and research, and money. That there exist housing and related environmental problems no one will deny. That these problems should receive greater attention as a matter of public policy and otherwise has been well enough established. That education plus research could be a major force to produce results of sufficient magnitude with benefits outweighing costs is a near unknown, unfortunately. This creates a dilemma to decide where to begin and how to define the opportunities and to fit them into a plan. Here are some statements we can make:

--Our knowledge concerning general student interest in housing, particularly as it may be seen as a career field, is limited. The interest potential needs further research in order to obtain a better measure on attitudes, motivations and other behavioral, social

- and economic factors. This could be a task for the students themselves. 115
- --Higher level employment opportunities exist judging
 - Response to inquiry given by government and agency personnel particularly referring to need for professionals in housing and property management. See Appendix III for copy of January 22 letter from HUD.
 - 2. Demand exists as determined from scanning newspaper want ads. See Appendix IV for a display. The specimens shown were culled from January-May 1971 Wall Street Journal and New York Times and do not include ads from the building materials, heavy construction, real estate brokerage, commercial real estate and corporate leasehold sectors. The illustration is confined to higher level positions and it can be assumed that demand also exists at other levels.
 - 3. Housing is becoming more and more industrialized and institutionalized. Larger corporations have entered the field. "Industrialized housing"

¹¹⁵ See: Survey of Student Interest in the Housing Department at MSU, a student project done during Spring Term 1971, Course MC 205, Survey Policy Science, under the direction of Dr. Raymond Cochrane. This survey disclosed a surprisingly high interest level to encourage further inquiry.

employing lesser skilled labor means demand for higher management and technical skills. Rationalization of production calls for specialized skills. Employment of systems asks systems know-how and its development. Research has to become a part of the entire process creating demand for researchers.

- --National policy favors rapid development of the institutions whose purpose it is to supply and service housing and so help to provide an ever better living environment for people.
- --In recent years we have gone far in developing human capital but must now gear up to create the physical capital to engage the former. Development of housing and communities could be one means to do this. But first we must bring along the skills which can perform the tasks. True, this points to rearrangement of priorities.

For an overview of potential employers of skills and users of knowledge and information see Appendix V.

The question, what should a higher education program leading to professional careers consist of, must obviously be dealt with in more carefully considered detail than is possible in this thesis. Particularly called for in such planning would be the involvement of existing and related

disciplines. The crude model, <u>Higher Education and Professional Career Relationships</u>, Figure IV, is presented to aid in visualizing such a program.

The left hand part of the model may be viewed as the undergraduate domain. It provides for a base made up of the humanities, the natural sciences and human ecology diffusing into professional education oriented to specific areas in the housing field. The transition in orientation—from liberal to professional—may occur at various stages, but should be timed to occur early enough so that completion of the undergraduate program qualifies for entering professional endeavors. Here then we have a broad generalist background plus limited, but employable, professional specialization.

The right hand part of the model may be seen as the domain of the scholar. Well-grounded in the humanities, the natural sciences and human ecology, the student is increasingly developing expertise as specialist, or generalist, or a combination of both, depending of course on interest and capabilities of the individual. This domain is important in that its buildup could materially contribute to improving ways and means leading to more and better housing.

Job titles shown in the model are arbitrarily chosen and are by no means all-inclusive. Major-minor implications were left out. It must be remembered that some of the

FIGURE IV HOUSING AND HUMAN HABITAT HIGHER EDUCATION AND PROFESSIONAL CAREER RELATIONSHIPS

| UN | DERGRADUATE | |
|---------------------------|---|--|
| 1 | PROFESSIONAL EDUCATION | |
| | PROFESSIONAL FIELDS: | |
| | Construction Management Real Estate Officer Finance Officer | |
| | Land Development Specialist | |
| ı | General Manager | |
| | Industrial Designer | |
| | Urban & Community Planner = | |
| LIBERAL | Consultant to Public & Private to Families & Individuals | |
| ARTS | Housing Economist | |
| | Housing Legal Expert | |
| INCLUDING | Government Agency Administrator | |
| HUMAN | Housing Authority Director Housing Commission Director | |
| ECOLOGY • | Code and Regulation Enforcement Officer Safety & Security Officer | |
| | Professionals in Housing Management Property Management | |
| ! | Communication Specialist | |
| | Education | |
| | College | |
| | Adult | |
| | Researchers | |
| 1 | 1.0000001010 | |
| HUMAN HABITAT AND SOCIETY | | |

evolving jobs do not currently exist in familiar form. Yet, the tasks are now performed by someone in some fashion.

The category "Researchers" shown in the model Figure IV is a rough lumping together of many different potential situations. Since research in housing and related fields is not an established practice, it is of nebulous dimension in the minds of students and people who might perform such research. Reward potential must somehow exist before individuals will take time and thought to identify problems so that ideas may be generated which lead to innovations and solutions. The process is subject to the laws of economics, or more precisely stated, must satisfy some form of cost-benefit criteria. Specific individual projects where benefits are readily demonstrable, and therefore salable, would serve the purpose. Required is planning and organization of research in a way where sustained funding can be justified. Researchers will then be attracted and involved. The researcher can also be expected to come out of and be active in the ranks of "educators" as the latter will beneficially engage in research. The same is likely to be true for the various other professional categories. The shift in national priorities away from fields which have been the high consumers of research resources should aid this situation.

As in any new field of human endeavor, opportunities for participation and employment will expand with growth of

the field itself. Unfortunately, this is a slow and tedious process, particularly in the beginning, requiring patience, nurturing and care. The stage appears to be set for good progress. The universities can help it immeasurably.

CHAPTER IX

RECOMMENDATION FOR PROGRAM PLANNING IN HOUSING AND THE HUMAN HABITAT AT MSU

Planning for the role of the university in housing, housing as defined in the introduction to this thesis, is foreseen as a formidable task. It will need to consider both short-range and long-range aspects as well as the step-by-step transitions in order to finally achieve the objective. What Burnham had to say very well applies here:

"Make no little plans. . . . " The following steps are recommended without trying to preempt the suggested planning group. It is the latter which should define and direct the program.

- 1--A commitment of interest and initial support from the administrative unit of MSU.
 - --Allocation of nominal manpower and funds sufficient for a campaign to obtain financial support of a comprehensive planning effort.
 - --Assuming that such support can be obtained, organize a policy-planning-steering group for the purpose of establishing policies and guiding the effort. A suggested makeup:

inside Technology including Systems

Human Ecology

Business

Resources

Liberal Arts

Extension and Continuing Education

outside HUD and/or HEW, USDA

NAHRO

MSHDA or State Government

Industry

Labor

Finance (Federal Home Loan Bank Board as an example)

Familiarity with the higher education system and processes would indeed be helpful.

-- The comprehensive planning program might deal with such subjects as:

University structure and organization

Research

Instruction

Public Service

Personnel

Facilities

Resources

Human ecology as a framework may be a point of consideration.

- --Planning group is assumed to have sufficient resources to engage an executive secretary, sub-groups or task forces dealing with specific areas, specialists and consultants whose services would be paid for.
- --Provide for appropriate public relations efforts.
- 2--Independent from, but in support of the above:
 - --Make intensive survey of student interest (students can do this).
 - --Make employment market and demand study (Placement Services could perhaps handle this).
 - Note: (2) must take into account changes in population composition and characteristics as they will occur during the 1970's and beyond.
- 3--Map strategies for implementation of plan with particular emphasis on funding, public relations and communications.

Notes: The above does not rule out planning of a program jointly with other universities. Land-Grant institutions in the North Central Region (USDA) may be a logical grouping.

It is reasonable to believe that funding for such a planning program could at least in part be obtained from outside sources.

CHAPTER X

CONCLUDING SUMMARY

This study was undertaken on the assumption that housing and housing related problems are of sufficient magnitude and social significance to warrant substantially intensified engagement of the universities in their tripart mission: education, research and public service. was considered prudent to make this assumption for the following reasons: (1) the problems encompassed in housing the American people, housing as broadly defined in this thesis, are increasing and constitute a major human need; (2) the present level of knowledge is both inadequate and often unavailable as a sound basis for decisions; (3) the complex nature of housing problems requires multidimensional responses, which can best be developed and delineated on a sustained basis by independent institutions; (4) the scientific method taught by the universities offers the best opportunities for success; (5) knowledge and information would be broadly disseminated through the involvement of young people: students, to their lifetime benefits; (6) particularly the Land-Grant universities with their philosophy of teaching, research and public service provide necessary elements to attack housing problems.

order for the cited reasons to have validity another assumption had to be made; that is, that the universities can accomplish a major change in their structure by organizing to handle problems requiring broad multi-disciplinary approaches.

Housing is an issue much larger than the commonly thought of artifact, i.e., some form of physical shelter. Public policy now directs that decent housing be provided in adequate measure for everyone as a satisfying living environment. In the two decades since we, as a nation, adopted this policy we have as yet to define it adequately. There are large knowledge gaps and notable lack of cohesiveness. As a consequence fragments of information are often used for selfish or adverse purposes, rather than in the interest of the whole society, namely to satisfy human needs.

Research, experimentation and experience are keys to new knowledge, a combination no less true for housing. Reinforced by national needs, public policy is calling for increased resources in the search for and application of new knowledge and the preparation of skills. It is up to the universities to plan and organize for managing their part of the effort, to stimulate dialogue, to identify areas in need of attention, to coordinate and integrate the research, so that resources can be efficiently utilized. Further, universities are the ideal instrument to process

and disseminate the information in ways which will achieve maximum benefit and progress for all society. They do have a license under the Land-Grant philosophy.

The record shows that housing research efforts and accomplishments have been insignificant with the exception of technological developments. However, some of this latter progress stands in question from the perspective of human ecology, which, in the case of housing, should be a prime concern. The university could relate housing needs to resources, perhaps in the framework of resource development, of environmental planning and an all-inclusive concept of human ecology. The university could also lead in the development of management skills and in the applicable systems science aimed at the best utilization of the resources for the common good.

In order to undertake the responsibility of this assignment the universities must learn how to address multi-disciplinary problems, a task which they are not now organized to accept. This job however, must be done in the interest of students and scholars who have to operate and compete in public and private service where the job is truly multi-disciplinary in nature.

Many people doubt whether this change can be accomplished because it involves and upsets traditional academic values. Yet, looking at the 100-year history of the Land-Grant universities one can only conclude that

changes have occurred in surprising numbers as the universities accommodated and adapted to the national needs. This is particularly true for MSU.

Housing is neither an urban issue, nor a rural one, neither an economic, nor a social, nor a political issue. It is the human habitat, or the environment of and for human beings to accommodate their life styles and activities. Urban, city and community planning, human ecology, landscape design, resource development and conservation, health, technology, including technology assessment, law, business, finance, education, religion, the arts and the social sciences collectively have a part to contribute. This is the reason which begs a comprehensive multidisciplinary effort. Through the systems approach we can learn which of the issues are central and which are peripheral.

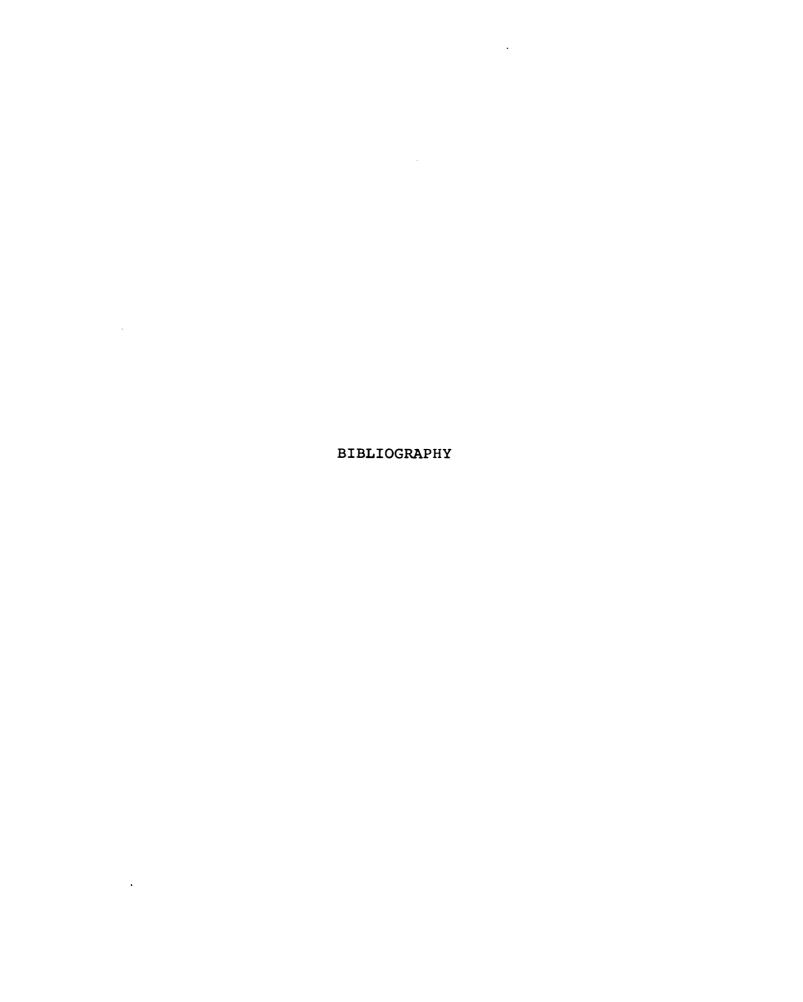
It is possible, that assuming a task such as this may mean giving up something else, because simply adding another field would have the effect of increasing an already existing "overload." The continuous process of change renders some existing functions obsolete, alters programs and leaves facilities in disuse. Activities so affected could provide for the realignment of resources to accommodate a housing program. For example, because of changes in population composition, the 1970's will see a decline in demand for teachers from the primary and

secondary education systems. However, it is not within the province of this thesis to identify that which could be rearranged to accommodate the kind of venture suggested. Enough was noted during the interviews and study to support the idea that opportunities do indeed exist.

The major part of this thesis attempted to present a case for university action and indicates measures required to attain a research-based housing education effort. The objective was to establish that housing the people of our nation is a significant and universal problem. Further, the objective was to show how housing education falls within the province of a major or Land-Grant university. Chapters VI and VII concentrated on this type of a university and its relevant characteristics, reported on wide interests, competencies, content and experience on the part of faculty and students, related outside views and illustrated some problems. Chapter VIII discussed opportunities, especially those for graduates of the proposed program. Chapter IX makes recommendations for a planning study to initiate steps for an increased emphasis on housing at MSU.

This thesis admittedly raises many more questions than it answers. To find answers to some of the questions may require formidable research and investigation. The large bundle of unknowns only helps to lend support to the central idea of this thesis, namely, that there is an

important role for the universities. It is hoped, that the material presented, the questions posed, the arguments raised, contain sufficient food for thought to stimulate action. A major thrust on the part of the university accepting responsibility for developing a body of knowledge, teaching and supplying solid information to users and decisionmakers concerned with environment, human habitat and the micro-environment, which we call housing, is long overdue. And why should it not be a science? Survival may well depend on it.



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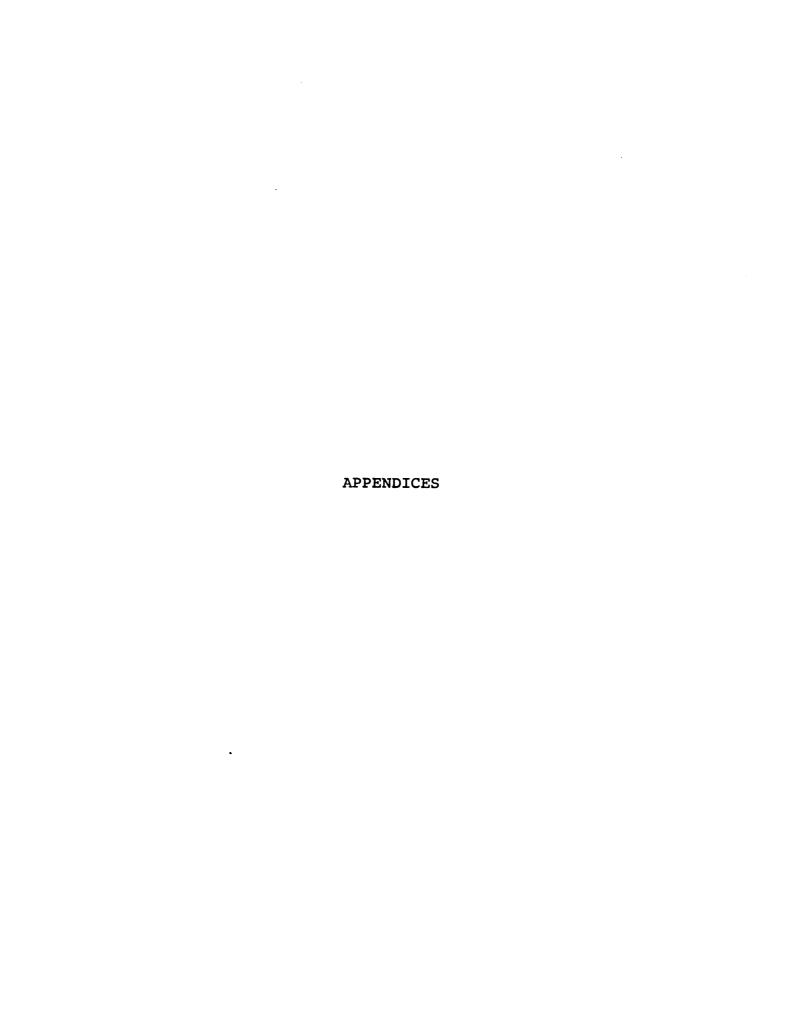
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- U.S. Government R & D Reports Indices. U.S. Department of Commerce, National Bureau of Standards, Institute of Applied Technology. Washington, D.C.: Government Printing Office, 1966-1970.



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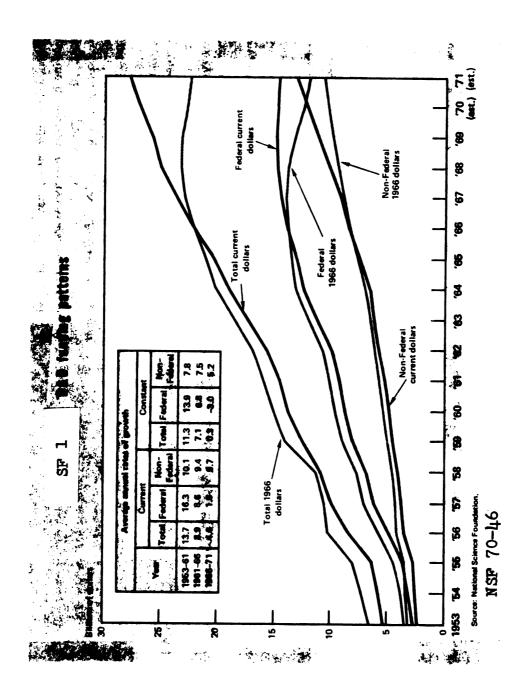
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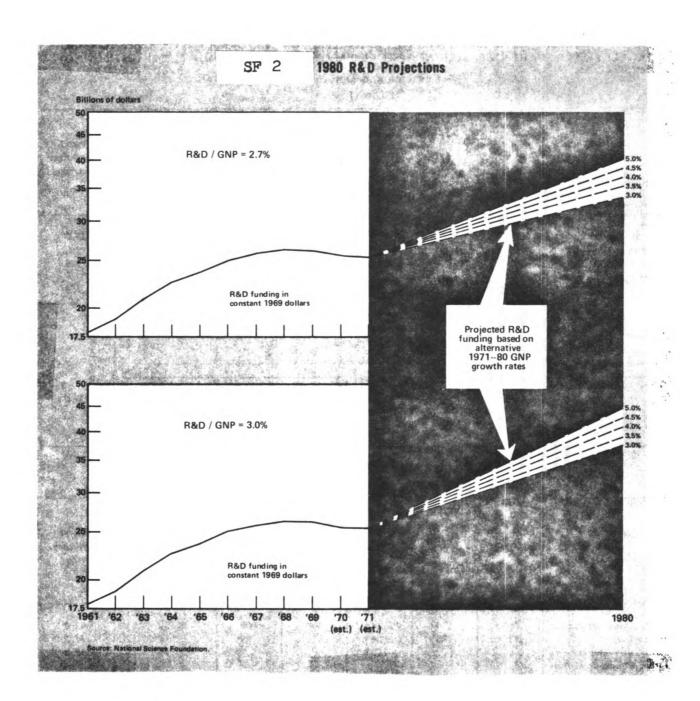
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NSF 70-46

路

FULL-TIME-EQUIVALENT (FTE) SCIENTISTS AND ENGINEERS EMPLOYED IN RESEARCH AND DEVELOPMENT, BY SECTOR, SELECTED YEARS.

[In thousands]

| Sector | 1954 | 1958 | 1961 | 1965 | 1968 | 1969 Þ |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Total | 236.8 | 354.7 | 425.2 | 498.0 | 550.2 | 554.9 |
| Federal Government * | 37.4 164.1 25.0 | 46.1 256.1 36.5 | 50.6 312.0 42.4 | 64.2 348.4 54.9 | 68.3 380.7 66.8 | 70.3 380.9 68.7 |
| Scientists and engineersGraduate students (| 20.3 | 29.2 | 33.6 8.8 | 41.4 | 49.6 17.3 | 51.0 |
| Associated FFRDC's, total | 5.0 | 8.1 | 9.1 | 11.1 | 11.2 | 11.6 |
| Scientists and engineersGraduate students ! | 4.9 | 7.9 | 8.8 | 10.7 | 10.7 | 11.1 |
| Other nonprofit institutions " | 5.3 | 7.9 | 11.1 | 19.4 | 23.2 | 23.4 |

· Numbers of full-time employees plus the FTE of part-time employees.

