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Engineer and the City; a Symposium Sponsored by the National Academy of Engineering at Its Fifth Autumn Meeting, October 22-23, 1969 (1969)

Pages
118

Size
8.5 x 10

ISBN
0309291666

National Academy of Engineering

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at its Fifth Autumn Meeting
October 22-23, 1969

THE ENGINEER AND THE CITY
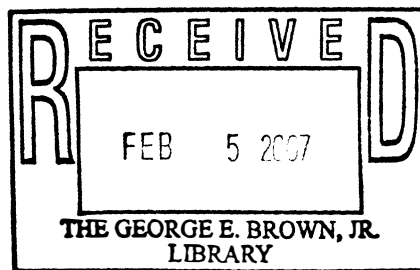
National Academy of Engineering
Washington, D.C.
1969

Members of the Program Committee for the
1969 Autumn Meeting

Martin Goland, *Chairman*
T. Keith Glennan
Thomas C. Kavanagh
W. Deming Lewis
Philip Sporn

Available from

National Academy of Engineering
2101 Constitution Avenue
Washington, D.C. 20418

Foreword

The American city is struggling to survive. With much of its surface blighted with substandard dwellings, arteries often choked with traffic, environment polluted with waste, the city presents a formidable resistance to facile change.

Many of its people, too, seem infected with a spiritual malaise born of overcrowding, deprivation, and a sense of their own impotence to alter their condition.

The engineer's technical expertise and his knowledge of systems engineering make him one of the valuable forces in effecting meaningful urban change. It is important, however, that any large-scale effort in this direction be preceded by an identification of those factors that aid or hinder the engineer in contributing to the search for solutions to our urban crisis. Armed with a new awareness of the available mechanisms, and allied with the social, economic, and political forces of the nation, the engineering community can again make the city a splendid expression of the American spirit.

It is the hope of the Program Committee that these papers will add a measure of balance to the question of how engineering interacts creatively with urban opportunities and challenges. The charge that the engineering profession is composed merely of technicians with narrow vision is patently naive. The same can be said for the more damning accusation that engineers are technological tinkerers whose net effect is to diminish the quality of our lives. But it is equally simplistic to contend that, even if given unlimited authority and resources, engineering alone can lead us to all the answers.

The symposium was designed to explore the firmer ground of the real world. In arranging the meeting, the Program Committee established a pattern for the four sessions: Broad overviews of the problems of the city are followed by discussions of promising methodologic approaches to their solutions. Case histories for areas that are heavily dependent on technology afford an opportunity to gain insight into how engineers are exerting leadership today. The final session places in perspective some priorities for the future.

We were particularly fortunate to have as our speakers so distinguished a group of national leaders in urban affairs. The members of the Program Committee are indebted to them for their warm and enthusiastic responses to our invitations.

It is too much to expect that a meeting dealing with so complex a subject will come forth with dramatic new answers. The symposium and these proceedings are, however, valuable contributions to the continuing exchange of ideas and perspectives that are the necessary foundations for a future guided, to the fullest measure possible, by wisdom.

MARTIN GOLAND
Chairman
Program Committee

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TOWARD A NATIONAL URBAN POLICY

Daniel P. Moynihan

In the Spring of 1969, President Nixon met in the Cabinet room with ten mayors of American cities. They were a variegated lot, mixing party, religion, race, region in the fine confusion of American politics. They had been chosen to be representative in this respect, and were unrepresentative only in qualities of energy and intelligence that would have set them apart in any company. What was more notable about them, however, was that in the interval between the invitation from the White House and the meeting with the President, four had, in effect, resigned. All but assured of reelection, they had announced they would nonetheless not run again. The mayor of Detroit, who, at the last minute, could not attend, announced *his* resignation in June.

Their decisions were not that uncommon. More and more, for the men charged with governance of our cities—great and small—politics has become the art of the impossible. It is not to be wondered that they flee. But we, in a sense, are left behind. And are in trouble. And know it.

At a time of great anxiety—a time that one of the nation's leading news magazines now routinely describes as "the most serious domestic crisis since the Civil War," a time when Richard Rovere, writing of the 1972 elections, adds parenthetically "assuming that democracy in America survives that long"—these personal decisions may seem of small consequence, yet one suspects they are not. All agree that the tumult of the time arises, in essence, from a crisis of authority. The institutions that shaped conduct and behavior in the past are being challenged, or worse, ignored. It is in the nature of authority, as Robert A. Nisbet continues to remind us, that it is consensual, that it is not coercive. When authority systems collapse, they are replaced by power systems, which *are* coercive. Our vocabulary rather fails us here: the term *authority* is an unloved one, with its connotations of authoritarianism, but there appears to be no substitute. Happily, public opinion is not so dependent on political vocabulary, certainly not on the vocabulary of political science, as some assume. For all the ambiguity of the public rhetoric of the moment, the desire of the great mass of our people is clear. They sense the advent of a power-based society and they fear it. They seek peace. They look to the restoration of legitimacy, if not in existing institutions, then in new or modified ones. They look for a lessening of violent confrontations at home and, in great numbers, for an end to war abroad. Concern for personal safety on the part of city dwellers has become a live *political* fact, while the reappearance of a Stalinoid rhetoric of apocalyptic abuse on the left, and its echoes on the right, have created a public atmosphere of anxiety and portent that would seem to have touched us all. It is with every good reason that the nation gropes for some means to weather the storm of unreason that has broken upon us and seems if anything to grow wilder.

It would also seem that Americans at this moment are much preoccupied with the issue of freedom, or rather with new, meaningful ways in which freedom is seen to be expanded or constrained. We are, for example, beginning to evolve some sense of the meaning of group freedom. This comes after a century of preoccupation with individual rights of a kind that were seen as somehow opposed to and even threatened by group identities and anything so dubious in conception as *group* rights.

The Civil Rights Act of 1964 was the culmination of the political energies generated by that earlier period. The provisions that forbade employers, universities, governments, or whatever to have any knowledge of the race, religion, or national origin of individuals with which they dealt marked in ways the highwater mark of social Darwinism in America, and did not long stand unopposed. Indeed, by 1965 the federal government had already, as best one can tell, begun to require ethnic and racial census of its own employees, of federal contractors and research grant recipients. To do so violated the spirit if not the letter of the Civil Rights Act, with its implicit model of the lone individual locked in equal—and remorseless—competition in the Mancunian marketplace, but very much in harmony with the emerging sense of the 1960's that groups have identities and entitlements as well as do individuals. This view is diffusing rapidly. (In Massachusetts, for example, legislation of the Civil Rights Act period that declared any

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public school with more than 50 percent black pupils to be racially "imbalanced" and in consequence illegal, is already being challenged, by precisely those who supported it in the first instance.) If, so far, these demands have been most in evidence among black Americans, there is not the least reason to doubt that they will now diffuse to other groups, defined in various ways, and that new institutions will arise to respond to this new understanding of the nature of community.