Estimate.

d includes professional R&D personnel employed at FFRDC's administered by organizations in the sector.

• Excludes social scientists.

f Numbers of FTE graduate students receiving stipends and engaged in research and development.

Note: Excludes scientists and engineers employed in State and local government agencies.

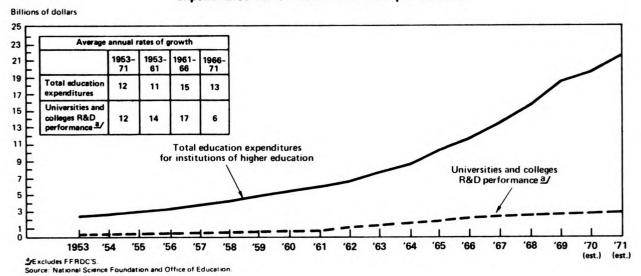
Source: National Science Foundation.

MSF 70-46

e Includes both civilian and military service personnel; military scientists and engineers in Department of Defense were estimated at 7,000 in 1954, 8,400 in 1958, 9,200 in 1961, 12,000 in 1965, 13,000 in 1968, and 14,000 in 1969.

SF 4 Universities and colleges highlights

Expenditures for education and R&D performance



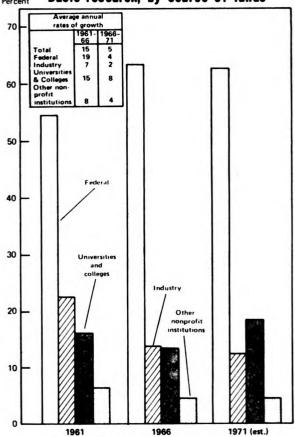
Research expenditures, by field

51% 20% 13% 8% 3% 3% 2%

Life sciences
Physical and environmental sciences
Social sciences
NEC

47% 20% 13% 10% 3% 3% 4%

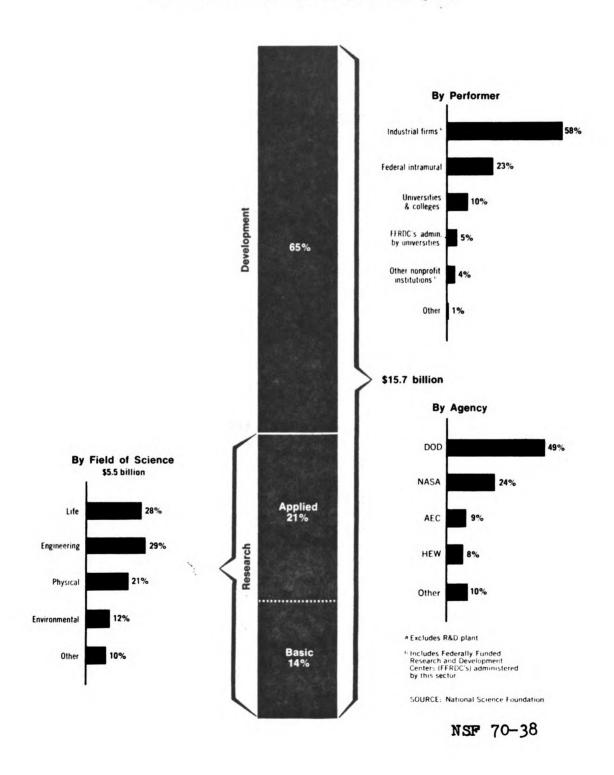
ent Basic research, by source of funds



Note: Four sources add to 100% for each year. Source: National Science Foundation.

Source: National Science Foundation.

SF 5
Distribution of Federal obligations for research and development, FY 1970 (est.)



SF 6

FEDERAL OBLIGATIONS AND EXPENDITURES, FISCAL YEARS 1940-71

[Dollars in millions]

Research, development, and R&D plant •

Total Expendi-tures as percent of budget outlays Fiscal years Obliga-tions Expenditures budget outlays 1940 \$ 9,589 \$ 74 0.8 1941 13,980 (r) 198 1.4 1942 34,500 **(**^) 280 0.8 1943 78,909 (') 602 0.8 1944 93.956 1.377 1.5 (°) 1945 95.184 **(**^) 1,591 1.7 1946 61,738 (°) 918 1.5 1947 36,931 691 900 2.4 1948 36,493 855 2.3 868 1949 40.570 1.105 1.082 2.7 1950 43,147 1,175 1,083 2.5 1951 45,797 1,812 1,301 2.8 1952 67,962 2,194 1,816 2,7 76,769 3,361 3,101 4.0 1953 3.039 1954 71.138 3.148 4.4 1955 68,503 2,745 3,308 4.8 1956 70,461 3,267 3,446 4.9 1957. 76,748 4,389 4,462 5.8 82,575 4.906 4,991 1958 6.0 92,111 1959 7.123 5.806 6.3 1960 92,230 8,080 7,744 8.4 97,802 9,607 9,284 9.5 1961 106,830 11,069 10,381 9.7 1962 11,999 1963 111,314 13.663 10.8 1964 118.585 15.324 14,707 12.4 1965 118,431 15,746 14,889 12.6 134,654 16,179 16,018 1966 11.9 1967 158,352 17,149 16,842 10.6 17,030 178.862 16.525 9.5 1968 1969 184.556 16,306 16,348 8.9 1970 (estimated) 4 197,885 16,392 16,154 8.2 1971 (estimated) 4 200,771 16,198 16,161 8.0

MOTE: R&D data for fiscal year 1952 and subsequent years are based on surveys of the National Science Foundation. Prior data were prepared by the Bureau of the Budget. Since the NSF surveys began, agencies have submitted revised data when necessary to maintain historical comparability with reporting practices of the latest period.

Federal obligations for research, development, and R&D plant

| \$15.6 | \$15.7 | \$15.6 |
|---------------|---------------|-----------|
| \$2.1 | \$2.2 _Basic | \$2.2 |
| \$3.1 RESEARC | \$3.3 Applied | \$3.7 |
| | | 7.35 |
| | - DEVELO | PMENT |
| 20.0 | 910.2 | |
| \$.7 | \$.7 <i>/</i> | LANT \$.6 |

SOURCE: National Science Foundation NSF 70-38

Beginning in fiscal year 1953 amounts for both obligations and expenditures include pay and allowance of military personnel in research

penditures include pay and anomalies of initially personnel.

b "Outlays" include expenditures plus net lending. Data through fiscal year 1953 are in terms of the "Consolidated Cash Statement" and data beginning with fiscal year 1954 are in terms of the "Unified Budget." For purposes of providing trend information the data are considered to be reported on a generally comparable basis.

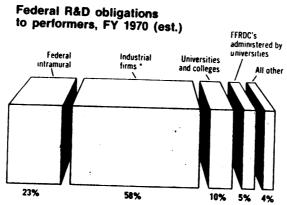
C Not available

Not available.

These estimates are based on amounts shown in The Budget, 1971 subject to subsequent administrative action. Data for 1971, moreover, do not reflect congressional action.

SF 7 Federal obligations for research, development, and R&D plant, by agency

| | a, agency | • |
|----------|---|--|
| Actual | Estim | nates |
| 1969 | 1970 | 1971 |
| \$16,306 | \$16,392 | \$16,198 |
| 7,890 | 7,931 | 7,788 |
| 4,018 | 3,830 | 3,307 |
| 1,708 | 1,722 | 1,560 |
| | 1,279 | 1,498 |
| | | 495 |
| | | 382 |
| | | 299 |
| | | 264 |
| . – | | 203 |
| _ | 1 | 104 |
| 112 | 151 | 68 230 |
| | ### Actual 1969 \$16,306 7,890 4,018 1,708 1,350 234 301 271 222 71 75 54 | Actual 1969 1970 \$16,306 \$16,392 7,890 7,931 4,018 3,830 1,708 1,722 1,350 1,279 234 369 301 316 271 286 222 241 71 121 75 90 54 56 |



* Includes Federally Funded Research and Development Centers (FFRDC's) administered by industrial firms

SOURCE: National Science Foundation

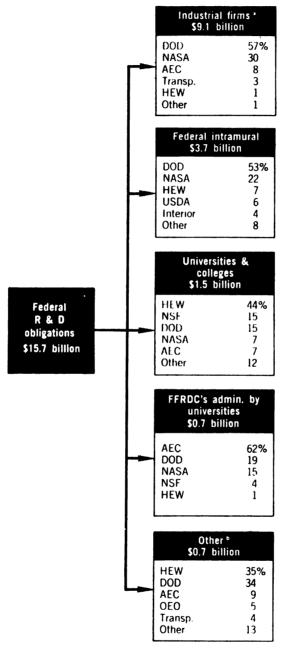
DISTRIBUTION OF FEDERAL R&D OBLIGATIONS BY STATE COMPARED WITH OTHER MEASURES OF NATIONAL ACTIVITY, BY STATE, 1969

| State | | Federal bligations | Рор | ulation | | personal come | | Federal |
|------------------------------------|-------------|-----------------------|-------------|---------------------|----------|---------------------|----------|------------------|
| | Rank | Percent of total | Rank | Percent of total | Rank | Percent of total | Rank | Percei of tot |
| United States, total (in millions) | \$1 | 5,355 | | 202 b | \$7 | 12,961 | \$1 | 75,777 |
| California | 1 | 27.94 | 1 | 9.63 | 1 | 11.18 | 2 | 8.48 |
| New York | 2 | 7.21 | 2 | 9.07 | 2 | 10.90 | 1 | 18.14 |
| Maryland | 3 | 6.26 | 18 | 1.86 | 14 | 2.08 | 10 | 2.89 |
| Florida | 4 | 5.76 | 9 | 3.15 | 10 | 2.93 | 13 | 1.89 |
| Massachusetts | 5 | 5.05 | 10 | 2.71 | 9 | 3.04 | 9 | 2.90 |
| New Jersey | 6 | 4.62 | 8 | 3.54 | 8 | 4.12 | 8 | 3.54 |
| Texas | 7 | 4.53 | 4 | 5.54 | 6 | 4.90 | 7 | 4.05 |
| Pennsylvania | 8 | 4.04 | 3 | 5.85 | 4 | 5.82 | 6 | 5.93 |
| District of Columbia | 9 | 2.89 | 40 | .40 | 36 | .52 | ٠ | |
| Ohio | 10 | 2.82 | 6 | 5.32 | 5 | 5.46 | 5 | 6.67 |
| New Mexico | 11 | 2.78 | 37 | .49 | 41 | .39 | 44 | .10 |
| Washington | 12 | 2.48 | 22 | 1.68 | 20 | 1.76 | 21 | 1.20 |
| Nabama | 13 | 2.33 | 21 | 1.75 | 25 | 1.22 | 26 | .83 |
| /irginia | 14 | 1.86 | 13 | 2.31 | 15 | 2.07 | 18 | 1.48 |
| Georgia | 15 | 1.80 | 14 | 2.30 | 17 | 1.90 | 19 | 1.3 |
| Colorado | 16 | 1.72 | 30 | 1.04 | 28 | 1.01 | 22 | 1.2 |
| Illinois | 17 | 1.64 | 5 | 5.47 | 3 | 6.41 | 3 | 7.72 |
| Nevada | 18 | 1.51 | 48 | .23 | 47 | .27 | 45 | 1.1 |
| Connecticut | 19 | 1.46 | 24 | 1.49 | 18 | 1.83 | 14 | 1.80 |
| Tennessee | 20 | 1.25 | 17 | 1.97 | 21 | 1.51 | 23 | .94 |
| Louisiana | 21 | 1.12 | 19 | 1.85 | 22 | 1.40 | 25 | .8: |
| Michigan | 22 | 1.09 | 7 | 4.34 | 7 | 4.65 | 4 | 7.5 |
| Missouri | 23 | | 15 | 2.30 | 12 | 2.17 | 11 | 2.5 |
| ndiana | 23 | .92 | | | | | 15 | 1.78 |
| Minnesota | 25 | .71 .58 | 12 20 | 2.53 1.83 | 11 19 | 2.54 1.80 | 17 | 1.70 |
| Wisconsin | 26 | | | 2.0 | - 12 | 2.00 | | 1.78 |
| Arizona | 27 | .55 | 16 34 | 2.10 | 13 31 | 2.08 | 16 34 | |
| | 28 | | | .84 | | .76 | | .30 |
| daho | 29 | .45 | 42 | .36 | 45 | .28 | 50 | .19 |
| North Carolina | 30 | .45 | 51 11 | 2.58 | 50 16 | 2.03 | 12 | 2.2 |
| 1 Mark | | | | | | | | |
| Utah | 31 | .32 | 36 | .52 | 38 | .42 | 42 | .21 |
| Kansas | 32 | .26 | 29 | 1.15 | 26 | 1.10 | 30 | .62 |
| Hawaii | 33 | .25 | 41 | .39 | 39 | .41 | 39 | .27 |
| Oregon | 34 | .24 | 31 25 | 1.01 | 29 23 | .98 1.32 | 29 | .6 |
| | 33 | | 23 | 1.36 | 23 | 1.32 | | |
| Rhode Island | 36 | .21 | 39 | .45 | 37 | .46 | 33 | .41 |
| New Hampshire | 37 | .20 | 43 | .36 | 42 | .34 | 41 | .23 |
| Mississippi | 38 | .17 | 28 | 1.17 | 33 | .70 | 38 | .3 |
| Kentucky | 39 | .14 | 23 | 1.60 | 24 | 1.24 | 20 | 1.3 |
| Oklahoma | 40 | .13 | 27 | 1.27 | 27 | 1.06 | 24 | .85 |
| South Carolina | 41 | .11 | 26 | 1.33 | 30 | .94 | 32 | .49 |
| Delaware | 42 | .10 | 47 | .27 | 44 | .29 | 28 | .7: |
| West Virginia | 43 | .10 | 32 | .90 | 35 | .64 | 37 | .32 |
| Maine Nebraska | 44 | .09 | 38 | .48 | 40 | .40 | 40 | .24 |
| | 45 | .07 | 35 | .72 | 32 | .71 | 31 | .59 |
| /ermont | 46 | .06 | 49 | .22 | 49 | .19 | 48 | .11 |
| Montana | 47 | .05 | 44 | .34 | 43 | .29 | 46 | .14 |
| Arkenses | 48 | .05 | 32 | .99 | 34 | .68 | 36 | .34 |
| North Dakota | 49 | .04 | 45 | .30 | 48 | .25 | 49 | .10 |
| Myoming | 50 | .04 | 50 | .16 | 51 | .15 | 51 | .07 |
| Bouth Dekota | 51 | .03 | 46 | .33 | 46 | .27 | 47 | .1: |
| | | | | | <u> </u> | | | ↓ |
| | 1 | 1 | | 1 | | | ı | |

includes individual income and employment taxes, corporation, excise, estate, and gift taxes (minus refunds).
 includes persons stationed in the armed forces in each area.
 included in Maryland tax figures.
 Collections from and refunds to U.S. taxpayers in Puerto Rico, Canal Zone, and in foreign countries.

Sources: U.S. Department of Commerce, Population Estimates and Projections, Series P-25, No. 436, Jan. 7, 1970; U.S. Department of Commerce, Office of Business Economics, Survey of Current Business, Vol. 50, April 1970; U.S. Treasury Department, Statistical Appendix to Annual Report of the Secretary of the Treasury on the State of the Finances for the Fiscal Year Ended June 30, 1988.

Federal R&D obligations to performers, by agency, FY 1970 (est.)



Includes Federally Funded Research and Development Centers (FFRDC's) administered by industry.

Source: National Science Foundation

NSF 70-38

Includes other nonprufit institutions, FFRDC's administered by nonprofit institutions, other and foreign.

Federal Research, Development, and R&D Plant

| SF 10 MAJOR CHARACTER! | TERISTICS | P | R&D OBLI | OBLIGATIONS | P | EDERAL AGI | FEDERAL AGENCIES, FISCAL YEAR 1970 (Est.)—Cont | AL YEAR 19 | 70 (Est.)—Co | Į. | |
|--|----------------------------------|-----------------------------|-------------------|---|------------------|--|--|--|--|--|---|
| | | R&D | Tota | Total research and development | and dev | elopment | Basic r | Basic research | Applied | Applied research | Development |
| Agency and subdivision | Total R&D Obliga- tions | obliga- tions as per- | | Character of work (percent distribution) | rork ution) | Major | l | Major | , | Major | • |
| | | total agency budget * | Basic research | Applied research | Devel- opment | (percent of total) | (percent of total) | (percent of total) | (percent of total) | (percent of total) | (percent of total) |
| Health Services and Mental Health Administration | 175.2 | | 32 | 89 89 | 16 | 47 Univ. 25 Intra. 11 N.P. 11 Other | 37 Life 34 Psych. 27 Soc. | 54 Univ. 31 Intra. | 69 Life 16 Psych. 13 Soc. | 40 Univ. 23 intra. 19 Other 16 N.P. | 53 Univ. 22 Intra. 19 Ind. |
| National Institutes of Health | 862.7 | | 32 | 69 | 1 | 58 Univ. 21 Intra. 14 N.P. | 86 Life 8 Phy. Sci. | 61 Univ. 26 Intra. 11 N.P. | •9 Life | 57 Univ. 19 Intra. 15 N.P. | 38 Univ. 27 Ind. 16 Intra. 11 N.P. |
| Office of Education | 88 | | 80 | 31 | 61 | 37 Univ. 30 N.P. FFRDC 13 N.P. 10 Univ. FFRDC | 70 Soc. 30 Psych. | 48 Univ. 27 Univ. FFRDC 16 N.P. 8 Intra. | 83 Soc. 17 Psych. | 57 Univ. 16 N.P. 11 Univ. FFRDC | 47 N.P. FFRDC 26 Univ. 11 N.P. |
| Social and Rehabilitation Service | 37.9 | | | 88 | 12 | 51 Univ. 26 N.P. 14 Other | | | 63 Soc. 30 Life | 55 Univ. 26 N.P. 11 Other | 34 Other 33 N.P. 26 Univ. |
| Social Security Administration | 10.8 | | 8 | 97 | | 62 Intra. 28 N.P. | 100 Soc. | 100 Intra. | 100 Soc. | 61 Intra. 29 N.P. | |
| Department of Housing and Urban Development | 26.2 | 1 | | 83 | 17 | 52 Ind. 23 Other 11 N.P. 9 Intra | | | 71 Eng. 18 Soc. | 61 ind. 22 Other 11 intra. | 52 N.P. 28 Other 10 ind. |
| Department of the Interior, total | 226.0 | 11 | 58 | 20 | ន | 61 Intra. 18 Ind. 11 Univ. | 45 Environ. 28 Life 16 Phy. Sci. | 80 Intra. 10 Other 9 Univ. | 41 Eng. 33 Life 14 Environ. 9 Phy. Sci. | 63 Intra. 16 Univ. 10 Ind. | 56 Ind. 35 Intra. |
| Bonneville Power Administration | 17 | | | 31 | 8 | 50 Ind. 37 Intra. 12 Univ. | | | 79 Eng. 12 Environ. | 58 Ind. 22 Univ. 20 Intra. | 47 Ind. 44 Intra. 8 Univ. |
| Bureau of Commercial Fisherles | 34.9 | | 23 | 2 | 13 | 78 intra. 17 Other | 84 Life | 81 Intra. 17 Other | 85 Life | 79 Intra. 15 Other | 71 intra. 28 Other |
| Bureau of Land Management | œ. | | 2 | 95 | 3 | 53 Intra. 43 Univ. | 100 Life | 100 Univ. | 86 Life 14 Soc. | 53 Intra. 43 Univ. | 100 Intra. |

SF 10

From: NSF 70-38

| | | r - |
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| | | |
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| | | · |
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| | | |
| | | |
| | | |
| | | |

—Scientific, technical, and health personnel in the Federal Government by selected agencies and occupational group and series, October 1969 路 11

| eers 163,538 76,026 2,941 | 41,067 8,275 25,783 6,123 22,547 5,070 3,236 1,053 11,519 1,813 34,066 6,883 2,069 2,327 1,667 2,096 402 231 774 541 28,468 2,481 19,050 1,463 19,050 1,463 | | | 6,293 6,293 722 4,918 3,761 1,157 9,332 6,463 3,878 2,585 | 14,392 5,049 4,660 9,343 194 9,149 158 | | | | 1 597 | | |
|--|---|-------|---|--|--|-------|-------|-------|-------|-------|-------|
| etra | | | 13,918 5,101 8,817 3,981 3,675 5,407 6,407 6,407 163 163 31 | 6,283 5,511 722 4,918 3,761 1,157 9,332 6,463 3,878 | 5,049 4,660 9,343 194 9,149 573 | 2,149 | 3,372 | 1,881 | * 100 | 2,275 | 6,249 |
| ics | | | 5,101 8,817 3,981 3,061 5,407 5,122 4,959 163 31 | 5,571 722 4,918 3,761 1,157 9,332 6,463 3,878 | 9,343 9,343 194 9,149 573 | 1,921 | 1,810 | 1,795 | 1,155 | 818 | 4,466 |
| s4, 148 35, 791 3490 elated | | | 8,817 3,675 6,407 6,122 4,959 163 31 | 4,918 3,761 1,157 9,332 6,463 3,878 2,585 | 9,343 194 9,149 573 | 1,537 | 369 | 643 | 1,071 | 424 | 2,091 |
| statistics statis | | | 3,981 3,675 5,122 4,959 163 163 | 4,918 3,761 1,157 9,332 6,463 3,878 2,585 | 9,343 | 384 | 1,441 | 1,152 | 25 8 | 494 | 2,375 |
| elated 77,789 8,266 1,160 | | | 3,675 3,675 5,407 6,122 4,959 163 163 31 | 3,761 1,157 9,332 6,463 2,585 | 9,149 | 228 | 1,562 | 28 | 372 | 1,357 | 1,783 |
| statistics 112,179 30,501 3,561 3 37,241 14,161 771 30,461 11,864 717 6,780 2,297 54 717 5,865 2,106 210 210 27,993 1,264 391 13,649 6,886 640 197 6,890 631 197 96,890 631 197 96 96 96,100 70 8,143 758 758 758 758 758 758 758 758 758 758 | | | 5,122 4,959 163 163 31 | 9,332 6,463 3,878 2,585 | 573 | 167 | 125 | 30 | 370 | 1,277 | 977 |
| statistics | | | 5,122 4,959 163 163 31 | 6,463 3,878 2,585 | 158 | 1,598 | 484 | 673 | 1,441 | 504 | 2,897 |
| tatistics 30,461 11,864 717 54 6,780 2,297 54 54 6,780 2,297 54 54 6,865 210 210 210 210 27,993 1,264 391 13,649 640 197 6,890 631 197 96,855 5,795 7, | | | 163 | 3,878 | 2 | 43 | 202 | 288 | - | 80 | 738 |
| 14,179 7,192 291 8,314 5,086 210 5,865 2,106 210 27,993 1,264 391 13,649 758 756 6,880 640 197 6,890 631 197 9,625 5,795 7,3435 2,732 3,435 2,732 | | | 163 | | 26 26 | 42 | 115 | 578 | | 00 | 596 |
| 8,314 5,086 81 5,865 2,106 210 27,993 1,264 391 1 13,649 640 197 6,890 631 197 7 9,625 5,795 | | | 31 | 1.686 | 209 | 30 | 73 | 40 | 491 | 116 | 920 |
| 8,514 2,086 81 81 82 82 81 82 82 82 82 82 82 82 82 82 82 82 82 82 | | | 31 | 000,1 | 000 | 0 | 2 | 2 | - | | 040 |
| 41,642 2,022 1,147 2 27,993 1,264 391 1 13,649 640 197 6,890 631 197 96,890 631 197 96,825 5,795 7,795 | | | 132 | 682 | 132 | 24 | 15 | 9 | 357 | 8 8 | 314 |
| 13,649 758 756 756 197 197 197 197 197 197 197 197 197 197 | | 6,757 | 88 | 8 | 34 | 299 | 146 | 26 | | | 171 |
| al. 13,649 758 756 156 197 6,890 631 197 66,890 631 197 66,890 631 197 67 68 640 197 67 68 640 631 197 68 640 640 640 640 640 640 640 640 640 640 | | | 19 | 3 | 25 | 299 | 126 | 26 | | | 167 |
| al. 6,986 640 197 6,890 631 197 6,890 631 197 640 631 197 640 631 197 6,890 631 197 6,890 631 197 6,890 631 197 6,890 631 6,89 | | | 6 | | 6 | | 20 | | - | | 4 |
| 6,890 631 197 1, 9625 5,795 | 1,119 583 | 486 | 10 | 472 | 83 | 1,185 | 30 | 7 | 934 | 259 | 971 |
| 9,625 5,795 | 1,111 583 | 485 | 10 | 460 | 93 | 1,160 | 30 | 7 | 921 | 259 | 943 |
| 9,625 5,795 | 80 | - | | 12 | | 25 | | - | 13 | - | 28 |
| 3,435 2,732 | 1,031 | 2,017 | 89 | 694 | 38 | 20 | | | | | 27 |
| g 190 3 063 | 114 | 354 | 1 | 217 | 4 | 6 | | - | - | 1 | 4 |
| 00,00 0,130 | 216 | 1,663 | 64 | 477 | 34 | 11 | | | - | - | 23 |
| Psychology 2,258 671 1,155 | 2 283 | 69 | 21 | 13 | 35 | 1 | | | 16 | | 48 |
| Professional 2,049 638 1,015 Nonprofessional 209 33 140 | 2 280 | | 21 | 13 | 35 | 1 | | | 16 | | 3 |
| Urban planning | 1 21 | 4 | - | 1 | 9 | 11 | 40 | 1 | | 121 | 22 |
| | 1 21 | 4 | | 1 | 9 | 11 | 40 | 1 | | 121 | 22 |
| 181 098 104 795 | 7 001 1 309 | 0 098 | 19 402 | 1 070 | 13 800 | | 0 040 | 1 908 | 8 | 1 771 | 9 959 |
| 000 | 1 | 1 | 0 017 | 1,010 | 000 | 100 | 01013 | 1 150 | 3 8 | 101 | 20010 |
| Nonprofessional 77,788 50,934 326 3, | 3,765 339 | | 3,675 | 1,157 | 9,149 | 167 | 1,441 | 56 | g 63 | 1,277 | 977 |
| onnel, total | 2,253 12,914 | 37 | 92 | 28 | 08 | 371 | 91 | 27 | 12 | | 874 |
| 46,765 5,623 25,911 | 2,248 11,553 | 33 | 45 | 15 | 11 | 339 | 74 | 26 | 12 | | 815 |
| al | | | 2 | 13 | 6 | 32 | 17 | 1 | | | 29 |

Source: National Science Foundation from U. S. Civil Service Commission data, NSF 70-44

—Scientific, technical, and health personnel in the Federal Government by selected agencies and occupational group and series, October 1969 SF 11

| Occupational group and series | Total | DOD | VA | Agri- culture | нем | Interior | NASA | Com- merce | Trans- porta- tion | State | TVA | AEC | Labor | HUD | other agencies |
|--|----------|---------|-----------|------------------|--------|----------|--------|---------------|--------------------------|-------|-------|-------|-------|-------|-------------------|
| Scientific and engineering | | 300 301 | 4 497 | 41 067 | 8 275 | 24.165 | 17,899 | 11,211 | 14,392 | 2,149 | 3,372 | 1,881 | 1,527 | 2,275 | 6,249 |
| personnel, total | 274,115 | 135,220 | 4,461 | 100,12 | 0 100 | 15 240 | 13 918 | 6 293 | 5.049 | 1,921 | 1,810 | 1,795 | 1,155 | 818 | 4,466 |
| Scientists and engineers | 163,538 | 76,026 | 2,941 | 22,547 | 5,070 | 9,941 | 5,101 | 5,571 | 389 | 1,537 | 369 | 643 | 1,071 | 424 | 2,091 |
| Kneineers | 84,148 | 53,791 | 240 | 3,236 | 1,053 | 5,399 | 8,817 | 722 | 4,660 | 384 | 1,441 | 1,104 | 379 | 1.357 | 1.783 |
| The state of the s | 110 577 | 59.200 | 1,486 | 15,284 | 2,152 | 8,825 | 3,981 | 4,918 | 9,343 | 228 | 1,502 | 8 8 | 000 | 00 | 900 |
| Nonprotessionals | 32,789 | 8,266 | 1,160 | 11,519 | 1,813 | 4,298 | 3 675 | 3,761 | 194 | 167 | 1,437 | 20 | 370 | 1,277 | 977 |
| Engineering and related | 77,788 | 50,934 | 326 | 3,700 | 800 | 190 | 201 | 0 000 | 573 | 1 598 | 484 | 673 | 1,441 | 504 | 2,897 |
| Scientific personnel | 112,179 | 30,501 | 3,561 | 34,066 | 6,883 | 14,239 | 5,407 | 9,332 | 010 | 2 I | 908 | 500 | | 80 | 738 |
| Dhyainal aniannea | 37,241 | 14,161 | 171 | 2,069 | 2,327 | 4,577 | 5,122 | 6,463 | 128 | 43 | 200 | 670 | | 00 | 596 |
| Professional | 30,461 | 11,864 | 717 | 1,667 | 2,096 | 3,847 | 4,959 | 3,878 | 40 | 1 | 06 | . 21 | | | 142 |
| Nonprofessional | 6,780 | 187'7 | 5 | | | | cer | 909 | 900 | 30 | 73 | 40 | 491 | 116 | 920 |
| Mathematics and statistics | 14,179 | 7,192 | 291 | 1,376 | 1,188 | 385 | 700 | 1,000 | 100 | 2 | 88 | 31 | | 36 | 314 |
| Professional | 8,314 | 5,086 | 81 210 | 602 | 541 | 148 | 132 | 687 | 77 | 24 | 15 | 6 | 357 | 80 | 909 |
| Nonprofessional | | | | 97 00 | 107 0 | 9 757 | 88 | cr. | 34 | 299 | 146 | 26 | - | | 171 |
| Biological sciences | 41,642 | 2,022 | 1,147 | 28,408 | 108.7 | 1 | 3 8 | 0 | 96 | 906 | 126 | 26 | | - | 167 |
| Professional | 27,993 | 1,264 | 391 | 19,050 | 1,463 | 1,657 | 0 0 | • | 9 00 | | 20 | | | | 4 |
| Nonprotessional | | | | | 603 | 496 | 10 | 472 | 93 | 1,185 | 30 | 7 | 934 | 259 | 971 |
| Social sciences | 986'9 | 640 | 181 | 1111 | 263 | 485 | 101 | 480 | 93 | 1,160 | 30 | 7 | 921 | 259 | 943 |
| Professional | 6,890 | 631 | IRI | 8 | 8 | 1 | | 12 | | 25 | | | - 13 | - | 87 |
| Nonprofessional | 3 | | | | | | | 804 | 38 | 20 | | | - | - | 27 |
| Geography and cartography | 9,625 | 5,795 | | 1,031 | - | 2,017 | | 210 | 8 4 | 0 | | | - | | 4 |
| Professional | 3,435 | 3,063 | | 917 | | 1,663 | 4 69 | 477 | 34 | 111 | | | - | | |
| Nombiologogogogogogogogogogogogogogogogogogo | | | | • | 600 | _ | 21 | 13 | 35 | 1 | - | | - 16 | | 48 |
| Psychology | 2,258 | | 1,155 | 7 0 | 086 | | | 13 | | | - | | - 16 | - | 45 |
| ProfessionalNonprofessional | 2,049 | 33 | 140 | | 23 | | - | - | | | | | | 101 | 9 66 |
| | 948 | | | 1 | 21 | 4 | | 1 | | 11 | 40 | | | 101 | |
| Urban planning | 248 | 20 | | 1 | 21 | 4 | - | - 1 | 9 | 11 | 40 | - | | - | |
| Nonprofessional | | | | | | | :11 | 1 | 111 | | | 1 908 | 11 2 | 1.771 | 3.352 |
| Lock of lock of the second | 161.936 | 104,725 | 998 | 7,001 | 1,392 | 9,926 | 7 | 1,879 | _ | | 1 | 1 | | 1 | 1 |
| Professional | 84,148 | 1 | | 3,236 | 1,053 | 5,399 | 8,817 | 1.157 | 9,149 | 384 | 1,441 | | | 1, | |
| Nonprofessional | - 77,788 | 11 | 11 | 11 | 11 | 11 | 11 | 1 | 80 | 371 | 91 | 27 | 7 12 | | - 874 |
| Health personnel, total | 59,121 | 6 | - | 1 | 1 | | | 1 | - | | | 26 | 5 12 | | - 815 |
| Professional | 46,765 | , cr | - | 2,248 | 11,553 | • | 4 5 | 13 | 6 | 32 | 17 | | 1 | - | - 28 |
| Warnestone | 12.356 | _ | 7.314 | | - | | | | | | | | | | |

Source: National Science Foundation from U. S. Civil Service Commission data. NSF 70-44

SF 12 —Percent distribution of scientists, engineers, and professional health personnel in the Federal Government, by occupational group and function, October 1969

| | | | | 1 | | | | 1 | | |
|---|--|---|--|--|--|---|---|--|---|--|
| Occupational group and series | Total, all functions | Research | Develop- ment | Research contract and grant adminis- tration | Test and evaluation | Design | Con- struction | Pro- duction | Installa- tion, oper- ations and main- tenance | Data collection, processing, and analysis |
| Scientific and engineering personnel, total | 100.0 | 13.9 | 15.4 | .5 | 4.6 | 10.1 | 3.5 | 2.6 | 5.3 | 8.9 |
| Scientific personnel | 100.0 | 22.9 | 9.7 | .7 | 3.5 | .6 | .1 | 1.5 | .6 | 15.1 |
| Physical sciences | 100.0 | 33.4 | 15.6 | 1.1 | 7.1 | 1.2 | .3 | .8 | 1.2 | 17.3 |
| Mathematics and statistics Biological sciences | 100.0 | 8.9 19.3 | .4 | 26.2 1.0 | 2.3 .9 | .5 (•) | (a) (a) | .3 | .7 .2 | 40.4 .8 |
| Social sciences (selected cate- | | | - | | | | ` ' | | | |
| gories) b | 100.0 | 17.5 | 1.0 3.4 | .8 .1 | .1 | (a) .8 | .1 | (*) 24.9 | .1 | 22.3 42.8 |
| Psychology | 100.0 | 25.5 | 6.7 | 1.0 | 3.1 | .3 | | | (•) | 1.3 |
| Urban planning | 100.0 | 1.3 | 3.9 | .4 | | 5.2 | 2.2 | | | 2.6 |
| Engineering personnel | 100.0 | 5.5 | 20.6 | .3 | 5.5 | 18.9 | 6.6 | 3.6 | 9.7 | 3.2 |
| Civil and related | 100.0 | 2.5 | 1.7 | .1 | 1.0 | 29.1 | 21.4 | .1 | 3.8 | 6.1 |
| Electrical and electronic | 100.0 100.0 | 3.6 1.9 | 31.6 13.8 | .3 .5 | 7.0 | 16.4 11.2 | 1.7 4.9 | 2.9 3.9 | 14.8 13.4 | 3.0 8.0 |
| Mechanical and related | 100.0 | 9.6 | 32.0 | .2 | 5.6 8.8 | 18.9 | 1.5 | 4.8 | 8.4 | 1.4 |
| Other engineering | 100.0 | 11.4 | 12.6 | .7 | 2.3 | 15.5 | 3.6 | 10.6 | 7.2 | 2.4 |
| Health personnel, total | 100.0 | 2.4 | .8 | . 5 | .2 | | | (*) | (•) | 1.9 |
| | | | 2.5 | .2 | .1 | | | | | 3.8 |
| Health officers | 100.0 | 6.6 | 2.0 | | .1 | | | | | |
| Health officers Nurses All other | 100.0 100.0 100.0 | 6.6 | .1 | (*) | (a) .7 | | | (4) | (a) (a) | |
| Nurses | Scientific and technical informa- | .1 | .1 | (•) | Clinical practice, counseling, and ancillary medical | Planning | Manage- ment | Teaching and training | | Other—no |
| Scientific and engineering personnel, total. | Scientific and technical information 1.0 1.5 | Standards and specifications 1.0 .5 | Regulatory enforcement and licensing | Natural resource operations 8.0 | Clinical practice, counseling, and ancillary medical services | 4.7 | Management 7.9 6.0 | Teaching and training | Technical assistance and consulting | elsewhere classified 5.0 |
| Scientific and engineering personnel. Scientific personnel. Physical sciences. Mathematics and statistics | Scientific and technical information | Standards and specifications 1.0 .5 .7 .5 | Regulatory enforcement and licensing | Natural resource operations | Clinical practice, counseling, and ancillary medical services | 4.7 | Manage-ment | Teaching and training | Technical assistance and consulting | Other—no elsewhere classified 5.0 6.0 3.9 |
| Scientific and engineering personnel, total Physical sciences Biological sciences Social sciences (selected cate- | Scientific and technical information 1.0 1.5 1.5 | Standards and specifications 1.0 .5 .7 | Regulatory enforcement and licensing 1.8 2.0 1.1 | (e) 2.4 Natural resource operations 8.0 15.6 .4 | Clinical practice, counseling, and ancillary medical services | 4.7 | 7.9 6.0 8.9 | Teaching and training | Technical assistance and consulting 4.5 6.9 2.3 | Other—no elsewhere classified 5.0 6.0 3.9 |
| Scientific and engineering personnel, total Physical sciences Biological sciences. Social sciences (selected categories) b | Scientific and technical information 1.0 1.5 1.5 1.0 .8 3.0 | Standards and specifications | Regulatory enforcement and licensing 1.8 2.0 1.1 | Natural resource operations | Clinical practice, counseling, and ancillary medical services | 4.7 4.1 2.1 4.2 4.4 14.3 | 7.9 6.0 8.9 3.8 3.7 | Teaching and training .4 .4 .3 .3 .3 .3 .3 .1 .1 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 | 5.0 6.0 3.9 7.9 5.5 |
| Scientific and engineering personnel, total. Scientific personnel Physical sciences Mathematics and statistics Biological sciences Social sciences (selected categories) Geography and cartography | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 .3 3.0 10.7 | 1.0 1.5 .7 .5 .2 .2 1.3 | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 | (e) 2.4 Natural resource operations 8.0 15.6 .4 (a) 44.4 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (*) .8 4.7 | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 | Teaching and training .4 .3 .3 .3 .3 .1 1 .0 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 12.6 | 5.0 6.0 3.9 7.9 5.5 |
| Scientific and engineering personnel, total Physical sciences Biological sciences. Social sciences (selected categories) b | Scientific and technical information 1.0 1.5 1.5 1.0 .8 3.0 | Standards and specifications | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 | Natural resource operations | Clinical practice, counseling, and ancillary medical services 1.0 2.0 .8 (*) | 4.7 4.1 2.1 4.2 4.4 14.3 | 7.9 6.0 8.9 3.8 3.7 | Teaching and training .4 .4 .3 .3 .3 .3 .3 .1 .1 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 | 5.0 6.0 7.9 5.5 15.3 5.1 |
| Scientific and engineering personnel, total. Scientific personnel Physical sciences Mathematics and statistics Biological sciences Social sciences (selected categories) b Geography and cartography Psychology Urban planning | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 .3 3.0 10.7 (*) | 1.0 | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 | (e) 2.4 Natural resource operations 8.0 15.6 44.4 .6 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (*) .8 4.7 | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 7.8 | Teaching and training .4 .3 .3 .3 .3 .1 1 .0 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 12.6 4.1.0 | 5.0 6.0 3.9 7.9 5.5 15.3 9.9 |
| Scientific and engineering personnel. Scientific personnel. Physical sciences. Mathematics and statistics. Biological sciences. Social sciences (selected categories) b. Geography and cartography. Psychology. Urban planning. Engineering personnel. Civil and related. | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 .3 3.0 10.7 (a) | 1.0 1.0 1.0 2.2 1.3 2.2 1.4 5 | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 (e) | 8.0 15.6 (a) 44.4 .6 9.1 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (*) .8 4.7 | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 39.7 5.3 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 7.8 9.9 9.5 | .4 .4 .4 .3 .3 .3 .3 .1 .1 .1 .0 .1.9 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 12.6 4.1.0 7.3 2.4 4.2 | 5.0 6.0 3.9 7.9 5.5 15.3 5.1 9.9 15.9 |
| Scientific and engineering personnel, total Physical sciences Mathematics and statistics Biological sciences Social sciences (selected categories) Geography and cartography Psychology Urban planning Engineering personnel Civil and related Electrical and electronic | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 .3 3.0 10.7 (a) .6 .1 | 1.0 1.0 1.0 2.2 1.1 1.0 1.1 1.1 | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 (*) 1.6 .5 1.7 | 8.0 15.6 .4 .4 .4 .6 9.1 .9 2.1 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (a) .8 4.7 40.0 | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 39.7 5.3 15.7 1.6 | 7.9 0.0 8.9 3.8 3.7 4.7 5.0 7.8 9.9 9.5 5.6 7.4 | .4 .4 .3 .3 .3 .1 1.0 1.9 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 12.6 .4 1.0 7.3 2.4 4.2 1.5 | 5.0 6.0 3.9 5.5 15.3 5.1 9.9 4.1 5.3 3.8 |
| Scientific and engineering personnel. Scientific personnel. Physical sciences. Mathematics and statistics. Biological sciences. Social sciences (selected categories) b. Geography and cartography. Psychology. Urban planning. Engineering personnel. Civil and related. | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 .3 3.0 10.7 (a) | 1.0 1.0 1.0 2.2 1.3 2.2 1.4 5 | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 (e) | 8.0 15.6 (a) 44.4 .6 9.1 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (a) .8 4.7 40.0 | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 39.7 5.3 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 7.8 9.9 9.5 | .4 .4 .4 .3 .3 .3 .3 .1 .1 .1 .0 .1.9 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 12.6 4.1.0 7.3 2.4 4.2 | 5.0 6.0 3.9 5.5 15.3 5.1 9.9 15.9 4.1 5.3 3.8 |
| Scientific and engineering personnel. Scientific and engineering personnel, total Physical sciences Mathematics and statistics Biological sciences Social sciences (selected categories) b Geography and cartography Psychology Urban planning Engineering personnel. Civil and related Electrical and electronic. General engineering. | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 3.0 10.7 (a) 6 1.0 | 1.0 1.0 1.0 2.2 1.3 2.6 1.4 2.9 | Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 (*) 1.6 | 8.0 15.6 .4 .4 .4 .6 9.1 .9 2.1 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (a) .8 4.7 40.0 | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 39.7 5.3 15.7 1.6 5.3 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 7.8 9.9 9.5 5.6 7.4 23.4 | .4 .4 .3 .3 .3 .1 .1 1.0 1.9 | Technical assistance and consulting 4.5 6.9 2.3 2.3 13.6 12.6 4.1 1.0 7.3 2.4 4.2 1.5 2.7 | 5.0 6.0 3.9 7.9 5.5 15.3 5.1 9.9 15.9 |
| Scientific and engineering personnel, total Scientific personnel Physical sciences Mathematics and statistics Biological sciences Social sciences (selected categories) Geography and cartography Psychology Urban planning Engineering personnel Civil and related Electrical and electronic General engineering Mechanical and related | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 .3 3.0 10.7 (a) .6 1.0 .7 | 1.0 1.0 1.0 2.2 1.1 2.2 1.3 2.6 1.4 5.1 1.1 2.9 1.4 | 1.8 2.0 1.1 .2 4.0 1.4 (a) 1.6 1.7 1.6 1.2 | 8.0 15.6 .4 (a) 44.4 .6 9.1 .9 2.1 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (a) .8 4.7 40.0 (b) | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 39.7 5.3 15.7 1.6 5.3 .9 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 7.8 9.9 9.5 5.6 7.4 23.4 6.9 | .4 .4 .3 .3 .3 .1 .1 .1.0 .1.9 | Technical assistance and consulting 4.5 6.9 2.3 2.8 13.6 12.6 .4 1.0 7.3 2.4 4.2 1.5 2.7 1.0 | 5.0 6.0 3.9 7.9 5.5 15.3 5.1 9.9 15.9 4.1 5.3 3.88 4.7 |
| Scientific and engineering personnel, total Scientific personnel Physical sciences Mathematics and statistics Biological sciences Social sciences (selected categories) b Geography and cartography Psychology Urban planning Engineering personnel Civil and related General engineering Mechanical and related Other engineering | 100.0 100.0 Scientific and technical information 1.0 1.5 1.5 1.0 3.0 10.7 (a) 6 1.0 .7 .5 | 1.0 1.0 1.0 2.2 1.3 2.6 1.4 1.9 | 1.8 Regulatory enforcement and licensing 1.8 2.0 1.1 .2 4.0 1.4 (*) 1.6 1.7 1.6 1.2 4.5 | (e) 2.4 Natural resource operations 8.0 15.6 .4 (a) 44.4 .6 9.1 .9 2.1 .2 .1 | Clinical practice, counseling, and ancillary medical services 1.0 2.0 8 (a) .8 4.7 40.0 (a) (b) (c) (c) | 4.7 4.1 2.1 4.2 4.4 14.3 2.0 1.0 39.7 5.3 15.7 1.6 5.3 .9 3.9 | 7.9 6.0 8.9 3.8 3.7 4.7 5.0 7.8 9.9 9.5 5.6 7.4 23.4 6.9 8.3 | | Technical assistance and consulting 4.5 6.9 2.3 2.3 13.6 12.6 .4 1.0 7.3 2.4 4.2 1.5 2.7 1.0 4.0 | 5.0 6.0 3.9 7.9 5.5 15.3 5.1 9.9 15.9 4.1 5.3 3.8 4.7 2.5 |

[•] Less than .05 percent.

sciences.

b Includes social science, sociology, economics, foreign agricultural affairs, history, manpower research analysis, and the anthropological

Source: National Science Foundation, from U. S. Civil Service Commission data.