In sum, two tendencies would appear to dominate the period. The *sense of general community is eroding,* and with it the authority of existing relationships, while simultaneously a powerful *quest for specific community* is emerging in the form of ever more intensive assertions of racial and ethnic identities. Although this is reported in the media largely in terms of black nationalism, it is just as reasonable to identify emergent attitudes in the "white working class," as part of the same phenomenon. The singular quality of these tendencies is that they are at once complementary and opposed. While the ideas are harmonious, the practices that would seem to support one interest are typically seen as opposing the other. Thus one need not be a moral philosopher or a social psychologist to see that much of the "crisis of the cities" arises from the interaction of these intense new demands, and the relative inability of the urban social system to respond to them.

Rightly or otherwise—and one is no longer sure of this—it is our tradition in such circumstances to look to the condition of government. Social responses to changed social requirements take the form in industrial democracies of changed government policies. This had led, in the present situation, to a reasonably inventive spate of program proposals of the kind the New Deal more or less began and which flourished most notably in the period between the presidential elections of 1960 and 1968 when the number of domestic programs of the federal government increased from 45 to 435. Understandably, however, there has been a diminution of the confidence with which such proposals were formerly regarded. To say the least, there is a certain nonlinearity in the relationship between the number of categorical aid programs issuing forth from Washington and the degree of social satisfaction that ensues.

Hence the issue arises as to whether the demands of the time are not to be met in terms of *policy,* as well as program. It has been said of urban planners that they have been traumatized by the realization that everything relates to everything. But this is so, and the perception of it can provide a powerful analytic tool.

Our problems in the area of social peace and individual or group freedom occur in urban settings. Can it be that our difficulties in coping with these problems originate, in some measure, from the inadequacies of the setting in which they

arise? Crime on the streets and campus violence may mark the onset of a native nihilism; but in the first instance they represent nothing more complex than the failure of law enforcement. Black rage and white resistance, Third World separatism, and restricted covenants all may define a collapse in the integuments of the social contract; but, again, in the first instance they represent for the most part simply the failure of urban arrangements to meet the expectations of the urban population in the areas of jobs, schools, housing, transportation, public health, administrative responsiveness, and political flexibility. If all these are related, one to the other, and in combination do not seem to be working well, the question arises whether the society ought not attempt a more coherent response. In a word, ought a national urban crisis to be met with something like a national urban policy? Ought not the vast efforts to control the situation of the present be at least informed by some sense of goals for the future?

The United States does not now have an urban policy. The idea that there might be such is new. So also is the Urban Affairs Council, established by President Nixon on January 23, 1969, as the first official act of his administration, to "advise and assist" with respect to urban affairs, specifically "in the development of a national urban policy, having regard both to immediate and to long-range concerns, and to priorities among them."

The central circumstance, as stated, is that America is an urban nation, and has been for half a century.

This is not to say that Americans live in *big* cities. They do not. Only slightly more than half (55 percent) of the population lives in cities of 50,000 persons or more, and the bulk of that group is concentrated in relatively small urban aggregations of 100,000 to 250,000 persons. Ninety-eight percent of the units of local government have fewer than 50,000 persons. In terms of the 1960 census only somewhat more than a quarter of the Congressmen represented districts in which a majority of residents lived in central city areas. The 1970 census will show that the majority of Americans in metropolitan areas in fact live in what are known as suburbs, while a great many more live in urban settlements of modest size. But they are not the less urban for that reason, providing conditions of living and problems of government profoundly different from that of the agricultural small-town past.

The essentials of the present "urban crisis" are simple enough to relate. Until about World War II the growth of the city, as Otto Eckstein argues, was "a logical, economic development." At least it was such in the northeastern quadrant of the United States, where most urban troubles are supposed to exist. The political jurisdiction of the city more or less defined the area of intensive economic development, which more or less defined the area of

intensive settlement. Thereafter economic incentives and social desires combined to produce a fractionating process that made it ever more difficult to collect enough power in any one place to provide the rudiments of effective government. As a result of or as a part of this process, the central area ceased to grow and began to decline. The core began to rot. This most primitive analog began to suggest to us that in some way life itself was in decline.

Two special circumstances compounded this problem. First, the extraordinary migration of the rural southern Negro to the northern city. Second, a postwar population explosion (90 million babies were born between 1946 and 1968), which placed immense pressures on municipal services and drove many whites to the suburbs seeking relief. (Both these influences are now somewhat attenuating, but their effects will be present for at least several decades, and indeed a new baby boom may be in the offing.) As a result the problems of economic stagnation of the central city became desperately exacerbated by those of racial tension. In the course of the 1960's tension turned into open racial strife.

City governments began to respond to the onset of economic obsolescence and social rigidity a generation or more ago, but quickly found their fiscal resources strained near to the limit. State governments became involved, and much the same process ensued. Starting in the postwar period, the federal government itself became increasingly caught up with urban problems. In recent years resources on a fairly considerable scale have flowed from Washington to the cities of the land and will clearly continue.

However, in the evolution of a national urban policy, more is involved than merely the question of national goals and the provision of resources with which to attain them. Too many programs have produced too few results simply to accept a more or less straightforward extrapolation of past and present practices into an oversized but familiar future.

The question of method has become as salient as that of goals themselves. As yet, the federal government, no more than state or local government, has not found an effective *incentive* system—comparable to profit in private enterprise, prestige in intellectual activity, rank in military organization—whereby to shape the forces at work in urban areas in such a way that urban goals—whatever they may be—are in fact attained. This search for incentives, and the realization that present procedures such as categorical grant-in-aid programs do not seem to provide sufficiently powerful ones, must accompany and suffuse the effort to establish goals as such. We must seek not just policy, but policy allied to a vigorous strategy for obtaining results from it.

Finally, the federal establishment must develop a much heightened sensitivity to its "hidden" urban policies. There is hardly a department or agency of the national government whose programs do not in some way have important consequences for the life of cities and for those who live in them. Frequently (one is tempted to say normally!), the political appointees and career executives concerned do *not* see themselves as involved with, much less responsible for, the urban consequences of their programs and policies. They are, to their minds, simply building highways, guaranteeing mortgages, advancing agriculture, or whatever. No one has made clear to them that they are simultaneously redistributing employment opportunities, segregating neighborhoods, or desegregating them, depopulating the countryside and filling up the slums, etc. All these things are second- and third-order consequences of nominally unrelated programs. Already this institutional naivete has become cause for suspicion; in the future it simply must not be tolerated. Indeed, in the future, a primary mark of competence in a federal official should be the ability to see the interconnections between programs immediately at hand and the urban problems that pervade the larger society.

THE FUNDAMENTS OF URBAN POLICY

It having long been established that with respect to general codes of behavior eleven precepts are too many, and nine too few, ten points of urban policy may be set forth, scaled roughly to correspond to a combined measure of urgency and importance.