SF 13 —Professional scientific, technical, and health personnel in the Federal Government, by occupational group and series, by agency. October 1968 and October 1969

| Occupational group and series | Total | DOD | VA | Agri- culture | HEW | Interior | NASA | Com- merce | Trans- porta- tion | State | TVA | AEC | Labor | HUD | All other agencies |
|---|----------|--------|--------|------------------|--------|----------|--------|---------------|--------------------------|-------|-------|-------|-------|-----|--------------------------|
| | | | | | | | | 1968 | | | | | | | |
| Scientific and engineering personnel, total | 160,819 | 74,274 | 2,865 | 25,877 | 6,311 | 14,422 | 13,858 | 6,293 | 4,968 | 1,995 | 1,807 | 1,767 | 1,158 | 904 | 4,320 |
| Scientific personnel | 78,054 | 21,983 | 2,337 | 22,668 | 5,083 | 8,856 | 5,017 | 5,581 | 366 | 1,590 | 374 | 655 | 1,092 | 417 | 2,035 |
| Physical sciences | 29,517 | 11,628 | 722 | 1,631 | 2,228 | 3,754 | 4,240 | 3,897 | 88 | 46 | 122 | 280 | | 00 | 268 |
| Chemistry | 8.474 | 2.781 | 676 | 1.256 | 1.868 | 984 | 123 | 299 | 22 | | 110 | 114 | | | 241 |
| General physical sciences | 6,505 | 1,881 | 1 | 46 | 275 | 300 | 3,110 | 441 | 34 | 41 | | 183 | | 7 | 11 |
| Physics Other physical sciences | 6,158 | 2,411 | £ 21 | 46 | 27 | 2,357 | 478 | 733 | 19 | 5 | 12 | 205 | | 1 | 36 |
| Mathematics and statistics | 8,858 | 5.072 | 79 | 809 | 909 | 142 | 665 | 992 | 124 | 17 | 57 | 36 | 145 | 35 | 22 |
| Biological sciences | - 27,127 | 1,246 | 351 | 19,219 | 1,391 | 4,138 | 78 | 63 | 22 | 364 | 125 | 24 | | | 167 |
| Social sciences (selected categories) | 6,894 | 629 | 199 | 1,108 | 298 | 468 | 10 | 477 | 68 | 1,136 | 31 | 4 | 930 | 266 | 948 |
| Psychology | 2,033 | 647 | 986 | 0 00 | 256 | 940 | 23 | 10 | 36 | 4 | | | 17 | | 45 |
| Urban planning | - 222 | 26 | | 1 | 4 | 3 | - | 3 | 7 | 00 | 39 | 1 | | 108 | |
| Engineering personnel | 82,765 | 52,291 | 528 | 3,209 | 1,228 | 5,566 | 8,841 | 712 | 4,602 | 405 | 1,433 | 1,112 | 99 | 487 | 2,285 |
| Civil and related | 18,880 | 9,268 | 77 | 2,080 | 924 | 3,028 | 42 | 111 | 2,251 | 128 | 376 | 59 | | 225 | 8 |
| Electrical and electronic | 20,306 | 15,236 | 26 | 218 | 20 | 838 | 1,032 | 315 | 1,281 | 85 | 579 | 49 | | 7 | 583 |
| Mechanical and related | 22,503 | 14,457 | 300 | 28 28 | 58 | 214 | 5,931 | 159 | 470 | 141 | 237 | 566 | | 17 | 260 |
| Other engineering | 8,015 | 4,545 | 82 | 762 | 135 | 951 | 298 | 41 | 77 | 37 | 183 | 164 | 99 | 169 | 10 |
| Health personnel, total | 46,163 | 5,560 | 25,336 | 2,248 | 11,553 | 38 | 46 | 17 | 71 | 364 | 92 | 28 | 13 | | 797 |
| Health officers | 13,583 | 406 | 6,000 | 2,187 | 4,591 | 9 | 30 | 1 | 36 | 119 | 16 | 10 | | | |
| Other health personnel | - 32,580 | 5,154 | 19,336 | 61 | 6,962 | 32 | 16 | 16 | 35 | 245 | 26 | 18 | 13 | | 616 |
| Nurse | 22,068 | 4,436 | 14,455 | 32 | 2,325 | 21 | 13 | 16 | 30 | 140 | 43 | 7 | 60 | | 547 |
| All other | 10.512 | 718 | 4.881 | 58 | 4.637 | 11 | 8 | | 10 | 105 | 33 | 11 | 10 | | |

SF 14

For title and column headings see SF 13 on preceding page.

| | | | | | | | | 1969 | | | | | | | |
|--|---|---|-----------------------------|---------------------------------|-------------------------------|-----------------------------------|--------------------------------------|--------------------------------|------------------------------------|-----------------------|--------------------------------|-------------------------------|-------|-----------------------------|---------------------------------|
| Scientific and engineering personnel, total | 163,538 | 76,026 | 2,941 | 25,783 | 6,123 | 15,340 | 13,918 | 6,293 | 5,049 | 1,921 | 1,810 | 1,795 | 1,155 | 818 | 4,466 |
| Scientific personnel | 79,390 | 22,235 | 2,401 | 22,547 | 5,070 | 9,941 | 5,101 | 5,571 | 389 | 1,537 | 369 | 643 | 1,071 | 424 | 2,091 |
| Physical sciences | 30,461 | 11,864 | 717 | 1,667 | 2,096 | 3,847 | 4,959 | 3,878 | 94 | 42 | 115 | 578 | | 00 | 296 |
| Chemistry General physical sciences Physics Other physical sciences | 8,248 8,542 5,700 7,971 | 2,766 2,107 4,562 2,429 | 667 47 3 | 1,254 50 52 311 | 1,755 169 53 119 | 954 401 129 2,363 | 33 4,897 | 308 457 726 2,387 | 23 37 10 24 | 39 | 101 | 108 193 82 195 | | 7 | 279 185 32 100 |
| Mathematics and statistics. | 8,314 | 5,086 | 81 | 602 | 647 | 148 | 31 | 666 | 132 | 15 | 28 | 31 | 134 | 36 | 314 |
| Social sciences (selected categories)* | 6,890 | 631 | 197 | 1,111 | 583 | 485 | 01 - | 460 | 93 4 | 1,160 | 30 | 7 | 921 | 259 | 943 |
| Psychology. | 2,049 | 638 | 1,015 | 12 | 260 | 8 4 | 21 | 13 | 35 | 111 | 40 | 1 | 16 | 121 | 45 |
| Engineering personnel | 84,148 | 53,791 | 540 | 3,236 | 1,053 | 5,399 | 8,817 | 722 | 4,660 | 384 | 1,441 | 1,152 | 84 | 484 | 2,375 |
| Civil and related Electrical and electronic General engineering Mechanical and related Other engineering | 18,369 20,942 13,862 22,921 8,054 | 9,186 15,734 9,479 14,811 4,581 | 78 29 306 46 81 | 2,160 218 63 84 711 | 607 83 113 80 170 | 2,849 847 554 207 942 | 37 1,032 1,525 5,927 296 | 107 327 160 149 39 | 2,266 1,312 517 483 82 | 120 84 140 7 | 365 593 64 248 171 | 53 49 277 585 188 | 83 | 224 5 80 17 168 | 316 629 644 277 509 |
| Health personnel, total | 46,765 | 5,623 | 25,911 | 2,248 | 11,553 | 33 | 45 | 15 | 11 | 339 | 74 | 26 | 12 | | 815 |
| Health officersOther health personnel | 13,682 | 417 5,206 | 6,064 | 2,194 | 4,591 | 29 | 29 | 14 | 33 | 148 | 13 | 10 | 12 | | 173 |
| Nurse. | 22,362 10,721 | 4,386 | 14,834 5,013 | 23 | 2,325 | 22 | 13 | 14 | 28 | 104 | 39 | r- 6 | 8 6 | | 581 |

• Includes social science, sociology, economics, foreign agricultural affairs, history, manpower research analysis, and the anthropological sciences. Source: National Science Foundation, from U. S. Civil Service Commission data.

From: NSF 70-11

SF 15 —Percent distribution of Federal scientists, engineers, and professional health personnel engaged primarily in research and development, by agency, October 1969

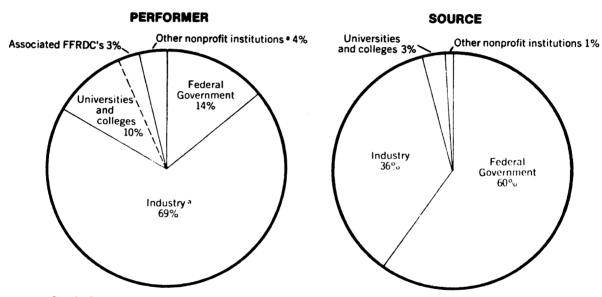
| Agency | | ific and engin | • • | | rofessional hes | |
|---|---------------|----------------|-------------|------------|--------------------|-------------|
| | Total | Research | Development | Total | Research | Development |
| All agencies | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Department of Defense. | 52 . I | 28.7 | 73.2 | 6.9 | 8.0 | 3.5 |
| Veterans Administration | 1.8 | 3.7 | .1 | 23.2 | 30.9 | |
| Department of Agriculture | 10.3 | 21.1 | .5 | 11.2 | 8.4 | 19.4 |
| Department of Health, Education, and Welfare | 3.8 | 7.4 | .5 | 55.4 | 49.2 | 74.1 |
| Department of the Interior | 8.1 | 15.4 | 1.5 | .4 | .5 | |
| National Aeronautics and Space Administration | 16.3 | 14.1 | 18.4 | . 5 | .4 | .9 |
| Department of Commerce | 3.8 | 6.1 | 1.7 | | | |
| Department of Transportation | 1.2 | .9 | 1.7 | .2 | .3 | |
| Department of State | (•) | | (a) | | | |
| Tennessee Valley Authority | . 1 | (•) | .2 | | - | |
| Atomic Energy Commission | .8 | . 1 | 1.5 | . 2 | | . 9 |
| Department of Labor | . 2 | .4 | .1 | . 2 | | 9 |
| Department of Housing and Urban Development | (•) | . 1 | (*) | (*) | . . | |
| All other agencies | 1.4 | 2.1 | .7 | 1.8 | 2.3 | .3 |

Less than .05 percent.
Note: Percent detail may not add to 100.0 because of rounding.

Source: National Science Foundation from U. S. Civil Service Commission data. NSF 70-44

SF 16 Distribution of the Nation's R&D funds, by performer and source, 1968

Total: \$25.2 billion

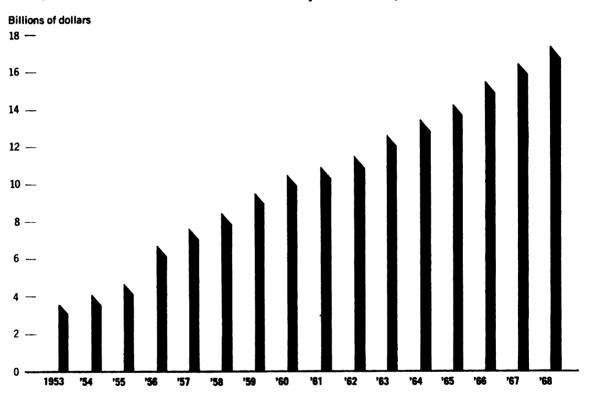


Data for Federally Funded Research and Development Centers (FFRDC's) administered by industry and nonprofit institutions are included in the totals for these two sectors.

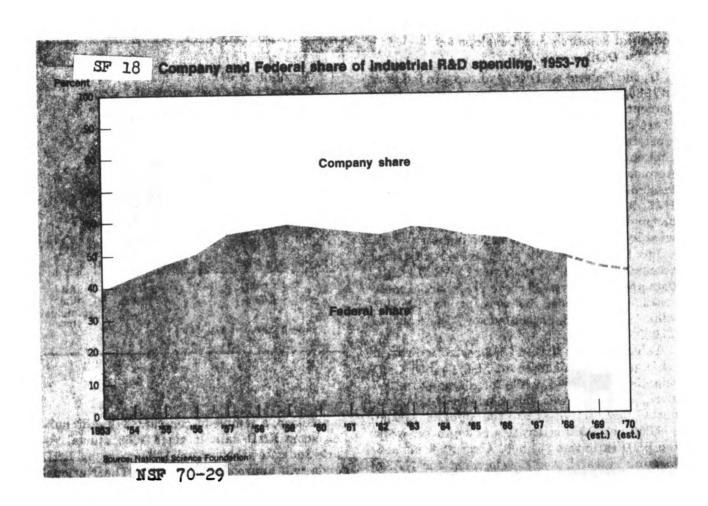
Source: National Science Foundation

NSF 70-29

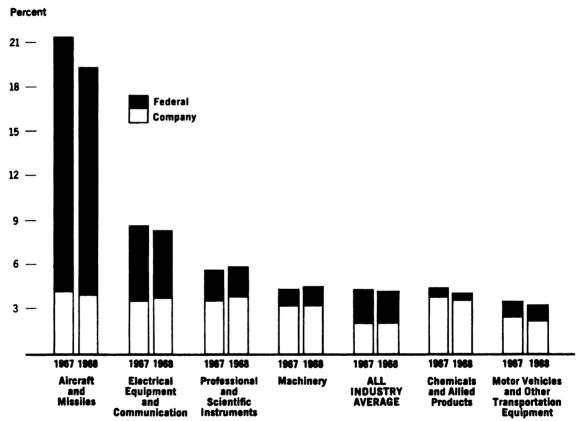
SF 17 Trends in funds for industrial R&D performance, 1953-68



Source: National Science Foundation NSF 70-29



SF 19 Total, company and Federal funds for R&D performance as a percent of net sales in selected industries, 1967 and 1968



Source: National Science Foundation

NSF 70-29

SF 20 —Trends in funds for industrial R&D performance, by source, 1953-68

[Dollars in millions]

| | Total | Total R&D | Ped. | Poderal | Comp | Company * |
|--------|---------|---|---------|------------------|---------|------------------|
| Уемг | Amount | Percent change from previous year | Amount | Percent of total | Amount | Percent of total |
| 1953 | \$3,630 | | \$1,430 | 39 | \$2,200 | 61 |
| 1954 ₺ | 4,070 | 12 | 1,750 | 43 | 2,320 | 57 |
| 1955 ₺ | 4,640 | 14 | 2,180 | 47 | 2,460 | 53 |
| 1956 | 6,605 | 42 | 3,328 | 26 | 8,277 | 20 |
| 1957 | 7,731 | 17 | 4,335 | 26 | 3,396 | 44 |
| 1958 | 8,389 | 6 | 4,759 | 57 | 3,630 | £\$ |
| 1959 | 9,618 | 15 | 5,635 | 29 | 3,983 | 41 |
| 1960 | 10,509 | 6 | 6,081 | 28 | 4,428 | 42 |
| 1961 | 10,908 | 4 | 6,240 | 57 | 4,668 | 43 |
| 1962 | 11,464 | 2 | 6,434 | 26 | 5,029 | 44 |
| 1963 | 12,630 | 10 | 7,270 | 28 | 5,360 | 42 |
| 1964 | 13,512 | 7 | 7,720 | 57 | 5,792 | 43 |
| 1965 | 14,185 | 20 | 7,740 | 55 | 6,445 | 45 |
| 1966 | 15,548 | 10 | 8,332 | 22 | 7,216 | 46 |
| 1967 | 16,415 | 9 | 8,395 | 51 | 8,020 | 49 |
| 1968 | 17,435 | 9 | 8,559 | 49 | 8,876 | 51 |
| | | | | | | |

Company funds include all funds for industrial research and development performed within company facilities except funds provided by the Federal Government. The data do not include company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other nonprofit organizations. In 1968 industrial firms contracted \$213 million in company-financed.

RaD projects to outside organizations.

^b Estimates of funds by source were derived by interpolating data on sources of funds obtained in the 1953 and 1966 surveys of industrial research and development.

^c Funds by source estimated by the National Science Foundation.

NSF 70-29

SF 21 -Funds for R&D performance, by industry and size of company, 1956-68

[Dollars in pullions]

| Industry and size of company | SIC code * | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|---|---|---------------------|------------------|---------------------|---------------------|-------------------|---------------------------|-----------------------------|-------------------|---------------------------|--------------|-------------------------------|---------------------|---------------------|
| Total | | \$6,605 | \$7.731 | \$8,389 | \$9,618 | \$10,509 | \$10,90K | \$11,461 | \$12,630 | \$13,512 | | | \$16,415 | \$17,485 |
| Distribution by Industry | | | | | | | | | | er ere rer | TATELL BELL | TOTAL L.F. | ELECTIFIC | |
| Food and kindred products. Textiles and apparel Lumber, wood products, | 20 22, 2 3 | ტ64 | 74 15 | A3 26 | 91 30 | 104 38 | 126 30 | 121 24 | | 141 32 | 151 38 | 163 61 | 165 67 | 173 59 |
| and furniture | 24, 2 5 26 | _(ب) 36 | 14 35 | 12 4 2 | 12 49 | 10 56 | 10 59 | 10 65 | | 12 71 | 12 77 | 13 88 | 14 83 | 17 91 |
| products | 28 | 641 | 705 | 792 | 891 | 980 | 1,101 | 1,175 | 1,239 | 1,300 | 1,390 | 1,461 | 1,669 | 1,640 |
| Industrial chemicals Drugs and medicines Other chemicals | 281 82 283 284-87, 289 | 460 94 87 | 503 104 98 | 553 128 111 | 600 154 137 | 666 162 152 | 706 180 2 15 | 242 | 809 216 214 | 876 2 38 186 | 274 184 | 955 318 188 | 1,004 356 209 | 1,025 393 222 |
| Petroleum refining and extraction | 29 , 13 | (†) | 211 107 | 246 H9 | 278 115 | 296 121 | 299 138 | 310 141 | | 410 159 | 434 166 | 430 178 | 455 200 | 538 229 |
| products | 82 33 | 60 90 | 469 KO1 | 4 75 131 | 6 81 152 | 89 177 | 88 177 | 96 171 | 100 183 | 110 195 | 117 213 | 128 232 | 156 24 2 | 167 253 |
| Perrous metals and products | 331-32, 3391 . 8399 | () | 64 | 80 | 84 | 102 | 98 | 97 | 106 | 116 | 128 | 139 | 135 | 186 |
| Nonferrous metals and products | balance of 33 | <u>ტ</u> | 44 | 51 | 68 | 75 | 79 | 74 | 77 | 79 | 85 | 93 | 107 | 117 |
| Pabricated metal products. Machinery | 34 85 | | 135 669 | 162 781 | 138 93 0 | 145 949 | 136 901 | 146 914 | | 148 1,051 | 145 1,128 | 154 1, 30 0 | 163 1,457 | 173 1,619 |
| communication | 36, 48 | 1,516 | 1,804 | 1,969 | 2,329 | 2,532 | 2,483 | 2,639 | 2,866 | 2,952 | 3,168 | 8,586 | 3,798 | 4,038 |
| Radio and TV receiv- ing equipment Communication | 36 5 | O | (4) | ල ල | ტ | (4) | ෆ | (h) | (7) | (ტ) | (4) | 67 | 84 | 102 |
| equipment and elec- tronic components Other electrical | 366-67, 48 | | 748 | 868 | 1,162 | 1,324 | 1,404 | 1,591 | 1,773 | 1,837 | 1,918 | 2,149 | 2,241 | 2,332 |
| equipment | 361-64, 369 | () | 1,056 | 1,101 | 1,167 | 1,208 | 1,079 | 1,048 | 1,093 | 1,116 | 1,250 | 1,370 | 1,473 | 1,603 |
| Motor vehicles and other transportation equip- | 371, 378 75, 379 | 688 | 707 | 856 | 866 | 884 | 936 | 999 | 1,090 | 1,176 | 1,223 | 1, 33 9 | 1,376 | 1,630 |
| Aircraft and missiles. Professional and scientific instruments. | 372, 19 38 | 2,188 | 2,574 249 | 2,609 294 | 3,0 90 | 3,514 329 | 3,829 29 7 | 4,042 309 | | 5,055 324 | 5,098 883 | 5,447 484 | 5,570 492 | 5,651 590 |
| Scientific and mech- | | | | | | | | | | | | | | |
| anical measuring instruments Optical, surgical, 'photographic, and | 881-82 | 97 | 139 | 156 | 159 | 160 | 119 | 101 | 70 | 73 | 76 | 76 | 85 | 90 |
| other instruments | 883 -87 | 108 | 110 | 138 | 150 | 169 | 178 | 208 | 214 | 251 | 808 | 857 | 407 | 500 |
| Other manufacturing Industries | 21, 27, 61, 39 | ტ | 93 | ~ 105 | 118 | 119 | 105 | 65 | 54 | 60 | 61 | 64 | 75 | 88 |
| Industries | 10-12, 14-17, 40-47, 49-67, 70-79, 89 | ф. | ტ | 117 | 139 | 168 | 194 | 234 | 276 | 318 | 382 | 490 | 54 6 | 578 |
| Distribution by Size of Company (based on number of employees) | | | | | and the | | | | | | · · · · · | | | |
| Less than 1,000 | | 369 650 6,686 | 632 | 532 642 7,215 | 546 740 8,332 | 892 | 612 949 9.347 | 633 990 9,84 0 | 1,022 | 632 1,035 11,846 | 956 | 621 1,043 793 13,092 | 1 892 | |

⁶ Industries, industry groups, and product fields shown separately in statistical tables are classified according to their Standard Industrial Classification Manual codes. See appendix A, footnote 2.

Not separately available but included in total.

From: NSF 70-29

^{*} Estimated by the National Science Foundation.

d SIC codes 3391 and 3399 included in the nonferrous metals and products group for 1956 to 1965.

^{*} Included in the other electrical equipment group.

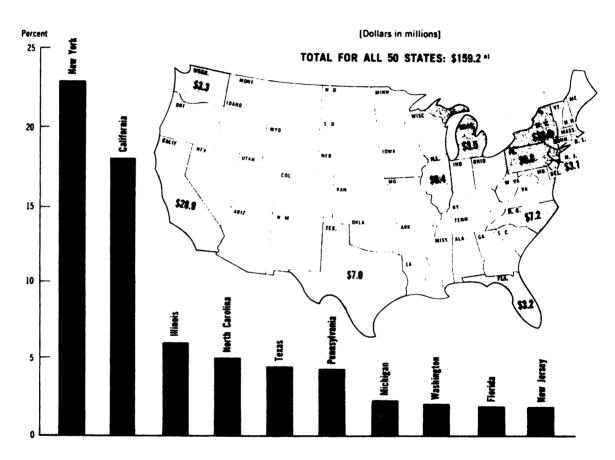
SF 22 —Comparison of State agency expenditures for research, development, and R&D plant between fiscal years 1964 and 1968

[Dollars in thousands]

| [170Hars in the | | | | , |
|----------------------|-------------|-------------------|-------------------|--|
| State | 1964 | 1968 | Percent change | Average annual growth rate, 1964-68 |
| United States, total | \$77,352 | \$ 159,214 | +106 | 19.8 |
| Alabama | 717 | 372 | -48 | -15.1 |
| Alaska | 2,361 | 2.623 | + 11 | 2.3 |
| Arizona | 246 | 425 | +73 | 14.6 |
| Arkansas | 341 | 835 | +145 | 25. |
| California | 11,163 | 28,926 | +159 | 26.9 |
| Colorado | 1.027 | 1,085 | + 6 | 1 |
| Connecticut | 814 | 2.257 | +167 | 27.9 |
| Delaware. | 9 | 84 | + 833 | 74.1 |
| Florida | 1.696 | 3,221 | + 90 | 17. |
| Georgia | 1,169 | 1.771 | + 51 | 10.9 |
| Hawaii | 767 | 1,667 | 117 | 21.4 |
| Idaho | 403 | 814 | + 102 | 19.3 |
| Illinois | 3,957 | 9.118 | † 138 | 21.: |
| Indiana | 751 | 1,368 | 1.82 | 16.3 |
| lowa | 416 | 1,752 | 1321 | 43.3 |
| Kunsas | 222 | 1.288 | + 480 | 55.2 |
| Kentucky | 884 | 2,536 | + 187 | 30.1 |
| Louisiana | 959 | 1,325 | +38 | 8.4 |
| Maine | 764 | 708 | -7 | -1.9 |
| Maryland | 475 | 1.187 | +150 | 25.7 |
| Massachusetts | 693 | 1,665 | +140 | 24.5 |
| Michigan | 1,943 | 3,457 | +78 | 15.5 |
| Minnesota | 1,117 | 2,368 | +112 | 20.7 |
| Mississippi | 1.232 | 858 | -30 | -8.6 |
| Missouri | 2,393 | 1.801 | 2 5 | -6 9 |
| Montana. | 257 | 1,106 | +330 | 44.0 |
| Nehraska | 578 | 367 | -37 | —10 . |
| Nevada | 58 | 82 | +41 | 9.0 |
| New Hampshire | 58 | 269 | +364 | 46.8 |
| New Jersey | 3,344 | 3,148 | - 6 | -1. |
| New Mexico | 128 | 832 | +550 | 59.1 |
| New York | 17,832 | 36,836 | +107 | 19.9 |
| North Carolina | 476 | 7.222 | +1,417 | 97.4 |
| North Dakota | 452 | 301 | - 33 | -9.1 |
| Ohio | 1.471 | 2,846 | + 93 | 17.9 |
| Oklahoma | 938 | 1,905 | + 103 | 19.4 |
| Oregon . | 735 | 1,371 | ×7 | 16.9 |
| Pennsylvania | 3,879 | 6,820 | 1 76 | 15.2 |
| Rhode Island | 130 | 1,070 | + 723 | 69.4 |
| South Carolina | 259 | 570 | +120 | 21. |
| South Dakota | 587 | 511 | - 13 | 3.4 |
| Pennessee | 264 | 371 | +41 | 8.9 |
| Pexas | 2,545 | 7,008 | +175 | 28.8 |
| UtahVermont | 94 51 | 2.006 608 | +2,034 + 1,092 | 114.9 85.8 |
| | " | 000 | , 2,002 | ,,,, |
| Virginia. | 2,397 | 2,875 | +20 | 4.7 |
| Washington | 1,527 | 3,281 | +115 | 21.1 |
| West Virginia | 844 | 1,133 | +34 | 7.6 |
| Wisconsin | 1,653 | 2,428 | +47 | 10.1 |
| Wyoming | 246 | 440 | + 79 | 15.6 |

From: NSF 70-22

STP 23 Ten States leading in State agency R&D activities, FY 1968



a) Includes R & D plant.

Source: National Science Foundation

NSF 70-22

SF 24 —Total State expenditures for all purposes, and State expenditures for research, development, and R&D plant, by functional area, fiscal year 1968

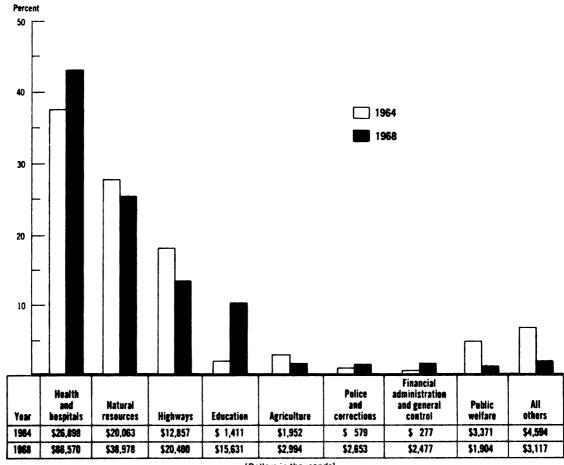
[Dollars in millions]

| | Total State er | kpenditures* | RaD expe | enditures | R&D expenditures |
|------------------------------|----------------|--------------|---------------|-----------|--|
| Function | Amount | Percent | Amount | Percent | as a percent of total expenditures |
| Total | \$57,273 | 100 | \$ 159 | 100 | 0.3 |
| Health and hospitals | 4,203 | 7 | 69 | 43 | 1.6 |
| Natural resources | 1,225 | 2 | 49 | 25 | 3.3 |
| Highways | 11,848 | 21 | 21 | 13 | .2 |
| Education | 15,297 | 27 | 16 | 10 | .1 |
| Agriculture | 780 | 1 | 3 | 2 | .4 |
| Police and corrections | 1,412 | 2 | 3 | 2 | .2 |
| Financial administration and | 1 | | | |] |
| general control | 1,329 | 2 | 2 | 2 | .2 |
| Public welfare | 8,649 | 15 | 2 | 1 | (b) |
| All others | 12,530 | 22 | 3 | 2 | (b) |

Excludes expenditures for higher education. These expenditures (\$8,982 million), are excluded to make the data comparable to the State agency RaD data.
 Less than 0.1 percent.

Source: NSF 70-22

SF 25 R&D expenditures of State agencies, by functional area and percent share of total, FY 1964 and 1968



[Dollars in thousands]

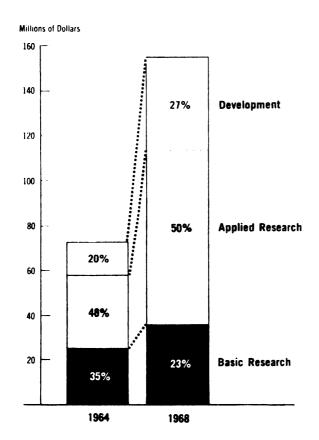
Source: National Science Foundation NSF 70-22

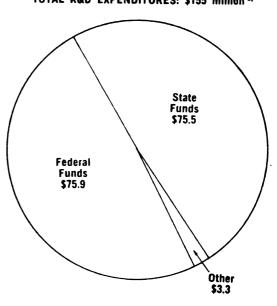
State agency R&D expenditures, by source of funds, FY 1968

TOTAL R&D EXPENDITURES: \$155 million "

SF 26

State agency R&D expenditures, by character of work, FY 1964 and 1968

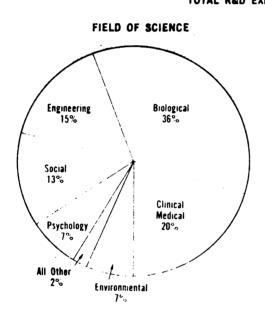


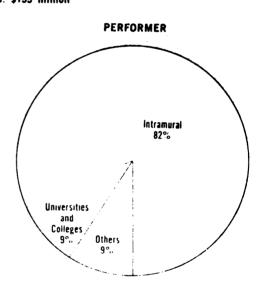


a) Excludes R&D plant Source: National Science Foundation NSF 70–22

SF 27 Distribution of State agency R&D expenditures, by field of science and performer, FY 1968

TOTAL R&D EXPENDITURES: \$155 million*

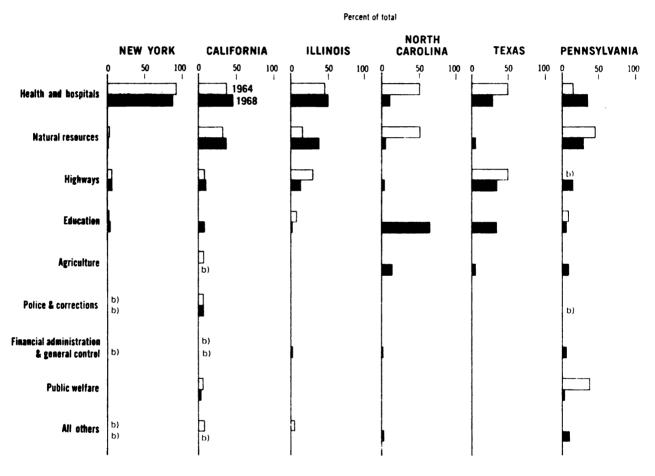




u) Excludes 6810 plant. Source: National Science Foundation.

NSF 70-22

SF 28 Six States leading in State agency R&D expenditures, " by functional area, FY 1964 and 1968



a) Excludes R&D plant.

b) less than 1%

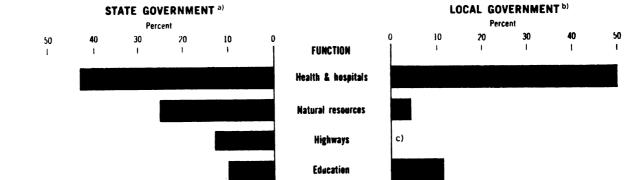
NSF 70-22 Source: National Science Foundation

SF 29—State agency scientists and engineers engaged in research and development compared to State agency expenditures for research and development, by functional area, fiscal year 1968

| Function | Scientists and engineers | R&D expenditures * |
|--------------------------|--------------------------------|-----------------------|
| Total | 3,733 | \$154.7 million |
| - | Percent of | listribution |
| Health and hospitals | 37 | 43 |
| Natural resources | 34 | 25 |
| Highways. | 10 | 13 |
| Education | 10 | 10 |
| Agriculture | 1 | 2 |
| Police and corrections | 2 | 2 |
| Financial administration | | |
| and general control | 2 | 2 |
| Public welfare | 1 | 1 |
| All others | 2 | 2 |

[•] Excludes RaD plant.

From: NSF 70-22



Police & corrections Financial administration & general control Public welfare

All others $^{\rm d)}$

SF 30 Comparison of State and local government R&D expenditures, by function

NSF 70-22

Source: National Science Foundation

a) Based on 1968 data excluding R&D plant. b) Based on 1967 data excluding R&D plant

c) less than 0.5 percent

d) State governments: Agriculture (2°s), other (2°s) Local governments: Housing and urban renewal (5°s), sewers and sewage disposal (5°s), municipal utilities (4°s), other (2°s)

SF 31 —Geographic distribution of funds for research, development, and R&D plant of State, local, and Federal governments, by State

[Dollars in thousands]

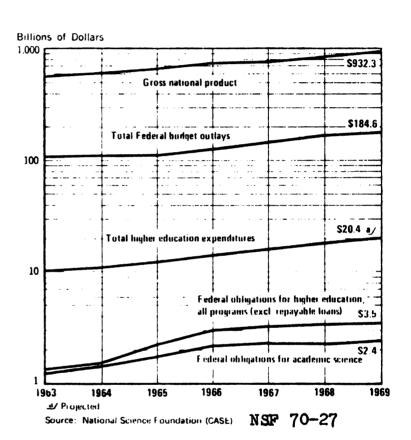
| State | State | · | Local | ь | Federa |] • |
|----------------------|--------------|----------|--------------|---------|-------------------|------------|
| | Expenditures | Percent | Expenditures | Percent | Obligations | Percent |
| United States, total | \$159,214 | 100 | \$81,673 | 100 | \$16,289,992 | 10 |
| labama | 372 | .2 | | | 407,948 | 2. |
| laska | 2,623 | 1.6 | | | 63,837 | |
| rizona | 425 | .8 | 255 | .8 | 82,262 | |
| rkansas | 835 | .5 | | | 8,272 | |
| alifornia | 28,926 | 18.2 | 8,681 | 27.4 | 4,390,722 | 27. |
| olorado | 1,085 | .7 | 376 | 1.2 | 268,102 | 1. |
| onnecticut | 2,257 | 1.4 | 862 | 1.1 | 144,988 | |
| elaware | 84 | .1 | | | 14,380 | |
| lorida | 3,221 | 2.0 | 554 | 1.8 | 875,958 | 5. |
| eorgia. | 1,771 | 1.1 | 64 | .2 | 284.662 | 1. |
| awaii | 1,667 | 1.0 | 59 | .2 | 88,690 | |
| daho | 814 | .5 | 1 | | 74,412 | |
| linois | 9,418 | 5.9 | 1,878 | 5.9 | 270,673 | 1. |
| diana | 1,368 | .9 | 145 | .5 | 86,541 | |
| Wa | 1,752 | 1.1 | 154 | .5 | 48,991 | |
| ansas. | 1,288 | .8 | 169 | .5 | 20,495 | |
| entucky | 2,586 | 1.6 | 54 | .2 | 24,414 | |
| ouisiana | 1,325 | .8 | 92 | .8 | 278,932 | 1. |
| aine | 708 | .4 | | | 6,060 | (°) |
| aryland | 1,187 | .7 | 1,708 | 5.4 | 942,555 | 5. |
| assachusetta | 1,665 | 1.0 | 1,244 | 3.9 | 840,952 | 5. |
| lichigan | 8,457 | 2.2 | 833 | 2.6 | 206,710 | 1. |
| innesota | 2,868 | 1.5 | 243 | .8 | 114,352 | |
| ississippi | 858 | .5 | 88 | .1 | 80,214 | |
| issouri | 1,801 | 1.1 | 250 | .8 | 121,831 | |
| ontana | 1,106 | .7 | | | 8,505 | |
| ebraska. | 367 | .2 | | | 16,476 | |
| evada | 82 | . 1 | | | 234,598 | 1. |
| ew Hampshire | 269 | .2 | | | 37,220 | |
| ew Jeracy | 3,148 | 2.0 | 459 | 1.4 | 693 ,515 | 4. |
| ew Mexico | 832 | .5 | 84 | .1 | 456,461 | 2. |
| ew York | 36,836 | 28.1 | 7,262 | 22.9 | 1,218,609 | 7. |
| orth Carolina | 7,222 | 4.6 | 62 | .2 | 66,098 | |
| orth Dakota | 301 | .2 | | | 6,412 | (¢) |
| hio | 2,846 | 1.8 | 515 | 1.6 | 674,292 | 4. |
| klahoma | 1,905 | 1.2 | 13 | (*) | 24,254 | |
| regon | 1,371 | .9 | 80 | .3 | 87,408 | |
| mnsylvania | 6,820 | 4.8 | 2,676 | 8.5 | 634,871 | 8. |
| hode Island | 1,070 | .7 | | | 82,018 | |
| uth Carolina | 570 | .4 | | | 20,183 | |
| uth Dakota | 511 | .8 | | | 6,765 | (e) |
| ennemee | 871 | .2 | 263 | .8 | 210,817 | 1. |
| exas | 7,008 | 4.4 | 1,110 | 8.5 | 899,718 | 5. |
| tah | 2,006 | 1.8 | 49 | .2 | 40,550 | |
| rmont | 608 | .4 | | | 7,075 | (*) |
| rginia | 2,875 | 1.8 | 282 | .7 | 291,018 | 1. |
| ashington | 8,281 | 2.1 | 170 | .5 | 858,448 | 2. |
| est Virginia | 1,188 | .7 | | | 24,308 | |
| isconsin | 2,428 | 1.5 | 792 | 2.5 | 117,988 | |
| yoming | 440 | .8 | | | 6,500 | (°) |
| strict of Columbia | | - | 804 | 2.5 | 457,681 69,261 | 2 |
| ther d | | | | | | |

1968 data.
1967 data.
Less than 0.05 percent.
Outlying areas and offices abroad.

Note.—State and local data shown include funds provided by Federal agencies; Federal data includes funds provided to all performers including State and local governments.