1. *The poverty and social isolation of minority groups in central cities is the single most serious problem of the American city today. It must be attacked with urgency, with a greater commitment of resources than has heretofore been the case, and with programs designed especially for this purpose.*

The 1960's have seen enormous economic advances among minority groups, especially Negroes. Outside the South, 37 percent of Negro families earn $8,000 per year or more, that being approximately the national median income. In cities in the largest metropolitan areas, 20 percent of Negro families in 1967 reported family incomes of $10,000 or over. The earnings of *young* married couples are approaching parity with whites.

Nonetheless, certain forms of social disorganization and dependency appear to be increasing among the urban poor. Recently, Conrad Taeuber, Associate Director of the Bureau of the Census reported that in the largest metropolitan areas—those with 1 million or more inhabitants: "the number of black families with a woman as head increased by 83 percent since 1960; the number of black families with a man as head increased by only 15 percent during the same period." Disorganization, isolation, and

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discrimination seemingly have led to violence, and this violence has in turn been increasingly politicized by those seeking a "confrontation" with "white" society. Urban policy must have as its first goal the transformation of the urban lower class into a stable community based on dependable and adequate income flows, social equality, and social mobility. Efforts to improve the conditions of life in the present caste-created slums must never take precedence over efforts to enable the slum population to disperse throughout the metropolitan areas involved. Urban policy accepts the reality of ethnic neighborhoods based on choice, but asserts that the active intervention of government is called for to enable free choice to include integrated living as the normal option.

It is impossible to comprehend the situation of the black urban poor without first seeing that they have experienced not merely a major migration in the past generation, but also that they now live in a state almost of demographic seige as a result of population growth. The dependency ratio, in terms of children per thousand adult males, for blacks is nearly twice that for whites, and the gap widened sharply in the 1960's.

Children per 1,000 Adult Males

	1960	1966
White	1,365	1,406
Negro	1,922	2,216

It is this factor, surely, that accounts for much of the present distress of the black urban slums. At the same time, it is fairly clear that the sharp escalation in the number of births that characterized the past twenty-five years has more or less come to an end. The number of Negro females under age 5 is exactly the number aged 5 to 9. Thus the 1980's will see a slackening of the present severe demands on the earning power of adult Negroes, and also on the public institutions that provide services for children. But for the decade immediately ahead, those demands will continue to rise—especially for central city blacks, whose median age is a little more than 10 years below that for whites—and will clearly have a priority claim on public resources.

1967 Negro Female Population

Age	Number
Under 5	1,443,000
5 to 9	1,443,000
10 to 14	1,298,000
15 to 19	1,102,000
20 to 24	840,000

2. *Economic and social forces in urban areas are not self-balancing. Imbalances in industry, transportation, housing, social services, and similar elements of urban life frequently tend to become more rather than less pronounced, and this tendency is often abetted by public policies. The concept of urban balance may be tentatively set forth: A social condition in which forces tending to produce imbalance induces counter-forces that simultaneously admit change while maintaining equilibrium. It must be the constant object of federal officials whose programs affect urban areas—and there are few whose do not—to seek such equilibrium.*

The evidence is considerable that many federal programs have induced sharp imbalances in the "ecology" of urban areas—the highway program, for example, is frequently charged with this, and there is wide agreement that other specifically city-oriented programs, such as urban renewal, have frequently accomplished just the opposite of their nominal objectives. The reasons are increasingly evident. Cities are complex social systems. Interventions that, intentionally or not, affect one component of the system almost invariably affect second, third, and fourth components as well, and these in turn affect the first component, often in ways quite opposite to the direction of the initial intervention. Most federal urban programs have assumed fairly simple cause and effect relationships that do not exist in the complex real world. Moreover, they have typically been based on "common sense" rather than research in an area where common sense can be notoriously misleading. In the words of Jay W. Forrester: "With a high degree of confidence we can say that the intuitive solution to the problems of complex social systems will be wrong most of the time."

3. *At least part of the relative ineffectiveness of the efforts of urban government to respond to urban problems derives from the fragmented and obsolescent structure of urban government itself. The federal government should constantly encourage and provide incentives for the reorganization of local government in response to the reality of metropolitan conditions. The objective of the federal government should be that local government be stronger and more effective, more visible, accessible, and meaningful to local inhabitants. To this end the federal government should discourage the creation of paragovernments designed to deal with special problems by evading or avoiding the jurisdiction of established local authorities, and should encourage effective decentralization.*

Although the "quality" of local government, especially in large cities, has been seen to improve of late, there appears to have been a decline in the vitality of local political systems, as well as an almost total disappearance of serious effort to reorganize metropolitan areas into new and more rational governmental jurisdictions. Federal efforts to

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re-create ethnic-neighborhood-based community organizations, as in the poverty program, or to induce metropolitan area planning as in various urban development programs, have had a measure of success, but nothing like that hoped for. The middle-class norm of "participation" has diffused downward and outward, so that federal urban programs now routinely require citizen participation in the planning process and beyond, yet somehow this does not seem to have led to more competent communities. In some instances it appears rather to have escalated the level of stalemate.

It may be we have not been entirely candid with ourselves in this area. Citizen participation, as Elliott A. Krause has pointed out, is in practice a "bureaucratic ideology," a device whereby public officials induce non-public individuals to act in a way the officials desire. Although the putative object may be, indeed almost always is, to improve the lot of the citizen, it is not settled that the actual consequences are anything like that. The ways of the officials, of course, are often not those of the elected representatives of the people, and the "citizens" may become a rope in the tug-of-war between bureaucrat and representative. Especially in a federal system, "citizen participation" easily becomes a device whereby the far-off federal bureaucracy acquires a weapon with which to battle the elected officials of local government. Whatever the nominal intent, the normal outcome is federal support for those who would diminish the legitimacy of local government. But it is not clear that the federal purposes are typically advanced through this process. To the contrary, an all-round diminishment, rather than enhancement, of energies seems to occur.

(This would appear especially true when "citizen participation" has in effect meant putting citizens on the payroll. However much they may continue to "protest," the protest acquires a certain hollow ring. Something like this has surely happened to groups seeking to influence public opinion on matters of public policy which have been openly or covertly supported by the federal government. This is a new practice in American democracy. It began in the field of foreign affairs and has now spread to the domestic area. To a quite astonishing degree it will be found that those groups that nominally are pressing for social change and development in the poverty field, for example, are in fact subsidized by federal funds. This occurs in protean ways—research grants, training contracts, or whatever—and is done with the best of intentions. But, again, with what results is far from clear. Can this development, for example, account for the curious fact that there seems to be so much protest in the streets of the nation, but so little, as it were, in its legislatures? Is it the case, in other words, that the process of public subsidy is subtly debilitating?)

Whatever the truth of this judgment, it is nevertheless clear that a national urban policy must look first to the vitality of the elected governments of the urban areas and must seek to increase their capacity for independent, effective, and creative action. This suggests an effort to find some way out of the present fragmentation, and a certain restraint on the creation of federally financed "competitive governments."