From: NSF 70-22

Trends in Federal support of higher education compared with other economic variables, 1963-69



Federal obligations to universities and colleges, by type of program and agency, fiscal years 1963-69

[Dollars in millions]

| | | | (De | ollars in mill | nonsj | | | | | |
|-------------------------------|---------------------------|---------------------------|-------------------------------------|------------------------|-----------------------|---|----------------------------|---|--|-----------|
| Program and year | Total, all agencies | Department of Agriculture | Atomic Energy Com- mission | Department of Commerce | Department of Defense | Depart- ment of Health, Education, and Welfare | Department of the Interior | National Aero- nautics and Space Adminis- tration | National Science Foun- dation | Other • |
| Total Federal obligations: | | | | | | | | | | |
| 1963 | \$1,413.0 | \$104.0 | \$76.1 | \$1.8 | \$218.0 | \$665.8 | \$4.0 | \$87.4 | \$256.3 | . |
| 1964 | 1.625.0 | 115.0 | 79.9 | 1.7 | 258.1 | 780.0 | 5.8 | 107.6 | 277.5 | |
| 1965 | 2,305.5 | 135.6 | 84.4 | 2.6 | 267.9 | 1,345.6 | 9.7 | 184.8 | 825.2 | |
| 1966 | 8.010.0 | 141.0 | 96.9 | 2.8 | 278.0 | 1,952.2 | 22.4 | 142.2 | 374.5 | |
| 1967 | 3,311.1 | 144.8 | 109.6 | 7.9 | 264.1 | 2.231.2 | 27.4 | 181.5 | 894.5 | 1 |
| 1968 | 8,379.7 | 144.2 | 119.7 | 9.8 | 243.1 | 2,215.2 | 28.2 | 129.8 | 422.8 | \$66 |
| 1969 | 3,453.8 | 155.9 | 121.0 | 3.9 | 278.7 | 2,293.4 | 24.3 | 127.2 | 867.0 | 81 |
| Academic science obligations: | | | | İ | 1 | | | | | |
| 1963 | 1,328.5 | 104.0 | 76.1 | 1.8 | 218.0 | 581.0 | 3.8 | 87.4 | 256.3 | |
| 1964 | 1,528.6 | 115.0 | 79.9 | 1.7 | 258.1 | 683.8 | 5.1 | 107.6 | 277.5 | l |
| 1965 | 1,816.2 | 135.6 | 84.4 | 2.6 | 267.9 | 856.5 | 9.6 | 134.3 | 325.2 | |
| 1966 | 2,163.5 | 141.0 | 96.9 | 2.8 | 278.0 | 1.109.2 | 19.1 | 142.2 | 874.5 | |
| 1967 | 2,323.8 | 144.8 | 109.6 | 4.4 | 264.1 | 1,251.0 | 23.9 | 131.5 | 394.5 | |
| 1968 | 2,349.8 | 144.2 | 119.7 | 8.0 | 243.1 | 1.229.4 | 28.2 | 129.8 | 422.8 | 24 |
| 1969 | 2,361.4 | 155.9 | 121.0 | 2.2 | 278.7 | 1,261.8 | 24.8 | 127.2 | 367.0 | 23 |
| Research and development: | | | | | | } | | | | |
| 1963 | 829.5 | 40.6 | 68.3 | 1.5 | 218.0 | 882.9 | 3.8 | 59.8 | 104.6 | l |
| 1964 | 975.6 | 47.5 | 70.5 | 1.1 | 258.1 | 399.2 | 5.0 | 78.2 | 115.8 | |
| 1965 | 1,095.0 | 69.1 | 74.8 | 2.1 | 267.9 | 441.9 | 9.5 | 100.6 | 139.2 | |
| 1966 | 1,252.1 | 62.9 | 83.2 | 2.1 | 278.0 | 507.8 | 18.7 | 107.4 | 192.5 | |
| 1967 | 1,324.1 | 64.0 | 89.7 | 3.4 | 264.1 | 577.0 | 23.9 | 109.0 | 198.1 | |
| 1968 | 1,423.0 | 62.2 | 101.8 | 6.7 | 243.1 | 619.1 | 27.8 | 126.1 | 212.4 | 23 |
| 1969 | 1,495.3 | 63.6 | 103.1 | 1.7 | 278.7 | 667.1 | 28.5 | 122.3 | 212.1 | 23 |
| R&D plant: | | ļ | | | | 1 | | | | Ì |
| 1963 | 105.9 | ł | 2.6 | | 1 | 39.2 | 1 .1 | 13.4 | 50.6 | L |
| 1964 | 100.8 | | 4.0 | | | 39.9 | 1 | 9.1 | 47.8 | |
| 1965 | 126.2 | 3.2 | 3.8 | [| | 54.8 | (b) | 8.4 | 56.0 | |
| 1966 | 114.8 | 2.0 | 7.4 | | ľ | 48.5 | .2 | 7.4 | 49.8 | |
| 1967 | 116.7 | 2.0 | 13.8 | .3 | | 38.1 | | 5.0 | 57.5 | |
| 1968 | 104.1 | 1.9 | 11.9 | .2 | | 36.9 | | 0.0 | 53.2 | |
| 1969 | 57.4 | 1.2 | 11.4 | | | 20.5 | | | 24.2 | |
| Other science activities: | | | | | 1 | ł | 1 | | | |
| 1963 | 393.1 | 63.4 | 5.3 | .3 | | 208.9 | (6) | 14.1 | 101.1 | |
| 1964 | 452.2 | 67.5 | 5.4 | .6 | | 244.6 | (6) | 20.2 | 113.9 | |
| 1965 | 595.0 | 78.8 | 5.9 | .6 | | 359.8 | (6) | 25.4 | 130.1 | |
| 196 | 796.6 | 76.1 | 6.8 | .7 | | 553.8 | .2 | 27.3 | 132.7 | |
| 1967 | 883.0 | 78.8 | 6.2 | .7 | | 635.9 | (b) T | 17.4 | 144.0 | |
| 1968 | 822.7 | 80.1 | 6.1 | 1.0 | | 573.4 | .4 | 3.7 | 157.2 | |
| 1969 | 808.8 | 91.1 | 6.5 | .5 | (b) | 574.1 | .9 | 5.0 | 130.6 | |
| Ionacience activities: | : | | | | | | | | | |
| 1963 | 84.5 | 1 | | 1 | 1 | 84.3 | .2 | 1 | 1 | |
| 1964 | 96.4 | 1 | 1 | 1 | 1 | 96.2 | · • | I | 1 | |
| 1965 | 489.8 | (b) | | 1 | | 489.1 | 1 .1 | 1 | l · · · · | · · |
| 1966 | 846.4 | (6) | | l | l | 843.1 | 8.4 | I | } |] |
| 1967 | 987.3 | (6) | | 3.5 | | 980.2 | 3.5 | | | l |
| 1968 | 1,029.9 | " | | 1.8 | | 985.8 | j | 1 | | 42 |
| A | 1,020.0 | 1 | 1 | 1.0 | I | 200.8 | | | | |
| 1969 | 1.091.9 | l . | 1 | 1.8 | (b) | 1,031.6 | 1 | 1 | \$ | 58. |

a Includes obligations for the Departments of Housing and Urban Development and Labor and the Office of Economic Opportunity; the Department of Transportation (1968 only) and the Agency for International Development (1969 only).

b Less than \$50,000. SOURCE: National Science Foundation (CASE). NSF 70-27

SF 34 .—Total Federal obligations to the 100 universities and colleges receiving the largest amounts, by agency, fiscal year 1969

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| Total for 100 universities and colleges. | Total for 100 universities and colleges Ex. 687 128 28 181 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 682 181 681 1107 | | | | | | | 202 | nen | TO LEASE TO | NASA | JON | Office |
|--|--|--|-------------|---------|-----------|-----------|-----------|-----------|-------------|-------------|-----------|-----------|----------|
| Microsoft Discontine of Perhadogy Microsoft Discontine of Perhadogy Microsoft Discontine of Perhadogy Microsoft Discontine of Disconti | Machine Christian of Technology Man. Machine Control University of Valuations (Virtual Professor) Machine Control University of Man. Machine Control University of Machine Control University of Machine Contro | Total for 100 universities and colleges | | | \$118,681 | \$107,682 | \$2,692 | \$232,681 | \$1,481,380 | \$15,864 | \$111,752 | \$276.478 | \$40.052 |
| Extract Diversity of Wathington. Michael 65,388 186 2,484 180 14,419 180 | University of Maintenance, Maint | 1. Massachusetts Institute of Technology | Mase | 97,604 | | 9.586 | 201 | 40,274 | 12.066 | 826 | 27,468 | 7,553 | 229 |
| University of Nationales, Berkeley Calif. 186 186 186 186 186 186 186 186 186 186 | Columnity of Michigan Mich. St. 128 1.00 1.00 1.01 | | Mass. | 69,558 | : | 2.494 | | 3,038 | 44 . 490 | 167 | 10.357 | 7.284 | 1,728 |
| University of California-Can Agreement Water, St. 538 1155 4.689 2.869 2.867 2 | Districtly of Walangests | 3. University of Michigan. | Mich. | 61,448 | 168 | 3,101 | 188 | 11,317 | 34,281 | 726 | 3.176 | 692.9 | 1.810 |
| University of California-Lota Angeles Calif. St. 129 4.065 4.584 22 6.34 05 5.172 1.104 9.544 0.544 0.554 0.355 0.325 1.354 0.55 0.3 | University of Culticonist A Augusta. Outline State of Visionist Augusta. Outline St | 4. University of Washington | Wash. | 26,398 | 126 | 2,685 | | 2,647 | 42.625 | 920 | 629 | 6.539 | 197 |
| Columbia University V. Columbia University V. Columbia University Of Waccando Maldian Williams State University of Waccando Maldian Williams State University of Universit | Octobility University of Wilsonson's California Chiefactory of Minematical | 5. University of California-Los Angeles | Calif. | 53.129 | | 4,761 | 23 | 2,039 | 36.172 | 140 | 5,444 | 4,091 | 429 |
| University of Chievestich Mariene Wig. 17.78 1.78 1.78 1.78 1.78 1.78 1.78 1. | Divincenty of Misseanian Wis. 31.539 4.890 7.29 11.54 10.530 24.100 24.10 24.10 11.54 11.54 11.54 11.54 11.54 10.530 24.100 24.10 | | 2 | 52.375 | | 168 | | 278 9 | 34 055 | 20 | 948 | A 59.6 | 705 |
| Standord University, Cuiff. St. St. St. St. St. St. St. St. St. St | Discreptly of Minneacta, Parkeley Calif. 513.33 1.53 1.53 1.53 1.53 1.53 1.53 1 | | W.is | 51 748 | 4 095 | 368 | 373 | 1 064 | 31 564 | 445 | 1 797 | 7 951 | 600 |
| University of Culifornia-Berkeley Min. 96 689 4 80 1 729 2 62 5 1818 22 3 18 18 18 18 18 18 18 18 18 18 18 18 18 | University of Maintenants. Un | | i i | 51 593 | | 715 | 2.6 | 10 359 | 24 100 | 896 | 6 039 | 102,1 | 310 |
| New York University of Minnesca. Minn. 50 102 3.982 1,832 65 2 364 53 618 59 68 New York University of Minnesca. M.Y. 46 139 4.591 4.591 4.71 11.71 59 4.59 2.080 2.080 2.284 59 4.59 2.080 | University of Minneacia, Minn. So 102 3.982 1.872 4.591 6.910 1.1 14.745 1.910 1.1 14.745 1.910 1.1 14.745 1.910 1.1 14.745 1.910 1.1 14.745 1.910 1.1 14.745 1.1 14. | University of California-Renkeley | | 50 689 | 068 7 | 52.2 | : % | 358 | 35. | 978 | 300.0 | 11 141 | 900 |
| New York University N.Y. 46.739 2.020 32 2.844 38.453 64.739 11 14.739 11 14.739 11 14.519 11 14.519 11 14.519 11 14.519 11 14.519 11 14.519 11 14.519 11 14.519 11 14.519 12 2.348 15.519 12 2.348 14.519 2.277 | New York University M.Y. 46.739 4.301 2.202 2.2.44 38.435 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 6.889 7.701 4.701 1.706 2.716 2.277 7.301 4.701 1.706 2.716 2.277 7.301 4.701 4.701 2.716 2.277 7.301 4.701 2.277 7.301 2.277 2.277 2.277 2.277 2.277< | University of Minnesota | Minn. | 50,102 | 3.982 | 1.832 | \$ | 2,916 | 33.815 | 329 | 2,367 | 8,901 | 916 |
| New York University M.Y. 46,518 4,391 2,098 2,248 4,618 64 688 John Robins University III. 42,515 4,391 2,196 34,970 21,986 34,970 24,58 John Robins University III. 41,349 2,166 2,516 6,388 17,024 21,56 University of Pennylvania P.a. 40,036 2,516 6,388 17,024 718 688 Ohis Control University Organizate University N.Y. 38,011 2,461 27,169 2,466 466 New Jectus University N.Y. 38,012 5,673 1,687 3,640 27,169 466 New Jectus University N.Y. 38,444 3,781 1,789 2,440 27,169 466 New Jectus University Oktobroker N.Y. 38,339 1,876 3,444 3,444 3,444 3,444 3,444 3,444 3,444 3,444 3,444 3,444 3,444 3,444 3,444 | New York University of Pennaybunia. N.Y. 46, 759 4, 251 2, 220 11, 745 4, 514 1, 515 4, 515 1, 745 4, 515 1, 745 4, 515 1, 745 4, 515 1, 745 4, 515 1, 745 4, 745 1 | | | | | | | | | | | , | |
| University of University of California-San Diego. Care University of California-San Diego. California-San Die | University of Chicketon M. C. | | . X.X. | 46.759 | | 2,020 | 32 | 2.844 | 33.453 | 3 | 563 | 689'9 | 1,094 |
| John Hoperity Md. 42,107 2 1,015 84 2,96 34,970 21 428 4 | Howerity of Chievenity (Chievenity Mid. 12, 107 2 1, 1015 84 2, 204 27.73 2 2.844 1. | | = | 45,515 | 4,591 | 4.910 | = | 14,745 | 18.941 | 391 | 802 | 6,632 | 489 |
| University of Chicago | Cremel University of Pennsylvania N.Y. 39 0.17 4.545 5.585 1.7024 22.77 7.301 4.584 7.301 4.301 | | Md. | 42.107 | 81 | 1,015 | 78 | 2,986 | 34.970 | 27 | 428 | 2.364 | 237 |
| University of Rennativania. Ph. 40.056 2 2.551 3.57 5.30 5.07 5.07 5.00 5.00 5.00 5.00 5.00 5.0 | Cornelly of Pennsylvania P. 40 0.056 2 5.55 5.35 17.024 77.15 5.35 17.024 77.15 5.35 7.87 | | <u>:</u> | 41.349 | | 5,156 | 82 | 1.706 | 24.773 | | 2,277 | 7,301 | 8 |
| Cornell University N.Y. 39.071 4.543 1.857 5.885 17.024 718 888 Ohio State University N.Y. 39.032 5.075 776 1.532 28.819 126 542 New Jenesy College of Medicine and Denistry N.Y. 39.032 5.075 776 28.21 28.81 116 28.83 446 Yale University Collic 33.33 1 1 6 2.49 21.215 3.091 Viniversity of California-San Diego Calif. 31.33 1 1 6 2.49 24.961 1.728 D.C. Calif. 31.33 3.34 3 3.74 3.091 3.091 D.C. Calif. 31.35 3.144 2.36 24.961 3.73 3.94 444 1.132 D.C. Calif. 31.35 2.444 2.38 24.365 3.091 3.091 D.C. Calif. D.C. 30.33 3.53 3.43 3.43 < | Cornel University N.Y. 39,071 4,543 1,837 5,388 17,024 718 688 7,879 Cohio State University Ohio State University No. 23,032 5,075 776 1,152 26,819 156 26,819 166 26,828 17,837 46 26,839 100 47 <t< td=""><td></td><td>Pa.</td><td>40.056</td><td>8</td><td>2,551</td><td>-</td><td>3.040</td><td>27.169</td><td></td><td>456</td><td>4,584</td><td>2,254</td></t<> | | Pa. | 40.056 | 8 | 2,551 | - | 3.040 | 27.169 | | 456 | 4,584 | 2,254 |
| Comparison of California and Dentistry N.Y. 39, 517.5 1,535 | Communication Communicatio | | > | | 1 543 | 010 | | 000 | | 9 | 900 | 9 | t |
| Name of the property | University of Southern California Culif. 25 33 44 4 55 0 1 1 1 1 2 8 5 3 1 4 4 5 0 1 1 1 1 2 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | | 30.01 | 200 | 375 | | 0.000 | 10.026 | 90, | 000 | 6,6,7 | 777 |
| Vew Jerrary Of Excitation and Dentistry N.J. 37, 253 20 37, 759 346 1,759 24, 961 1,759 34, 916 1,228 1,1238 1,1238 <th< td=""><td> New Jergest College of Medicine and Dentistry N.J. 37,916 37,723 3,761 3,773 3,7</td><td></td><td>) X</td><td>38 . 14</td><td>2</td><td>808</td><td></td><td>100.1</td><td>90.013</td><td>971</td><td>225</td><td>200,0</td><td>300</td></th<> | New Jergest College of Medicine and Dentistry N.J. 37,916 37,723 3,761 3,773 3,7 | |) X | 38 . 14 | 2 | 808 | | 100.1 | 90.013 | 971 | 225 | 200,0 | 300 |
| Yale University of Southern California. Calif. 37.223 3.761 1.7789 24.961 22.440 21.215 3.48 University of Southern California. Calif. 33.379 1 676 6.140 21.215 1.128 Howard University of California-San Diego. Calif. 31.231 5 1.484 3.485 23.194 13 Luniversity of California-San Diego. Calif. 31.231 5 1.484 3.485 23.194 13 Luniversity of Pittaburgh. Pa. 30.934 3 518 1.652 19.405 44 1.132 University of Pittaburgh. Ma. 22.339 1.651 22.56 26.63 4412 22.56 2.66 44 1.132 Washington University of Masserburgh. Mich. 22.613 4.412 2.256 26.63 1.477 360 2.34 Michigan State University Mich. 22.613 4.412 2.266 36 1.477 360 2.34 University of Naryland. M | Vinternity of Southern California | | - | 37 916 | | 200.0 | | 11111 | 37 730 | | | 4.043 | • |
| Cuiversity of Southern California. Calif. 38.334 676 6.6 2.440 21.215 1.228 Howard University of California-San Diego. Calif. 31.785 1 1.2 61 46 32.813 191 University of California-San Diego. Calif. 31.785 1 1.484 32.813 24.365 24.40 12.715 31.91 Duke University N.C. 31.231 5 1.484 2.346 24.385 1.30 University of California-San Diego. N.C. 30.934 3 518 2.446 1.27 3.91 University of Naturality Ma. 22.339 1.651 2.256 2.1675 44 1.132 University of Massichusetta Mich. 22.139 1.652 2.266 3.67 3.64 3.80 4.4 University of Caloracial Mich. 27.139 1.859 3.753 1.95 2.641 1.87 3.90 2.84 University of Caloracial Mich. 27.539 1.859 <td> California San Diego California San Pancisco California San</td> <td></td> <td></td> <td>37.223</td> <td></td> <td>3.761</td> <td></td> <td>1.759</td> <td>24.961</td> <td></td> <td>348</td> <td>4.650</td> <td>1.744</td> | California San Diego California San Pancisco California San | | | 37.223 | | 3.761 | | 1.759 | 24.961 | | 348 | 4.650 | 1.744 |
| University of Southern Californias Calif. 36.334 676 676 2.440 21.215 1.228 Howard University of California-San Diego D.C. 31.375 1.184 2.316 8.740 127 3.091 University of California-San Diego Duke University N.C. 31.231 5.1484 2.465 2.194 13 1.90 University of California-San Diego Duke University Duke University 2.133 24.385 22.194 13 130 University of Masserve University Pa. 30.934 3.8 1.651 2.226 20 88 23.675 44 1.132 University of Masserve University Mich. 28.543 1.651 2.226 20 88 23.675 36 2.344 1.132 University of Masserve University Mich. 27.749 1.859 3.753 1.9 2.641 13.44 1.132 University of Masserve University Mich. 27.56 3.753 3.641 13.44 1.323 W | University of Southern California Calif. 36 3 3 3 9 1 | | | | | | | | | | } | - - | |
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APPENDIX I.

MSU faculty and staff present at initial meeting on September 29, 1970

College of Human Ecology

- Robert R. Rice, Chairman
 Department of Human Environment and Design
- Gertrude Nygren, Professor

College of Agriculture

- James W. Goff, Director, School of Packaging
- William B. Lloyd, Professor, Building Construction
- Carlton M. Edwards, Professor, Agricultural Engineering, Extension Specialist in Housing
- Raleigh Barlowe, Chairman, Department of Resource Development

College of Engineering

- Donald J. Montgomery, Chairman, Department MMM
- Henry Krause, Head, Engineering Instructional Services

College of Social Science

- Myles G. Boylan, Director, School of Urban Planning and Landscape Architecture
- Sanford S. Farness, Professor of Urban Planning
- Grafton D. Trout, Professor, Sociology
- Nancy Marshall, Professor, Psychology

Institute for Community Development

- Robert C. Anderson, Assistant Director

APPENDIX II

Faculty and staff members of MSU interviewed between September 1970 and April 1971:

College of Human Medicine

Andrew D. Hunt, Jr., Dean

Sandra A. Daugherty, Professor, Dept. of Medicine

Robert F. Lewis, Professor, Dept. of Medicine

Walter N. Mack, Professor
Dept. of Microbiology and Public Health

Lester F. Wolterink, Professor, Dept. of Physiology

George W. Fairweather, Professor, Dept. of Psychology

College of Business

Kullervo Louhi, Dean

Robert L. Blomstrom, Director,
School of Hotel, Restaurant and Institutional
Management

Robert W. McIntosh, Professor, School of Hotel, Restaurant and Institutional Management

Carl E. Liedholm, Chairman, Dept. of Economics

Mitchell Stengel, Associate Professor, Dept. of Economics

E. Jerome McCarthy, Professor
Dept. of Marketing and Transportation Administration

R. Winston Oberg, Professor, Dept. of Management

Eugene F. Dunham, Jr., Instructor,
Dept. of Accounting and Financial Administration

David I. Verway, Research Associate, Bureau of Business and Economic Research

College of Agriculture and Natural Resources

Lawrence L. Boger, Dean

David Lee Armstrong, Director, Resident Instruction

James T. Bonnen, Professor, Agricultural Economics

Arthur Mauch, Professor, Agricultural Economics (retired)

Alfred A. Schmid, Professor, Agricultural Economics

James D. Shaffer, Professor, Agricultural Economics

Warren H. Vincent, Professor, Agricultural Economics

Alvin E. House, Assistant Professor, Agricultural Economics

James S. Boyd, Professor, Agricultural Engineering

Merle L. Esmay, Professor, Agricultural Engineering

Arthur W. Farrall, Chairman, Agricultural Engineering (ret.)

Carlton M. Edwards, Associate Professor, Agricultural Engineering

Ben J. Holtman, Associate Professor, Agricultural Engineering

Mason E. Miller, Director,
Institute for Extension Personnel Development

James W. Goff, Director, School of Packaging

William B. Lloyd, Professor,
School of Packaging, Building Construction Program

Stanley E. Woell, Instructor, School of Packaging, Building Construction Program

Louis F. Twardzik, Chairman,
Park and Recreational Resources

Eugene F. Dice, Assistant Professor,
Park and Recreational Resources

College of Agriculture and Natural Resources continued

Raleigh Barlowe, Chairman, Resource Development

William J. Kimball, Professor, Resource Development

George S. McIntyre, Director, Cooperative Extension Service

Lois H. Humphrey, Program Director,
Family Living Education, Cooperative Extension Service

Denio A. Caul, Director, Extension Program, Cooperative Extension Service

College of Engineering

Donald J. Montgomery, Chairman, Dept. of Metallurgy, Mechanics and Materials Science

Robert W. Little, Professor,
Dept. of Metallurgy, Mechanics and Materials Science

Robert W. Summitt, Professor,
Dept. of Metallurgy, Mechanics and Materials Science

Herman E. Koenig, Chairman,
Dept. of Electrical Engineering and Systems Science

Rita Zemach, Assistant Professor,
Dept. of Electrical Engineering and Systems Science

John W. Hoffman, Director, Division of Engineering Research

George A. Coulman, Associate Professor, Division of Engineering Research

College of Communication Arts

Herbert J. Oyer, Chairman,
Dept. of Audiology and Speech Sciences

College of Education

- H. Paul Sweany, Professor,
 Dept. of Secondary Education and Curriculum
- C. Blair MacLean, Associate Professor,
 Dept. of Secondary Education and Curriculum
- Russell J. Kleis, Associate Professor,
 Dept. of Administration and Higher Education

College of Human Ecology

Jeanette A. Lee, Dean

Robert R. Rice, Chairman,
Dept. of Human Environment and Design

Margaret Jacobson, Chairman,
Dept. of Family and Child Sciences

Carol W. Shaffer, Associate Professor, Dept. of Family and Child Sciences

College of Social Sciences

Myles G. Boylan, Director School of Urban Planning and Landscape Architecture

Charles W. Barr, Professor, Urban Planning

Sanford S. Farness, Professor, Urban Planning

Carl Goldschmidt, Associate Professor, Urban Planning

Gwendolyn H. Andrew, Director

Sheldon G. Lowry, Professor, Dept. of Sociology

Christopher E. Sower, Professor, Dept. of Sociology

Grafton D. Trout, Jr., Assistant Professor, Dept. of Sociology

College of Social Sciences continued

Leon H. Weaver, Professor,
Dept. of Police Administration and Public Safety

Ronald J. Horvath, Assistant Professor, Dept. of Geography

Carl E. Frost, Professor, Dept. of Psychology

College of Arts and Letters

Joseph J. Kuszai, Associate Professor, Dept. of Art

Robert S. Alexander, Associate Professor, Dept. of Art

Institute of Urban Affairs

Robert L. Green, Director

Adelbert Jones, Assistant Director

Institute for Community Development

Duane L. Gibson, Director

Robert C. Anderson, Assistant Director

University Public Services

Floyd G. Parker, Director

University Archives

William H. Combs, Director

University Administration

John E. Nellor, Assistant to the Vice-President for Research and Development

Elliott G. Ballard, Assistant to the President

William R. Wilkie, Assistant to the President

Paul L. Dressel, Director, Office of Institutional Research



213 DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT WASHINGTON, D. C. 20410

APPENDIX III

OFFICE OF THE UNDER SECRETARY

IN REPLY REFER TO:

JAN 2 2 1971

Professor Gertrude Nygren
College of Human Ecology
Department of Human Environment
and Design
Michigan State University
East Lansing, Michigan 48823

Dear Professor Nygren:

Secretary Romney has asked me to reply to your letter of January 6, 1971 regarding the interest at Michigan State in housing affairs.

While reading about the curriculum content of your various colleges and the emphasis being placed on human ecology, we were reminded of some parallels at the Center for Housing and Environmental Studies, now a part of the New York State College of Human Ecology at Cornell University. Under the direction of the late Glenn H. Beyer, Cornell's curriculum and research evolved in a direction similar to yours.

The magnitude of the housing and urban problems confronting the Nation and this Department is such that there can be no question about the need for more people with better training in housing affairs. At the present time we are particularly aware of the shortage of trained and capable people to manage housing projects for low- and moderate-income families. In considerable measure, the success or failure of such projects and the programs which produce them depends on the ability of individual project managers.

We are hopeful that some of the major universities where there is a concern for housing and related problems may also see this need and introduce courses to help meet it. At first glance, it might seem that the education of housing project managers would call for narrow but specialized vocational training curricula such as those for hotel and real estate managers. However, it has been our observation that successful managers of rental housing projects for low- and moderate-income families have professional ability not only in finance and

property maintenance, but also in guidance counselling, recreation planning, problems of the youthful and elderly, and in welfare, health and sociology generally. They understand and know how to cope with problems such as vandalism, truancy, crime and police-community relations.

While recognizing the shortage of skilled housing project managers, we have not yet determined how to cope with the problem nor how our resources might best be used to increase the available supply.

We would welcome your views and suggestions on this problem.

Sincerely yours,

Charles J. Orlebeke
Deputy Under Secretary

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SALES and **MARKETING EXECUTIVE** HOUSING

As a result of internal promotions, one of the nation's largest independent housing companies has a rare opportunity for an innovative and hard-driving Sales and Marketing Director for our Illinois Division. Must be thoroughly familiar with all phases of new home sales and merchandising. Successful candidate will have demonstrated ability to recruit, train and direct a professional 20 man sales force. He will be totally responsible for marketing program for volume singlefamily and townhouse developments in moderate price range.

Excellent compensation program including profit sharing, health and life insurance and stock opportunity for sustained financial success combined with unique potential for advancement in company with an exceptional growth rate. Send resume and earnings his-BOX CP-290, THE WALL STREET JOURNAL 4/8/71 tory to:

SEEKING PROFESSIONAL MANAGER FOR MAJOR RESIDENTIAL TIMESTORY of the fines; largest multi-building would be properly chicago, Nopariment executive ex. n America; horsonal located in the light of the located in the loc In molor residential developments. To head up school on the school of th development riviessionois. Ceneralie executive ex MARKETING DIRECTOR La Reest Publicly held Poughe Company listed on heards Arkeling Director an Innovative Company listed on None thoroughly honor th

Aponsible for marketing to 25 man sales force.

Ownhouse developments in moderate volume orice REAL ESTATE MANAGER

\$30,000 Range

Substantial, well-established enterprise with national repetation seeks an aggressively-motivated land developer with for continued growth and participation. Responsible developmental projects, his primary attention will focus on the Great Lakes and central Florida territories for prospective shopping centers, golf courses and residential communities. Capable of spotting and assessing strategic growth opportunities, his strong suit must entail working closely with senior indiagement in the setting of real estate goals and implementation of projects. must entail working closely with senior management in the

Appropriate education and proven record of accomplishment in large scale property management required. Attractive central Florida location. Reply in complete confidence, giving details of salary history to:

Box CO-456, The Wall Street

MODULAR CONSTRUCTION

V.P. Engineering

V.P. Marketing

Current expansion program creates an unusual opportunity for the qualified applicants to join our diversified, listed company in an exciting commercial/ industrial module program.

The men we are seeking will be responsible for the designing and engineering of marketing our modular building products.

Please provide a complete resume so that we may arrange for an early interview

Box CO-521, The Wall Street Journal

Ponsible for markethe program for volume health and Sharing developments in moderate and stock apportunities the all stock apportunities to stock apportunities apportunities to stock apportunities ap sharing and program including health and portunities for and social strain in the social strain and socialities for such and socialities for such social ties for such social such s A COM BILL STOCK OPPORTUNITIES FOR SILE STORY FOR THE STOR State, Hillsdale, Hillsdale, Hillsdale, ANG CASC AND HAR STOWN I TAKE WALL STREET JOURNAL &

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Construction Management Opportunity

Rapidly expanding national retail chain is seeking manager to supervise building projects in the Midwest. Candidate should have college degree, demonstrated ability to supervise construction activities, analyze building costs, negotiate construction contracts, and establish programs on cost control and standardization of maintenance and construction procedures.

Position requires traveling in the Midwest. Excellent fringe benefits and opportunity for advancement.

Please submit complete resume and salary requirements to: Box CP-428, The Wall Street Journal 45/9/

MANAGERS FOR LARGE CHICAGO SUBURBAN REAL ESTATE AND RECREATION DEVELOPMENT

Rental Manager Apartment rentals and tenant relations

Maintenance Manager Buildings, grounds, and equipment

Controller

Full range of controllership duties

Please send resume or letter and state salary requirements. Box CP-53, The Wall Street Journal 3/30/11

LAND ACQUISITION DEVELOPMENT EXECUTIVE

Major multi-market housing company listed on New York Stock Exchange seeks aggressive, dynamic attorney to take charge of land programs for Michigan Division. Will be responsible for coordinating public and municipal government relations and legal aspects of land development. Must be skillful negotiator with exposure to assembling and zoning land for residential developments and demonstrated business judgment.

He will participate in a fast moving, profit-oriented management team and report to a young Division President. We are able to promote rapidly from within because our average growth rate during the past ten years has exceeded 35% annually. If you believe you are the unusual executive we are seeking, send resume and salary history to:

Box CP-298, The Wali Street Journal

APARTMENT DEVELOPMENT EXECUTIVE 3/1/71

~ continued

RECUIIVE 5[17]
Rapidly expanding real estate development and management firm is seeking an apartment division executive. Applicant must be experienced in all phases of apartment development and possess a strong business background. Knowledge of all government housing programs helpful. Areas of involvement will include planning, design, construction and management for large multi-family housing projects. The person we are seeking is undoubtedly employed, but seeking greater opportunity and compensation. Reply in detail to Personnel Managem. P.O. Rox 1536. Des Moines, Iowa 50306.

CONSTRUCTION CONTRACTS MANAGER

We are a major Chicago residential builder-developer with an immediate need for a top caliber Contracts Manager.

Successful applicant with experience will have ability to direct a 3 man department in estimating. bidding, negotiating and writing sub-contracts for multi-million dollar/year construction of single and multi-family units. He will possess a thorough knowledge of light construction and land development techniques, and will he motivated to achieve maximum cost reduction.

We are offering top salary. limited advancement potential, profit sharing, plus generous fringe package, Send resume in confidence to:

Box CO-519 THE WALL STREET JOURNAL

Fast-growing general contractor, Pittsburgh, seeks professional to supervise staff of 12 in expanding housing program for low and moderate income families. Currently involved with 1200 inner city privately constructed units, rehabilitated and new. Must be experienced in: progressive management techniques; total operating of property management system; rental collections and application processing procedures; complete programs of property maintenance and social services. Minimum six years experience in managing large numbers of housing units. Business Administration degree. Starting salary \$15,000-\$17,000. Benefits. Send resume: Milton Washington, Executive Vice President, Allegheny Housing Rehabilitation Corporation, 625 Stanwix, Pittsburgh, Pa. 15222

(An Equal Opportunity Employer)

4/6/71

WSJ 5/26/11

217

HOMEBUILDING SUPER-STAR

We're big but still lean.

We're the only nationwide single and multifamily homehufider of our size* that is still its own company.

We need a big, lean, unspoiled, self-sufficient division president, highly experienced in residential building.

We offer assistance from our national organization, but the main thrust must come from you.

The rewards are outstanding.

If you are the man, submit resume to:

AMERICAN HOUSING GUILD

National Office

2210 Fourth Avenue San Diego, California 92101

*Nation's largest privately held builder of single-family housing

PROPERTY MANAGEMENT

We are looking for an Assistant to the President of one of the top 100 Development Organizations in the United States, located in and around the Minneapolis-St. Paul, Minnesota area.

The man selected will head up our newly formed Property Management Division, and assume full responsibility in the operation of over 1,000 apartment units. He will also be expected to Furchase and Sell Land Inventory; Manage, Rent and Control a number of smaller Commercial Enterprises; Arrange Joint Ventures, Limited Partnerships and Related Transactions.

This man must have a complete college background and experience in the field of Property Management. He can expect to receive a liberal commission and an exceptional salary.

Our firm will be highly selective in choosing the right man for this position. If you feel you have the experience and initiative to handle these responsibilities contact:

Box CR-652, The Wall Street Journal

PRESIDENT-Kitchen Cabinets

Major housing and building products manufacturer listed on NYSE seeks a very special TOP EXECUTIVE to take the helm of new multi-plant kitchen cabinet subsidiary.

Dallas, Texas area will be Home Office and first plant site for the "right person" who'll get top salary plus liberal bonus arrangement, Apply ONLY (repeat only) if you're

• capable of assuming full profit and loss responsibility for multi-plant operation,
• experienced in weed kitchen cabinets with a successful company, capable of establishing Southeast and Southwest distributors, and
• knowledgeable of modern production techniques, equipment, and product design.

Send-resume to: CHARLES ADMANDELLA

Send resume to: CHARLES AQUAVELLA REDMAN INDUSTRIES

7800 Carpenter Freeway, Dallas, Texas 75247 All replies confidential, An equal opportunity employer.

REAL ESTATE SALES MANAGER APPENDIX IV Notionally known Midwestern land developer, tops Nationally known Miawestern land developer, tops The force of new multi-million dollar Michigan lake Viect. Man should be able to eventually accept full Survey responsibility for project, proven capacity to ale and Inspire salesmen required. Extraordi. are and inspire salesmen required. Extraorium. Extraorium. SUCCESSFUI development of sales force and y to grow. Write fully and in complete con-403, The Wall Street Ja HOUSING EXECUTIVE building and development company repulsions seems entreprenent company repulsions, land entreprenent company repulsions, land and anounal type individually appearable approach a proof can be individually and marketing the continuity and individual enter with Must with Panding its salar Condon Fix August Condon Fix August With Must with Panding its salar Condon Fix August Condon Fix Augus DE CO. NO. THE WALL STREET SOURNAL 5/17/7/ HOUSING and DEVELOPMENT EXECUTIVE Large, major builder and development company Large, major builder and development company ork Stock Exchange has need for executive to head its Single Family House Division ating over diverse geographical area. andidate should have heavy background in by analysis, F.H.A. and conventional finance on, construction and conventional rinance series position reativity in product design and sales, ad-Open. Qualified applicants should send complete details of education, experi-5, The Wall Street Journal

CONSTRUCTION PROJECT MANAGER

Nation's largest publicly-held housing company listed on NYSE has a rare opportunity for someone with the requisite skills to act as liaison with local government officials, receive bids, award and write contracts, co-ordinate architects and engineers on a 15 million dollar project that is destined to become Chicago's most luxurious apartment complex. Top salary with excellent compensation program including health and life insurance, profit sharing, plus unique potential for advancement in a company with annual average growth rate in excess of 30%. Send resume and earnings history to Mr. William Kennicott. Kaufman & Broad Homes, Inc., 2 Sak Crock Lane, Hinsdale, Illinois 60521. No phone calls, please.

An Equal Opportunity Employer

maritan Arthur Colores of Colores Arthur Marita **CONSTRUCTION**

Large well-established low-rise and high-rise apartment developercontractor seeks individual with accounting and financial control experience.

Initially

to negotiate sub-contracts

 to establish and implement accounting procedures and systems to maintain control over sub-contractors and suppliers

USI

- to report costs and contract performance on regular basis to the president and the chief of construction to assist the president in varied project planning assign-
- mente
- · to perform all these functions alone

Eventually

· to expand and oversee total accounting function

· to assume responsibility for financial planning and control

· to be Financial Vice President

Degree required. MBA desired. Five years of above experience in construction industry is minimum. You will be a member of small team. Company committed to enormous growth. Great Lakes location.

Write in confidence. State background and compensation requirements.

BOX CO-928, THE WALL STREET JOURNAL

Land Acquisition and Development Executive

Major multi-market housing company listed on New York Stock Exchange seeks aggressive, dynamic attorney to take charge of land programs for Michigan Division. Will be responsible for coordinating public and municipal government relations and legal aspects of land development. Must be skillful negotiator with exposure to assembling and zoning land for residential developments and demonstrated business

He will participate in a fast moving, profit-oriented management team and report to a young Division President. We are able to promote rapidly from within because our average growth rate during the past ten years has exceeded 35% annually. If you believe you are the unusual executive we are seeking, send resume and salary history to:

Box CM-733, The Wall Street Journal 7

APPENDIX IV continued REAL ESTATE

Major management opportunity with America's leading builder.

Levitt and Sons is seeking a creative management executive with strong leadership qualities to head up and develop the vital real estate arm of our Company.

To qualify, you must be thoroughly experienced in all types of real estate including shopping centers. parks buildings. industrial and various residential uses such as multi-family housing. mobile homes, recreational land, etc.

You must be able to evaluate the most profitable use of land we currently own as well as new sites for development. We are seeking an innovative manager able to develop and utilize imaginative financial methods such as REIT and joint venture syndication.

The responsibilities of the position are of major importance to the growth of our Company. The salary is commensurate. Send resume to:

Robert Ross, SVP-Operations Levitt and Sons, Inc. Lake Success, N. Y. 11040

REGIONAL SALES MANAGER HOUSING

Must have proven experience and background in VA/FHA, single family and townhouse subdivisions. Capable of supervising and administering sales force on multi-project basis. Proven administrator, strong on detail with knowledge of sales, sales promotion, advertising and public relations related to housing industry. Excellent salary and benefits available to an individual capable of providing results. Major N.Y.S.E. developer.

BOISE CASCADE RESIDENTIAL COMMUNITIES GROUP

201-297-5800

EXECUTIVE OFFICE OF THE CO HIGH LEVEL MANAGER

Executive Director, National Capital Housing Authority

SALARY \$26,547-\$33,627 LOCATION: Washington, D. C. CLOSING DATE: January 31, 1971

The Authority manages large housing developments with several thousand more under developments. Candidates should have experience in Public Housing programs plus high level administrative experience. Submit applications to:

Assistant to the Mayor for Housing Programs Rm. 112A, Bistrict Building 14th & E Streets, N. W. Washington, D. C. 20005

219

General Manager of Land Development Co.

National publicly owned corporation needs General Manager for its newly established wholly owned subsidiary in land development. Must have minimum of 10 years experience in either residential or industrial land development, Real Estate Broker's License and preferably M.A.I.

- Located in desirable metropolitan area in Southwestern U. S.
- Salary commensurate with experience.
- Excellent benefits.

Interested applicants are invited to submit confidential resume with references to:

Box 911-DE, The Wall Street Journal 2017 1233 Regal Row, Dallas, Texas 75247

CONSTRUCTION DIVISION . . . Rapidly expanding development company, with beadquarters in central New York state is seekings

EXECUTIVE VICE PRESIDENT - Construction -

\$30,000 Range + profit sharing + tax shelter.

Responsible for total management of the construction division, building multi-location turn-key projects, Requires an individual with demonstrated construction management ability; one who is thoroughly familiar with all phases of construction. Prefer engineering degree. Must be an outstanding planner, organizer and leader.

GENERAL SUPERINTENDENT — Construction —

\$18,000 to \$20,000 range + profit sharing.

Responsible for full supervision of multi-location projection ect superintendents; and for supervision of various." construction projects to assure optimum construction activity and progress. Requires an individual with demonstrated ability to direct and control supervision of multi-site construction projects. Must be thoroughly. familiar with all details of construction work. Prefer. experience with wall-bearing masonry type construction.

Qualified candidates are invited to send resume in fulfa entidence, including salary history, to Bex DF-702 JIMES:" (We're an equal opportunity employer.)

APPENDIX IV continued NAGE

We are a leading, diversified financial institution headertered in Baltimore and are expanding our portfolio ent function to include real estate investments. As sult; we have an immediate opening for a Real Estate rager. The candidate we seek will have a college degree a minimum of 5-years experience in real estate and tgage investing. In addition, the successful candidate will a demonstrated record of success in this business as as being capable of appraising risk as well as rewards.

Real Estate Manager will be responsible for seeking and loping real estate and mortgage investments and for ollow-up of such investments.

erforming this function, the manager will be utilizing pany, as well as self-developed contacts.

sive company benefits, tremendous growth potential, fully competitive salary makes this on attractive in for any aggressive individual who meets the above

totame, with polary history, in conte

Mr. R. N. Cooper OMMERICAL CREDIT COMPANY 300 St. Paul Place Beltimore, Maryland 21262

(APARTMENTS AND HOUSING)

needs Land man for acquisition of sites for development in Eastern and Southern portion of the U.S.

Qualifications

Site Analysis Market Analysis Feasibility Studies Home Office-Midwest

Compensation—Commensurate with Qualifications. Reply to:

Box CR-340, Wall Street Journ

PLANT MANAGER **Shelter Industry**

n old line, quality oriented, growth company we in our field. Due to the promotion of our present plant of 250 man Ohio plant is in need of a result oriented. The person we seek should have had Pot responsir a manufacturing operation of at least ter million sales. und should also include line manufacturit, sales, purchasindustrial relations. We are a multi-plant corporation dern facilities.

end brief letter or resume stating prior experience and equirements to:

BOX CO-558, THE WALL STREET JOURNAL

DIRECTOR OF 220 MARKETING-HOMEBUILDING

Major NYSE residential builder seeks two top marketing managers with recent experience in California or Chicago homebuilding operations. Top salary and bonus plan. Candidates should possess a minimum of 5 years qualified experience in the following areas which he will be

asked to supervise. —Market Research and Analysis \

—Product Planning

-Sales

-Market Planning

-Advertising and Publicity

Send resume and salary history to: Box 649-S, The Wali Street Journal 2999 W. 6th St., Los Angeles, Calif. 90005 We are an equal opportunity employer M/F

Due to our rapid expansion, we are in need of a profit-oriented individual with exceptional drive and intelligence who wants to be given the opportunity to become general manager of a construction company within one year.

We are a large home building company with construction divisions in Chicago, Atlanta, Louisville, Indianapolis, Dallas, Columbus, and Dayton.