Nathan Glazer has made the useful observation that in London and Tokyo comprehensive metropolitan government is combined with a complex system of "subgovernments," such as the London boroughs, representing units of 200,000-250,000 persons. These are "real" governments, with important powers in areas such as education, welfare, and housing. In England, at all events, they are governed through an electoral system involving the national political parties in essentially their national postures. (Indeed, the boroughs make up the basic units of the parties' urban structure.) It may well be there is need for social inventions of this kind in the great American cities, especially with respect to power over matters such as welfare, education, and housing, which are now subject to intense debates concerning "local control." The demand for local control is altogether to be welcomed. In some degree it can be seen to arise from the bureaucratic barbarities of the highway programs of the 1950's, for example. But in the largest degree it reflects the processes of democracy catching up with the content of contemporary government. As government more and more involves itself in matters that very much touch on the lives of individual citizens, those individuals seek a greater voice in the programs concerned. In the hands of ideologues or dimwits, this demand can lead to an utter paralysis of government. It has already done so in dozens of urban development situations. But approached with a measure of sensitivity, and patience, it can lead to a considerable revitalization of urban government.

4. *A primary object of federal urban policy must be to restore the fiscal vitality of urban government, with the particular object of ensuring that local governments normally have enough resources on hand or available to make local initiative in public affairs a reality.*

For all the rise in actual amounts, federal aid to state and local governments has increased only from 12 percent of state-local revenue in 1958 to 17 percent in 1967. Increasingly, state and local governments that try to meet their responsibilities lurch from one fiscal crisis to another. In such circumstances, the capacity for creative local government becomes least in precisely those jurisdictions where it might most be expected. As much as any other single factor, this condition may be judged to account for

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the malaise of city government, and especially for the reluctance of the more self-sufficient suburbs to associate themselves with the nearly bankrupt central cities. Surviving from one fiscal deadline to another, the central cities commonly adopt policies that only compound their ultimate difficulties. Yet their options are so few. As James Q. Wilson writes: "The great bulk of any city's budget is, in effect, a fixed charge the mayor is powerless to alter more than trivially." The basic equation, as it were, of American political economy is that for each 1 percent increase in the gross national product the income of the federal government increases 1 1/2 percent while the normal income of city governments rises one-half to three-quarters of a point at most. Hence both a clear opportunity and a no less manifest necessity exist for the federal government to adopt as a deliberate policy an increase in its aid to urban governments. This should be done in part through revenue sharing and in part through an increase in categorical assistance, hopefully in much more consolidated forms than now exist, and through credit assistance.

It may not be expected that this process will occur rapidly. The prospects for an enormous "peace and growth dividend" to follow the cessation of hostilities in Vietnam are far less bright than they were painted. But the fact is that the American gross national product grows at a better rate than a billion dollars a week, and we can afford the government we need. This means, among our very first priorities, an increase in the resources available to city governments.

A clear opportunity exists for the federal government to adopt as a deliberate policy an increase in its aid to state and local governments in the aftermath of the Vietnam war. Much analysis is in order, but in approximate terms it may be argued that the present proportion of aid should be about doubled, with the immediate objective that the federal government contribution constitute one-third of state and local revenue.

5. *Federal urban policy should seek to equalize the provision of public services as among different jurisdictions in metropolitan areas.*

Although the standard depiction of the (black) residents of central cities as grossly deprived with respect to schools and other social services, when compared with their suburban (white) neighbors, requires endless qualification, the essential truths are that life for the well-to-do is better than life for the poor and that these populations tend to be separated by artificial government boundaries within metropolitan areas. (The people in-between may live on either side of the boundaries and are typically overlooked altogether.)

As a minimum, federal policy should seek a dollar-for-dollar equivalence in the provision of social services having

most to do with economic and social opportunity. This includes, at the top of the list, public education and public safety. (Obviously there will always be some relatively small jurisdictions—"the Scarsdale school system"—that spend a great deal more than others, but there can be national or regional norms and no central city should be forced to operate below them.)

Beyond the provision of equal resources lies the troubled and elusive question of equal results. Should equality of educational opportunity extend to equality of educational achievement (as between one group of children and another)? Should equality of police protection extend to equality of criminal victimization? That is to say, should there be not only as many police, but also as few crimes in one area of the city as in another? These are hardly simple questions, but as they are increasingly posed it is increasingly evident that we shall have to try to find answers.

The area of housing is one of special and immediate urgency. In America, housing is not regarded as a public utility (and a scarce one!) as it is in many of the industrial democracies of Europe, but there can hardly be any remaining doubt that the strong and regular production of housing is very nearly a public necessity. We shall not solve the problem of racial isolation without it. Housing must not only be open, *it must be available.* The process of filtration out from dense center city slums can only take place if the housing perimeter, as it were, is sufficiently porous. For too long now the production of housing has been a function not of the need for housing as such, but rather of the need to increase or decrease the money supply, or whatever. Somehow a greater regularity of effective demand must be provided the housing industry, and its level of production must be increased.

6. *The federal government must assert a specific interest in the movement of people, displaced by technology or driven by poverty, from rural to urban areas, and also in the movement from densely populated central cities to suburban areas.*

Much of the present urban crisis derives from the almost total absence of any provision for an orderly movement of persons off the countryside and into the city. The federal government made extraordinary, and extraordinarily successful, efforts to provide for the resettlement of Hungarian refugees in the 1950's and Cuban refugees in the 1960's. But almost nothing has been done for Americans driven from their homes by forces no less imperious.

Rural to urban migration has not stopped, and it will not for some time. Increasingly, it is possible to predict where it will occur, and in what time sequence. (In 1968, for example, testing of mechanical tobacco harvesting began on the East Coast and the first mechanical grape

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pickers were used on the West Coast.) Hence, it is possible to prepare for it, by training of those who leave and by providing for them where they arrive. Doubtless the United States will remain a nation of exceptionally mobile persons, but the completely unassisted processes of the past need not continue with respect to the migration of impoverished rural populations. There are increasing indications that the dramatic movement of Negro Americans to central city areas may be slackening and that a counter movement to surrounding suburban areas may have begun. This process is to be encouraged in every way, especially by the maintenance of a flexible and open housing market.

But it remains the case that in the next thirty years we shall add 100 million persons to our population. Knowing that, it is impossible to have no policy with respect to where they will be located. *To let nature take its course is itself a policy.* To consider what might be best for all concerned and to seek to provide it is surely a more acceptable goal.

7. *The state government has an indispensable role in the management of urban affairs and must be supported and encouraged by the federal government in the performance of this role.*

This fact, being all but self-evident, tends to be overlooked. The trend of recent legislative measures, almost invariably prompted by executive initiatives, has been to establish a direct federal-city relationship. States have been bypassed, and doubtless some have used this as an excuse to avoid their responsibilities of providing the legal and governmental conditions under which urban problems can be effectively confronted.

It has, of course, been a tradition of social reform in America that city government is bad and that, if anything, state government is worse. This is neither true as a generalization nor useful as a principle. But on the other hand, by and large, state governments, with an occasional exception such as New York, have *not* involved themselves with urban problems and are readily enough seen by mayors as the real enemy. But this helps neither. States must become involved. City governments, without exception, are creatures of state governments. City boundaries, jurisdictions, and powers are given and taken away by state governments. It is surely time the federal establishment sought to lend a sense of coherence and a measure of progressivism to this fundamental process.

The role of state government in urban affairs cannot easily be overlooked: it is more typically *ignored* on political or ideological grounds. By contrast, it is relatively easy to overlook county government, and possibly an even more serious mistake to do so. In a steadily increasing number of metropolitan areas, the county, rather than the original core city, has become the only unit of government

that makes any geographical sense. That is to say, the county is the only unit whose boundaries contain most or all of the actual urban settlement. The powers of county government have typically lagged well behind its potential, but it may also be noted that in the few—the very few—instances of urban reorganization to take place since World War II, county government has assumed a principal, even primary role in the new arrangement.

8. *The federal government must develop and put into practice far more effective incentive systems than now exist whereby state and local governments and private interests can be led to achieve the goals of federal programs.*

The typical federal grant-in-aid program provides its recipients with an immediate reward for promising to work toward some specified goal—raising the educational achievement of minority children, providing medical care for the poor, cleaning up the air, reviving the downtown business district—but almost no reward for actually achieving such goals, and rarely any punishment for failing to do so.

It is by now widely agreed that what federal grant-in-aid programs reward most is dissimulation. By and large the approach of the federal government to most urban problems is to provide local institutions with money in the hope that they will perform but with no very powerful incentives to do so.

There is a growing consensus that the federal government should provide market competition for public programs or devise ways to imitate market conditions. In particular, it is increasingly agreed that federal aid should be given directly to the consumers of the programs concerned—individuals included—thus enabling them to choose among competing suppliers of the goods or services that the program is designed to provide.

Probably no single development would more enliven and energize the role of government in urban affairs than a move from the monopoly service strategy of the grant-in-aid programs to a market strategy of providing the most reward to those suppliers that survive competition.

In this precise sense, it is evident that federal programs designed to assist those city-dwelling groups that are least well off, least mobile, and least able to fend for themselves must in many areas move beyond a *services* strategy to an approach that provides inducements to move from a dependent and deficient status to one of independence and sufficiency. Essentially, this is an *income* strategy, based fundamentally on the provision of incentives to increase the earnings and to expand the property base of the poorest groups.

Urban policy should in general be directed to raising the level of political activity and concentrating it in the electoral process. It is nonetheless possible and useful to be

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alert for areas of intense but unproductive political conflict and to devise ways to avoid such conflict through market strategies. Thus conflicts over "control" of public education systems have frequently of late taken on the aspect of disputes over control of a monopoly, a sole source of a needed good. Clearly some of the ferocity that ensues can be avoided through free choice arrangements that, in effect, eliminate monopoly control.

If we move in this direction, difficult "minimum standard" regulation problems will almost certainly arise and they must be anticipated. No arrangement meets every need, and a good deal of change is primarily to be justified on grounds that certain systems need change for its own sake. (Small school districts, controlled by locally elected boards may be just the thing for New York City. However, in Phoenix, Arizona, where they have just that, consolidation and centralization would appear to be the desire of educational reformers.) But either way, a measure of market competition can surely improve the provision of public services, much as it has proved an efficient way to obtain various public paraphenalia, from bolt-action rifles to lunar landing vehicles.

Here, as elsewhere, it is essential to pursue and to identify the *hidden* urban policies of government. These are nowhere more central to the issue than in the matter of incentives. Thus for better than half a century now, city governments with the encouragement of state and federal authorities have been seeking to direct urban investment and development in accordance with principles embodied in zoning codes, and not infrequently in accord with precise city plans. However, during this same time the tax laws have provided the utmost incentive to pursue just the opposite objectives of those incorporated in the codes and the plans. It has, for example, been estimated that returns from land speculation based on zoning code changes on the average incur half the tax load of returns from investment in physical improvements. Inevitably, energy and capital have diverted *away* from pursuing the plan, *toward* subverting it. It little avails for government to deplore the evasion of its purposes in such areas. Government has in fact established two sets of purposes and has provided vastly greater inducements to pursue the implicit rather than the avowed ones. Until public authorities, and the public itself, learn to be much more alert to these situations, and far more open in discussing and managing them, we must expect the present pattern of self-defeating contradictions to continue.

9. *The federal government must provide more and better information concerning urban affairs and should sponsor extensive and sustained research into urban problems.*

Much of the social progress of recent years derives from the increasing quality and quantity of government-generated statistics and government-supported research. However, there is general agreement that the time is at hand when a general consolidation is in order, bringing a measure of symmetry to the now widely dispersed (and somewhat uneven) data-collecting and research-supporting activities of the federal government. Such consolidation should not be limited to urban problems, but it must surely include attention to urban questions.

The federal government should, in particular, recognize that most of the issues that appear most critical just now do so in large measure because they are so little understood. This is perhaps especially so with respect to issues of minority group education, but generally applies to all the truly difficult and elusive issues of the moment. More and better inquiry is called for. In particular, the federal government must begin to sponsor longitudinal research designed to follow individual and communal development over long periods of time.

It should also consider providing demographic and economic projections for political subdivisions as a routine service, much as the weather and the economy are forecast. (Thus, Karl Taueber has shown how seemingly unrelated policies of local governments can increase the degree of racial and economic differentiation between political jurisdictions, especially between central cities and suburbs.)

Similarly, the extraordinary inquiry into the educational system begun by the U.S. Office of Education under the direction of James S. Coleman should somehow be established on an ongoing basis. It is now perfectly clear that little is known about the processes whereby publicly provided resources affect educational outcomes. The great mass of those involved in education and of that portion of the public that interests itself in educational matters continue undisturbed in the old beliefs. But the bases of their beliefs are already thoroughly undermined and the whole structure is likely to collapse in a panic of disillusion and despair unless something like new knowledge is developed to replace the old. Here again, longitudinal inquiries are essential. And here also, it should be insisted that however little the new understandings may have diffused beyond the academic research centers in which they originated, the American public is accustomed to the idea that understandings do change, and, especially in the field of education, is quite open to experimentation and innovation.

Much of the methodology of social science originated in clinical psychology, and perhaps for that reason tends to be deficiency-oriented. Social scientists raise social problems, the study of which can become a social problem in its own right if it is never balanced by the identification and analysis of social successes. We are not an unsuccessful

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country. To the contrary, few societies work as hard at their problems, solve as many, and in the process stumble on more unexpected and fulsome opportunities. The cry of the decent householder who asks why the profession (and the news media that increasingly follow the profession) must be ever preoccupied with juvenile delinquency and never with "juvenile decency" deserves to be heard. Social science like medical science has been preoccupied with pathology, with pain. A measure of inquiry into the sources of health and pleasure is overdue and is properly a subject of federal support.