Send resume and salary history in confidence to:

BOX CM-461. THE WALL STREET JOURNAL

An Equal Opportunity Employer

GENERAL MANAGER DEVELOPMENT APPENDIX IV

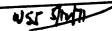
Are you the man to head international company's Chicagoland homebuilding and planned development arm?

opment arm:
Will supervise experienced personnel in land acquisition, site preparation, construction, marketing, finance and sales. Salary in "Thirties" to start with good bonus potential. Send resume detailing numbers of houses constructed, acres developed, sales, acc. of past 5 years or more to: etc., of past 5 years or more to:

Bez 352-V. Wall Street Journal 2199 W. 6th St., Les Angeles, Calif. 9006

APARTMENT MANAGEMENT SUPERVISOR
Life insurance company managing real estate investment trusts seeks an experienced regional apartment supervisor. Must travel, have management and construction experience. Send resume and salary history to: Investment Division LIFE INVESTORS INSURANCE CO. AMERICA, 375 Collins Road N. C. Cedar Rapids, Iowa 52404.

PRESIDENT for co. expanding from nobile to modular. Sophistication nandatory, Mobile/modular housing expertise. \$40.50k area. Executive Personnel Div. Vance Employment Ser. 217 Barfield Bidg., Amarilio, Texas 79101. (806) 372-3456. Amarillo,



F

REAL ESTATE SALESMAN

NEW JERSEY LICENSED ONLY

IT STANDS TO REASON THE BIGGEST HAS THE

1.Y. 1.Y. 3.G.

BEST **OPPORTUNITIES**

United States, we're continually growing, investing, and lenging and key positions. earnings even further as members of our dynamic sales earnings even further as members of our dynamic sales team selling our new Palm Coast, Florid development. CHIEF LAND PLANNER: Landscape Architect and or urban and and the highest earning potential.

Interested in growing with us? Call: Mr. Stewart (201) 871-1400 or write

Development Corporation

32-40 North Van Brust Street Englewood, New Jersey 07631

Major homebuilder seeks personnel for suburban Chicago operations.

Production Manager-Minimum 8 years experience directing 5 or more Supts, in site preparation, estimating, purchasing, construction, etc. of 100 plus unit R-1 projects.

Asst, to Production Manager—Requires knowledge of civil engineering or house construction, plus strong affinity for numbers and management information systems.

Send salary requirement and resume to:

BOX 277-8, THE WALL STREET JOURNAL W. Sixth Street, Los Angeles, California 20005

SHELTER DEVELOPMENT SPECIALISTS

Large N.Y.S.E. listed corporation in the building and develop-As a subsidiary of the ninth largest corporation in the ment business has need for outstanding personnel in chal-

developing the booming real estate industry.

At present, we have tremendous opportunities for suc. PROJECT FEASABILITY SPECIALIST: Mortgage banking, M.A.I. cessful, licensed real estate salesmen to increase their of F.H.A. experience, various types of housing developments.

best product, the finest company image, furnished leads, regional planning training, H.U.D. program experience, heavy experience in selling zoning and making presentations.

> SYSTEMS or C.P.M. SPECIALIST: Create and control systems for building, development operations, Government experience helpful.

Please send complete Resume to:

P.O. Box 27128, Columbus, Ohio 43227

OPERATIONS RESEARCH

Panners, Psychologists, Mathematicians Sociologists, Consulting: Our Social actively engaged in development program evaluation, legal services program and public systems. You will be conducted unations and/or and gathering, processing preting, evaluating data designed to urban life. You will within such federal DOL, HUD, HEW, and state agencies. Analytical accuracy keys to this dynamic tary experience in statistics or operating gies is most desiral.

JOIN THE AUERBACH SOCIAL IN F 221 YSTEM TEAM.

AUERE, Comporation is a leader in the field of information sciences and computer consulting. Our Specio-Economic Division is actively engaged in a variety of community development programs, including welfare programs evaluation; job matching systems, legal services programs, law enforcement and public systems design.

You will be conducting studies, field evaluations and/or analyses concerned with gathering, processing, communicating, interpreting, evaluating and displaying social data designed to improve the quality of urban life. You will be working with and within such federal departments as DOT, DOL, HUD, HEW, OEO and various city

Analytical accuracy and creativity are the keys to this dynamic technology. Supplementary experience in either data processing, statistics or operations research methodologies is most desirable. Masters degree or equivalent expertise, with two to five years of experience is required.

These are challenging, rewarding and vital services. The environment at AUERBACH is both free and stimulating. If you are interested in these important positions, send your resume, with salary requirements, to Mr. M. J. Semrau, AUERBACH Associates Inc., 121 N. Broad Street, Philadelphia, Pa. 19107. We are, an equal opportunity employer.

APPENDIX IV

continued Positions Available

REAL ESTATE MANAGER

Complete charge of 400 townhouse cooperative. Send full details, salary requirements, in first letter. Secretary, Colonial Square Cooperative, 3012 Williamsburg, Ann Arbor, Michigan 48104.

MORTGAGE OFFICER
We seek aggressive individual willing to assume responsibility at the helm of an established mortgage banking business. Experience in creating commercial and residential loans, dealing with institutional investors, and mortgage servicing a must. Compensation commensurate with experience and ability. Located in Chicagoland area.

Box CP-413, The Wall Street Journal

HEARING EXAMINER ZONING FATTI Prince George's County, Md.

\$21,975 to \$29,449. Entrance above minimum possible for persons with superior qualifications. Requirements: Be an attorney admitted to practice before the highest court of a state or of the District of Columbia, possess judicial temperament, have at least five years experience in administrative litigation, and demonstrate a knowledge of administrative and zoning law, practice, and procedure by written examination (at locations convenient throughout country). Apply by letter or phone by close of business (4:30 P.M.) May 1, 1971, to:

Personnel Office, Courth use Upper Marlboro, Md 20870

PHILADELPHIA/WASHINGTON/NEW YORK/BOSTON/SAN FRANCISCO/LONDON

PROJECT COORDINATOR Modular Housing

Excellent opportunity for the right man to join an experienced, old line, strong over-the-counter company. We are an Ohio, multiplant corporation with modern facilities, recognized for our quality products. If you have a college degree, experience in the construction industry and a working knowledge of accounting, design and project development, respond to this advertisement. This is a high level, management position with our company.

Send brief letter or resume stating salary requirements to:

BOX CO-596, THE WALL STREET JOURNAL 3/10/71

SEEKING PROFESSIONAL MANAGER FOR MAJOR RESIDENTIAL COMPLEX

One of the finest, largest multi-building apartment developments in America; located in Chicago. Need professionally competent, personable property management executive experienced in major residential developments. To head up over-all administration and direction. Generous salary and benefits for the man with the qualifications and enthusiasm.

Box CO-205, The Wall Street Journal

SALES MANAGER for Homes Mfr., Distributor Sales Division

Must have solid varied background in sales administration and sales training—very promotion-minded. General knowledge of residential construction and specific experience in home sales organization very desirable. Excellent future with 45 year old, highly productive firm. Will involve extensive travel, high compensation and benefits for right individual with good understanding of current housing market conditions. Send resume clearly stating education and family situation, dated work history. Indicate compensation requirements. Z 7530 TIMES.

ENGINEER Site Planning

Rapidly expanding consultant has unusual growth openings for:
Project Engineers. Will prepare feasibility studies, preliminary-final
construction plans, estimates, etc., for single and multi-family
developments, P.U.D.'s, commercial, etc. All levels of experience desired. Heavy backleg. Firm paid benefits. Benus program.
Equal opportunity employer. Same day response.

SEAR-BROWN NYT 4

85 Metro Park Rochester, New York 14623

Paditions Available

Leading community developer and bomebuilder seeks young,

ambitious and creative manager

for Mortgage Finance Department. Responsibilities: To se-

cure, process and expedite mortgage financing for FHA, VA

and Conventional Housing Pro-

Degree in Law, Accounting, or

M.B.A. preferred. Excellent salary and other benefits, plus tremendous opportunity for chal-

lenging work and rapid man-

Box CP-644, Wall Street source

agement advancement. employees know of this,

222

MOBILE HOMES

Kaufman and Broad Home Systems, Inc.

Offers a rare opportunity to join one of the nation's fastest growing mobile home manufacturers at the perfect time...

We have just completed the first phase (increasing from two to seven manufacturing facilities) of a planned expansion program . . .

Qualified candidates for sales, purchasing, manufacturing, and general management—by acting now—will have many outstanding opportunities for rapid promotion.

Your joining a winner on the way up, when you are accepted . . .

Write us today enclosing a confidential resume.

Kaufman & Broad Home Systems, Inc.

10801 National Boulevard

Los Angeles, California 90964

WINGEL 11

MOBILE HOME COMMUNITY SALES MANAGER

was salesmen

Top Fortune "500" Company offers outstanding personal opportunity in the rapid growing shelter industry. We require a SALES MANAGER.

as Available

grams.

Positions Available

ENGINEERLand Development

Executive engineer to head Engineering Department in rapidly expanding Detroit area. Assignment: to coordinate and direct activities of all civil engineering in order to meet land improvements, engineering designs and construction sched-

LAND DEVELOPMENT MANAGER

Our land development subsidiary requires experienced individual to manage land development activities in various locations. Responsible for acquisition, zoning work, feasibility studies, cost estimating, bid letting, and supervision of contracts. Should have degree or equivalent plus at least 2 years related experience. Will hestiquarter in LaFayette, Indiana. Reply to R. W. Moberg.

NATIONAL HOMES CORP.

P.O. BOX 680, LAFAYETTE, IND. 47902

An Equal Opportunity Emplayer

duties will include establishing cost estimates for etermining feasibility costs for proposed projects, overnmental approvals of plans, directing developgineering schedules to assure accurate and complete of maps, plans for single and multi-family housing

t contacts with consultants and governmental regrds. Engineering degree with at least ten years exareas such as contract negotiations, cost estimating, aw and zoning.

t starting salary, fringe benefits and growth potential eptional man who has the necessary statistics and mit complete resume in writing only including earnto:

LEVITT AND SONS, INCORPORATED

23815 Northwestern Highway Southfield, Michigan 48075

An Equal Opportunity Employer



223

REAL ESTATE SALES!

The BRANIGAR ORGANIZATION

Illinois' outstanding land development company for over 50 'active starting salary and extensive employee benefits. years is expanding operations at d resume in confidence to:

APPLE CANYON LAKE

near Galena, Illinois

This is a big 3,000 acre development consisting of 2600 HOMESITES surrounding a 500 acre Lake. We need ambitious salesmen capable of earning

\$18,000-\$40,000 YEARLY

sary. Top commissions, and good chance for advancement. ing. The compensation is completely negotiable and will This is an outstanding career opportunity to join a growing company with a 50 year history of success.

Please call Mr. Stormer for full details.

The Branigar Organization, Inc.

Irving Park and Medinah Rds.

Medinah, Illinois 60157

625-8200 894-1400

UKS 3/2/71

Real Estate **Production Manager Purchasing Agent**

To grow with one of America's fastest-growing real estate developers

This young, aggressive community developer is growing by leaps and bounds. We need two top management real estate pros who can keep up with our pace, and quicken our growth. Both will work on large, exciting apartment and single dwelling projects in New York area.

We need a take-charge **Production Manager** with a proven track record. An individual who knows construction like the palm of his hand. Who can manage a multi-million dollar project from concept to fulfillment. We need a cracker-jack **Purchasing Agent** with a heavy construction background and solid experience dealing with contractors, handling cost estimating, budgets, etc.

Please send resume with salary requirements to:

X 7749 TIMES

An Equal Opportunity Employer

continued **CONSTRUCTION SERVICE** MANAGER

lonal manufacturer of Building Systems is seeking a man oughly familiar with building construction, including tion of light structural steels. Responsibilities will ine erection subcontracts, identifying and settling field elems with dealers and erectors. Minimum 5 years pres experience required.

ox CO-648, The Wall Street Journal

An Equal Opportunity Employer

PRESIDENT MORTGAGE BANKING FIRM

ago area company is seeking a president for its mort-» banking subsidiary. The person we are looking for is ently in the mortgage banking field, at an executive Vacant property selling-experience destrable, but not neces-, and has extensive background in FHA mortgage fide significant capital gains potential.

Box CP-337, The Wall Street Jou

REGIONAL DIRECTORS HOUSING DEVELOPMENT

al firm with program to build over 100,000 units of housing and moderate income families seeks individuals with five nore years of real estate development experience and substanexperience with FHA multi-family programs to direct regionperations.

d resumes and salary requirements to:

Herbert Messer

HOUSING PARTNERSHIP 1133 Fifteenth St., N.W.

Washington, D. C. 20005

Positions Av

mediate opening is available in a major residential of m operating in the St. Louis area and planning multi-city We are a young, dynamic company and a ek an experations; a man possessing special expertise in real estate and struction financing; land acquisition and, if necessary, direct rvision of on-site construction.

ability to manage and integrate many different projects and onnel within the framework of organizational goals is absoy necessary. We welcome creative, innovative thinking and antee the opportunity to the individual to use all his available ts, Compensation is open and dependent upon applicant

BOX OP-318, THE WALL STREET JOURNAL

22L

Mobile Home FINANCING SPECIALIST

Ford Motor Credit Company, a wholly owned subsidiary of Ford Motor Co., has an immediate opening at corporate staff for an individual with seasoned experience in planning, developing, and servicing mobile home financing business.

- The successful candidate must have automotive salesfinancing experience including an excellent working knowledge of manufacturer-dealer financing arrange-
- Moderate travel is required in training branch and dealer personnel.
- **M** A college degree is desirable, but not mandatory.
- II This position offers an exceptional opportunity for personal challenge and responsibility in a growing organization. Our compensation and benefit programs are unexcelled in the sales-finance business.

For immediate confidential consideration, please send resume detailing work experience, educational background and salary requirements to: WSJ 4/6/71

Personnel Recruiting and Placement



Ford Motor Credit Company

The American Road, Dearborn, Mich. 48121

An Equal Opportunity Employer M/F

REAL ESTATE INVESTMENT TRUST

Construction Loan Officer

Dynamic, Los Angeles based R.E.I.T. with an unprecedented growth record seeks an aggressive and intelligent loan officer with some experience in real estate financing of large commercial or residential

Selected candidate will become a regional vice president responsible for marketing and loan placement in a major geographic area. Banking or mortgage company experience highly desirable, but will consider these with experience selling a financial service.

Position offers an outstanding, diversified compensation package and unlimited growth opportunities. Send resume and earnings history to

> Box 874-Y, The Well Street Journal 4/1/1/ 2999 W. Sixth St., Les Angeles, Cellf. 90003

APPENDIX IV continued

CONSTRUCTION_14

Expanding international motel organization is seeking a dy-namic results-oriented well unded executive for the De-pendent Division. Candidate AREITON OR SALES have 10 years of expericommercial or light invith knowledge of mo-ruction. BSCE re-

y and benefits. confidence to: treet Journal

Bex. CM-Des, 124

DENVER. COLORADO APARTMENT MANAGER

Position Available for top flight manager for a development of over 400 units. Freter husband/wife team, but will consider/highly experienced individual.

APARTMENT MANAGEMENT
SUPERVISOR
Life insurance company managing
real estate investment trusts seeks
an experienced regional apartment
supervisor. Must travel, have management and construction experience. Send resume and salary history to: Investment Division Life
investors insurance Co. OF
AMERICA, 375 Colling Read S. E.,
Cedar Rapids, Lews 53466.

CONSTRUCTION COST CONTROL MANAGER

Leading national multi-family developer has an opportunity for man with construction experience to assume responsibilities involving cost and budgeting for our many apartment developments, and for our new housing for sale program. Position will offer the right man tremendous challenge and good salary. Send resume to:

Mr. John Cavendish THE KLINGBEIL CO. 42 E. Gay St. 4/6/7/ Columbus, Ohio 43215

APPENDIX V.

LISTING OF POTENTIAL EMPLOYERS OF HOUSING PROFESSIONALS

AND SKILLS

- (a) Home planning, furnishing and decorating, advisory or consulting services which are a part of commercial operations or independent consultants
- (b) Financial institutions and larger insurance companies with interests in residential investments
- (c) Large insurance brokers
- (d) Investment trusts with residential investments
- (e) Housing and planning (city, community, urban, rural), consulting firms, incl. architectural, engineering and design firms
- (f) Co-op organizations
- (g) Media of all types
- (h) Voluntary trade and professional associations and organizations
- (i) Information centers
- (k) New Town development, examples:

Jonathan, Minnesota
Park Forest South, Illinois
St. Charles Communities, Maryland
Flower Mound New Town, Texas
Maumille, Arkansas
New Century Town, Illinois
Columbia, Maryland
Reston, Virginia
Clear Lake City, Texas
Irvine, California
Sun Cities, Florida, Arizona, California
Lake Havasu City, Arizona
Sylvander, New York

Also 'New Town in Town' developments

(1) Government, U.S.

Housing and Urban Development Health, Education and Welfare Agriculture, incl. Farm Credit Administration Commerce Interior Defense TVA and Regional Commissions National Science Foundation Economic Opportunity Science and Technology Environmental Protection Congressional Offices Home Loan Bank Board National Capital Housing Authority Washington Mayor's Office FNMA and GNMA Rural Electric Cooperatives

(m) Government, State

Governors' Offices
Housing Commissions and Authorities
Planning and Development
Urban Renewal
Environmental Protection
Codes
Social Work Agencies

(n) Government, Local

Mayors' Offices
Housing Commissions and Authorities
Planning Commissions
Urban Renewal
Codes and Regulations, incl. Enforcement
and Environmental Protection

- (o) Education on all levels incl. Extension and Continuing Education
- (p) Corporate enterprise with interests in housing

Albee Homes
Aluminum Company of America
Aluminum Company of Canada Ltd.
American Acronomics Corporation
American Building Maintenance Industries

American Continental Homes, Inc. American Cyanamid Corporation American Electric Power Company American Standard, Inc. AMFAC, Inc. Amrep Corporation Anaconda Corporation Arlen Properties, Inc. Armstrong Cork Company Arvida Corporation AVCO Corporation Baird & Warner, Inc. Ball Bros. Research Corporation Behring Corporation Big Sky of Montana, Inc. Bloomfield Building Industries, Inc. Boeing Company Boise-Cascade Corporation Bramalea Consolidated Developments Ltd. 3 H Building Corporation Canaveral International Corporation Capital Divers (Canadian) Celanese Corporation Centex Construction Corporation Champion Home Builders Company Christiana Oil Corporation Chrysler Realty Corporation Citizens Financial Corporation City Investing Company CNA Financial Corporation Commercial Credit Company The Commodore Corporation Community Dimensions, Inc. Conchemco, Inc. Conner Homes Corporation Consolidated Building Company Continental Homes, Inc. Cousins Properties, Inc. Crawford Corporation Dart Industries, Inc. Development Corporation of America (DCA) Deltona Corporation De Rose Industries, Inc. Eaton Yale & Towne Corporation Edwards Industries Engelhard Minerals & Chemical Corporation Federal Housing Systems Corporation First Hartford Realty Corporation

First National Realty & Construction Corporation Fleetwood Enterprises, Inc. Florida Gas Company Ford Motor Company Forest City Enterprises Frouge Company Fuqua Homes, Inc. General Builders Corporation General Electric Company General Financial Systems, Inc. Great Southwest Company Gulf Oil Company Grumman Corporation Hallmark Cards, Inc. Hallcraft Homes, Inc. Hercules, Inc. Hodgson Houses, Inc. Hunt Building Marts Inland Steel Corporation Instrument Systems Corporation International Paper Company International Telephone & Telegraph Company Investment Corporation of Florida Investors Funding Company Irvine Company Johns-Manville Corporation Kaiser Aluminum & Chemical Corporation Kaiser Hawaii Kai Development Company Kaiser Industries Corporation Kaufman & Broad, Inc. Kenilworth Associates Key Company Kit Manufacturing Company Knutson Companies, Inc. Leroy Corporation Leisure Technology Corporation Liberty Homes, Inc. Life Realty & Apartment Leasing Corporation Marcor, Inc. Marlette Homes, Inc. Maryland Community Development, Inc. Mastercraft Homes. Inc. McCulloch Oil Corporation McGrath Corporation Michigan Consolidated Gas Company Midwestern Finance Company H. Miller & Sons Mobile Homes Industries Mobil Oil Corporation

Modular Housing Systems Monarch Industries National Environmental Corporation National Gypsum Company National Homes Corporation Nationwide Homes Corporation Newhall Land & Farming Company Niagara & Mohawk Power Company Olin Corporation Owens-Corning Fiberglas Corporation Parkwood Homes, Inc. Pease Company Potlatch Forests, Inc. Presidential Realty Corporation Presley Development Company Pulte Homes Realty Income Trust Reasor Corporation Redman Industries, Inc. Republic Development Corporation Revenue Properties, Ltd. Raynolds Metals Corporation Rex-Noreco Richardson Homes Corporation Robino-Ladd Rohr Corporation Rouse Company Ryan Homes, Inc. Scholz Homes, Inc. Schult Mobile Home Corporation Sear-Brown Sears, Roebuck & Company Shappel Industries Shell Oil Company Shelter Resources Singer Company Skyline Corporation Southwest Forest Industries Southwest Land Corporation C. D. Spanger Construction Company Standard Pacific Corporation The Stanley Works Stirling Homex Corporation Sunset Occidental Petroleum Corporation SVP-Operations Swift Industries Tenneco, Inc. Thickol Corporation

Tishman Realty Corporation Town & Country Mobile Homes Transamerica Corporation Transamerica Development Corporation TRW, Inc. UGI Corporation J. W. Underwood Company Urban Investment & Development Corporation U.S. Financial Corporation U.S. Gypsum Corporation U.S. Home Development Corporation U.S. Industries, Inc. United States Steel Company Vindale Corporation Jim Walter Corporation Del E. Webb Corporation Washington Homes Wasserman Development Corporation Western Orbis Westinghouse Electric Corporation Weyerhaeuser Company Wick Building Systems, Inc. Wickes Corporation Zimmer Homes Corporation

(q) Research where applicable to any of the above.