10. *The federal government, by its own example, and by incentives, should seek the development of a far heightened sense of the finite resources of the natural environment, and the fundamental importance of aesthetics in successful urban growth.*

The process of "uglification" may first have developed in Europe, but as with much else, the technological breakthroughs have taken place in the United States. American cities have grown to be as ugly as they are, not as a consequence of the failure of design, so much as of the success of a certain interaction of economic, technological, and cultural forces. It is economically efficient to exploit the natural resources of land and air and water by technological means that the culture does not reject, albeit that the result is an increasingly despoiled, debilitated, and now even dangerous urban environment.

It is not clear how this is to change, and so the matter that the twenty-second century, say, will almost certainly see as having been the primary urban issue of the twentieth century is ranked last in the public priorities of the moment. But there *are* signs that the culture is changing, that the frontier sense of a natural environment of unlimited resources, all but impervious to human harm, is being replaced by an acute awareness that serious, possibly irreparable harm is being done to the environment, and that somehow the process must be reversed. This *could* lead to a new nonexploitive technology, and thence to a new structure of economic incentives.

The federal establishment is showing signs that this cultural change is affecting its actions, and so do state and city governments. But the process needs to be raised to the level of a conscious pursuit of policy. The quality of the urban environment, a measure deriving from a humane and understanding use of the natural resources, together with the creative use of design in architecture and in the distribution of activities and people must become a proclaimed concern of government. And here the federal government can lead. It must seek out its hidden policies. (The design of public housing projects, for example, surely has had the consequence of manipulating the lives of those who inhabit them. By and large the federal government set

the conditions that have determined the disastrous designs of the past two decades. It is thus responsible for the results and should force itself to realize that.) And it must be acutely aware of the force of its own example. If scientists (as we are told) in the Manhattan Project were prepared to dismiss the problem of long-lived radioactive wastes as one that could be solved merely by ocean dumping, there are few grounds for amazement that business executives in Detroit for so long manufactured automobiles that emitted poison gases into the atmosphere. Both patterns of decision evolved from the primacy of economic concerns in the context of the exploitation of the natural environment in ways the culture did not forbid. There are, however, increasing signs that we are beginning to change in this respect. We may before long evolve into a society in which the understanding of and concern about environmental pollution, and the general uglification of American life, will be both culturally vibrant and politically potent.

Social peace is a primary objective of social policy. To the extent that this derives from a shared sense of the value and significance of the public places and aesthetic value of the city, the federal government has a direct interest in encouraging such qualities.

Daniel J. Elazar has observed that although Americans have been willing to become urbanized, they have adamantly resisted becoming citified. Yet a measure of this process is needed. There are not half a dozen cities in America whose disappearance would, apart from the inconvenience, cause any real regret. But to lose one of those half-dozen would plunge much of the nation and almost all the immediate inhabitants into genuine grief. Something of value in our lives would have been lost, and we would know it. The difference between those cities that would be missed and those that would not be resides fundamentally in the combination of architectural beauty, social amenity, and cultural vigor that so sets them apart. It has ever been such. To create such a city and to preserve it was the great ideal of the Greek civilization, and it may yet become ours as we step back ever so cautiously from the worship of the nation state with its barbarous modernity and impotent might. We might well consider the claims for a different life asserted in the oath of the Athenian city-state:

> We will ever strive for the ideals and sacred things of the city, both alone and with many;
> We will unceasingly seek to quicken the sense of public duty;
> We will revere and obey the city's laws;
> We will transmit this city not only not less, but greater, better and more beautiful than it was transmitted to us.

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DISCUSSION

QUESTION: In point 3 and in point 5, you indicated that the funds should "pass through" the states. Would you explain a little more why that should be?

ANSWER: We designed a relatively simple formula based primarily on population. The "pass through," which is mandatory to the state, is an addition to a local tax effort, so that those localities, general government localities, that have made an effort to tax their own people for their own needs will indeed be rewarded.

We are not trying to pass money on to the states and the cities so that they, in turn, can stop spending their own tax revenues.

The purpose of the mandatory "pass through," though, I think, is basically one of simplicity.

QUESTION: I wonder whether, in the process of suggesting that monies go to the states instead of directly to urban areas, there had been any provision made for urban interests to compete for those funds once they are made available at the state level. It would be very hard for the urban poor to compete for such money, because on the state level they are powerless. What provision would there be for them to compete for those funds?

ANSWER: In the revenue sharing proposal, which is our basic proposal to date, there can be no competition of the type you suggest. It is a mandatory business. A city, based on its population and the amount of money it in turn contributes to the tax base, gets a certain amount of money.

Does that answer your question?

QUESTION: No. Some people are sympathetic to bypassing the state with federal funds so that local interest groups within the urban context can more effectively compete on the state level for funds.

If you bypass the state and go directly to urban interest groups, then their chance of getting funds is certainly a lot better.

ANSWER: We would expect the states to obey the laws of the nation. This question comes up primarily with regard to segregationist policies of certain states. They have to accept the provisions of the federal program and they don't have an option to accept one thing and not accept another, and so we try to protect the federal law and interest.

It might be possible, of course, for a state to feel so strongly about the policy that it would not choose to buy into our welfare program, for example, but we base it on the principle of self-interest. We made it, we think, to the state's advantage economically to buy into the program and to accept our guidelines. I think we have to do it issue by issue and protect those interests.

QUESTION: How does the Office of Science and Technology or the science policy effort of the Administration participate or play a role in your efforts toward a national urban policy here?

ANSWER: Dr. DuBridge of course, the Science Adviser to the President and the head of the Office of Science and Technology, is regularly a participant in our urban affairs councils.

The President has created under Dr. DuBridge a Council on Environmental Quality. We regularly attend those meetings, and we work jointly on certain projects. So they are part of the same family and we work very closely together.

QUESTION: A keypoint was referred to near the end of number 7: our lack of understanding of urban phenomena. Would you care to discuss what sorts of activities and institutional reforms you might be thinking about to gain a better understanding of urban phenomena?

ANSWER: One thing, which the President proposed during the campaign, is an institute on the educational future, similar, I guess you would say, to our institutes on national health, mental health, and so forth. Our research in this field is generally contracted out and generally in response to a proposal that comes from within. It therefore has some great gaps, and usually has a low budget priority.

Congress cut very heavily into the funds for educational and experimental research. So we have been doing a great deal of talking about that with the President, and I think there is a possibility of some specific proposal sometime in the future.

We have done some structural things in this area. For example, in our reorganization of OEO, we very clearly cut off the advocacy function from the evaluation function as it existed when the President came into office. The same people running the programs were evaluating the programs. They were looking over their own shoulders. We have now separated that and have put the evaluation people in another place. I think that is an improvement.

As another example, in the field of international exploration of these issues, we have had a conference with the English, and another one will be held next week, to discuss the evaluation of social action programs.

We are giving considerable thought to the improvement and revision of federal statistical systems. It is not a dramatic field, and so it does not often make the papers, but there are a great many of these problems bubbling up in various branches of the government now.

QUESTION: You mentioned two directions for national policy. One is to revitalize locally based community action in urban affairs, and the second is to

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revitalize the state role. Is this not perhaps a contradiction in goals?

I speak in particular of a group in Boston called ABCD, which stands for Action for Boston Community Development and they have been quite hurt by the cut in federal aid because of the shift in responsibilities for welfare programs in the city to the state. The ABCD group has been particularly successful, because each office is located in a particular community where the aid is needed, so that personnel are very accessible to the people needing the aid, and the personnel themselves rise out of these groups and help the people in the community where they live.

Do you think this aid will make the communities less successful?

ANSWER: I am familiar with that program in Boston. It is one of the best community action programs in the United States. Not all by any means are that successful.

OEO Director Don Rumsfeld, through the regional office, is assessing the programs and agencies to weed out the weaker and more ineffective programs, which will in turn strengthen those that have done a superb job, such as the one in Boston.

I did put primary emphasis on elective officials, and not specifically any contradiction in terms on the para-governments, which I would consider community action agencies, at least in those cases then where they have not accepted the Green Amendment and worked in with the Mayor.

I think the intent of what the President calls the New Federalism is to return power to the states and localities.

Some federal programs are clearly more manageable by the mayors than by the governors.

The Model Cities program is primarily a mayor's program, as is the Summer Youth program. I think there could be closer cooperation, but I am not proposing to replace the mayor or most local elected officials with the state officials. My point was really more to get the states, which have been often remiss in this, more actively involved in it.

CHAIRMAN: We have to cut off the discussion at this point. I will exercise, if I may, the Chairman's prerogative of trying to synthesize what I think I have heard in several of these questions. A recurring expression of concern is heard about the problems of whether and from what source the municipal, the state, or the federal government is going to get the clout to do what is necessary to be done to solve the problems of population growth and urban sprawl and urban deterioration.

One possible answer is that it is not going to be solved by any single one nor by any one that is better than the other. We have as a governmental philosophy that the closer our government can be to the people, the more responsive it will be to the people.

I suggest that the speaker may be stressing that at every level of government there has to be a heightening of interest—a willingness to really get with it—in devising, with the people, the kinds of programs and the involvement of capabilities that will bring about the best solutions.

You can ask me what are the best solutions, and I can simply say, "Those that will produce the kind of a life we would all like to live."

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TECHNOLOGY IN MUNICIPAL AFFAIRS

J. Erik Jonsson

It is a great honor and responsibility to be asked to share with this distinguished body of professional men of signal accomplishments some thoughts and ideas that may help to shape pragmatic approaches to solutions of our cities' problems. The scope of the Academy's organization for this as well as the wide-ranging multifaceted work it has already begun is impressive, showing meaningful insight into technological needs. I have little doubt that the sum of these endeavors—this symposium for identification of specific factors that may aid or inhibit engineers' contributions to solutions of urban problems and your continuing efforts—will succeed.

We have been alerted to crises by such highly audible and visible symptoms of the ailing city as considering it to be a place assailed by crescendos of demands, threats, violence; a place abandoned at the ballot box by its most qualified citizens, spurned by taxpayers wearied of the heavy loads imposed by higher ranking governments; a place deserted for suburbia by its most able educated men and women; a place that spawns crime and harbors criminals; a place where the politically ambitious with little knowledge of management of complex affairs or of technology gain their training and experience for higher posts from self-seeking ward politicians whose entire philosophies are expressed in terms of *quid pro quo;* a place throttled by apathy, indifference, and inattention of others. Lacking are those willing to lead by molding public opinion—not merely to respond to it.

At least we are stimulated now to undertake a thorough study of urbanization in general and, hopefully, as individuals, of our own cities in particular. By these means we begin to fabricate the "team attack" on the cities' ills about which there is so much talk. We begin also to fashion an improved collective understanding of the city essential both to motivate and enable us to maintain there that which is good and improve that which is not. Only with thorough understanding can we bequeath even tolerable environments and the know-how to create new ones to future generations of our exponentially increasing population. This creation they will have to do as inevitably as they must renew what we leave behind.

As a "big city mayor" for nearly six years, I have grown accustomed but not adjusted to the feeling of running uphill at top speed on a treadmill. The Academy's interest and concern, especially if it is as urgent as I sense it to be, suggests that such adjustment may be avoided altogether. In our time, scientists, engineers, and their colleagues, with the support of our productive energies, have brought us to the virtual conquest of drudgery, disease, pestilence, and many seeming vagaries of nature. Lately such persons, among whom you are distinguished, have assured us a "giant step forward" in the everlasting search to understand the universe. It is reassuring to have your attention and competence turned to the cities. Who is better able than scientists and engineers to devise new means to gain basic understanding and consequently make improvements to our way of life? None are better equipped to bring analysis, synthesis, order, and discipline into the stream rather than bemoaning the long-standing serious, complex, and difficult urban problems as terrifying or unsolvable. Solvable they are, but not with pat, simple, overnight solutions. The time to solve them is uncomfortably short, but it is adequate. If we can understand what must be done, we are well on our way; halfway, one of my teachers used to say.

The degree to which we skillfully and satisfactorily solve the problems of the ugly, decaying, spreading urban mess will depend on the degree to which, as realists, we see things as they are, and as we take exceeding care to accommodate the nature of man in our solutions. If the engineer is truly to contribute to the solution of urban problems (not just create more new technology that may but serve to compound the present state of affairs), he must understand the city and its setting with the greatest possible sensitivity to its human factors and the interaction of these with the physical.

Frequently civic-minded doctors, lawyers, ministers, engineers, businessmen—people of like and unlike persuasions—say to me: "What can I do to help solve Dallas' problems?" Most often, my answer is: "The best thing you

can do is to give of yourself; you can't hire someone to do what is needed of you. As to your resources, you and you only know what you and your institutions possess that may be brought to bear. I can give you an overview of the problems, perhaps thereby to reveal the barriers to solutions and, therefore, a means to determine how we may join forces to prescribe for them."

It is this kind of approach that I propose to you now. Our overview should begin with the fundamental fact that cities are built by people to serve people. As we might expect, cities clearly reflect the strengths, the weaknesses, the characteristics of those who built them and those who inhabit them; the resources at their command; their collective energy; their initiative and "will to preserve, protect, and defend." Time, that slippery and elusive fluid, enters into our overview as well. Sometimes we marvel at the foresight and grasp of future needs displayed by ancient and living men alike. More often we are aghast at the short-term characteristics of their insights. Never to be forgotten is the caution in Shakespeare's *Julius Caesar:* "There is a tide in the affairs of men which taken at the flood leads on to fortune; omitted all the voyage of their lives is bound in shadows and miseries." Only those who design their cities and institutions with utmost creativity, build them with quality and integrity uncompromised, and maintain them with skill and devotion can understand and take the tide at flood.

No city can be viewed as a complete and independent entity standing alone. Its environment may be as vital as its other resources. External forces of various kinds and magnitudes from near and far operate upon it. Often these forces, over which a city can exercise little or no control, may exert more influence on its future and its ultimate fate than those that are applied within its confines. The forces can be physical as in the case of weather and climate. They can be economic, as when a protracted strike or external competition destroys an essential business or industry vital to the community. They can be legal, as when an inhibitory law limits growth and development.

There are other aspects of the overview. Because telecommunications brings instant knowledge of remote events, goals and plans may be made immediately obsolete by happenings literally half a world away. Because air transport brings the rest of the world within reach of the ordinary man's pocketbook and his newly available leisure time, travel to distant lands becomes commonplace. A few of the barriers to amity and accommodation between people are broken down, a few new ones are raised. Linkages, new alliances, in commerce and travel, heretofore impossible, are forged and expanded in scope and speed almost beyond credibility.

Thus—with the great mobility of men, raw material, products, and services readily achieved—new opportunities, new competition, and new problems multiply; new perplexities and new crises occur to bedevil men in the smallest and remotest places. In the great cities, the centers of trade and travel, already overflowing with 70 percent of our population on less than 2 percent of our land, the influx of new residents from afar, domestic or foreign, appears almost cataclysmic.

Technology created and constantly pushed forward by scientists and engineers, numbering in our country less than 1.5 percent of our 203 million people, has brought the greatest migration to the cities that is recorded in all history. Our new mobility is employed to an extraordinary degree, but with it, we seem unable to fashion a sense of community. Sometimes a horde of people will desert a city all at once. At other times a tidal wave of new residents moves in to enjoy what they consider to be a more favorable environment or opportunity. Most of the migrants have not been prepared for life in densely packed environments. They were no more ready for the cities than the cities were for them. Bringing little education and few skills to the metropolis, they tend to huddle in rapidly growing clusters in aging housing vacated by former residents who had deserted to more pleasant vistas in distant suburbs. Bewildered and helpless, these new ones never *identify* with the city. Finding little demand for their raw muscle power, many soon resort to any means they can discover and employ for survival. Welfare is the common life-preserver for most; crime the end point of many.

Officials of local governments experience an unparalleled dwindling of the taxable values and income to support increasing costs for serving the growing numbers. Cancerous slums spread; the better equipped and better financed citizens who might assist in meeting and dealing with these problems flee from them in increasing numbers. As suburbs multiply, so do duplication and overlapping of taxing units—wasting resources, introducing conflicts of interest.

Thus we see the dynamics of a city as one of its most dominant characteristics in our time. Almost nothing about it is static, for even decay can have dynamic effects. Buildings constructed for half a century of use become obsolete and are removed because of a shift in technology or diminished economic justification. Major fractions of central city cores are bulldozed and rebuilt, but the slums don't disappear. They simply become vertical.

The neighborhood as we knew it in earlier times does disappear, and with it the closeness of neighbors to each other in their feelings about common aims and concerns—their empathy. Neither slum dweller nor suburbanite returns to his old way of life. Their former habits and customs, their days, become more and more compartmentalized, less involved with those close by.

For most city denizens, a house or an apartment is a home no longer. It is simply a shelter, a defense against a hostile world, a meeting place for the family to become reacquainted briefly between sorties and safaris whose aims are to achieve more living in less time. Inevitably it results in just the opposite.

To be worth living in, a city should do better than that for its people, and the people should do better for their city. It should be a pleasant, gracious place reflecting its natural surroundings or improving upon them, to be viewed not as a destroyer of Mother Nature and all her laws and tenets, but as if "it grew there," part of the land itself.

A city's resources should be used as effectively as possible while providing a balance of freedom and opportunities for its individuals and institutions to maximize their potential in their efforts to satisfy their needs and reach their goals. In meeting these requirements, the larger and older cities of America are failing abysmally. So completely do they miss their targets that many believe they must be abandoned and new cities built to replace them. Such profligacy we cannot afford. Affluent though we may be, we must do the rebuilding jobs that face us in such multiple and disheartening arrays, and do them well and in timely fashion.

This is not to say that whole new cities should not and will not be built. Quite the contrary is true, and here we shall have fresh, new requirements for such settlements. They must be designed with flexibility and adaptability to changing conditions; to make highly salvageable our precious store of materials and the labor invested in their application; and so that relationships of various components and strata of facilities may be changed and moved without need for bulldozing and consequent loss of their great intrinsic values. If thing get out of balance, it must be possible to readjust and rebalance while there is time.

The main thrust of our efforts, however, must come in rebuilding and restoring our old and aging cities. To succeed we must first understand what the finished product should be like, what people who live there need and desire; their characteristics and their conditions; their many and involved relationships to each other and to educational and social facilities; to employment; to housing; to shops; to transportation; and a thousand things more. I believe we should take into account how people change with time, how their goals shift, how plans change, how they adapt. The young man of 1930 hoped for a steady job—any job—security through savings or a modest retirement pension. Not today! His present aims are nearly without limit and will increase much more with each succeeding decade. Thus the end result of our urban design must reasonably approach the flexibility and quality of the newer cities or new mass migrations could result. Failure could lead to continued trauma, to fatal explosion.

So far I have tried to convey that the cities with which I am most familiar are largely products of haphazard, random growth and development. There is little consistency, coordination, mutual sharing or pooling of resources, and unified attach on problems among individuals, institutions, and governments. Some entities are obviously close to peril points; failing to adjust and adapt to our new times, they seem close to the end of the road. Let's see if we can draw attention to a few characteristics of our patients that might suggest some constructive help to be rendered.

1. Systems as they exist in the cities were developed largely by empirical methods to render simple services to a less complicated society. They were *responses* to *some* developing needs, not *anticipations* of all of those needs. Connections between fragmental subsystems were lacking or imperfect.

2. Few communities possess rational goal setting and planning endeavors. Here engineers with their systems approaches might really lend a hand if they became involved.

3. Interaction between various facets of the society wasn't sufficiently understood; it still isn't. Here we need a great deal of work; creating systems more nearly total and better interconnected will enlarge and complicate the problems but will lend hope for better comprehension of interactions through simulation and other studies. Interaction among housing, jobs, and transportation, for example, are urgently in need of critical examination, and I feel certain that Dr. Forrester, author of the new book *Urban Dynamics*, will bring much light to that subject later. I readily assent to his view that our intuitive solutions for such pressing urban problems have been wrong almost always; we might have done better to listen for intuitive promptings than to proceed in just the opposite manner. The interactions of humans with each other and with the mechanical devices of our society are something else. It is here, I believe, that we need explorations beyond any I have heard about.

4. Merging of governmental and taxing bodies is one of the real needs in most parts of the country. Bureaucratic vested interests, false civic pride, and fears of individuals and institutions that they would lose control of some share of empire make everything difficult. Where merging can't be accomplished, perhaps sharing facilities by contract might. The small units are in danger because they simply can't furnish the many services now called for by their citizens, nor can they afford to buy the tools they must buy to make acceptable progress. The world has passed them by.

5. Cities get about 15 percent of the tax dollar, the

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federal government about 67 percent. How can they render more and more service with ad valorem taxes on property as the only reliable base?

6. Citizens scream about the cost of government, but don't bother to vote. Will they ever wake up? Much more neglect, apathy, indifference, and they will have completed the job of letting local government fall into obsolescence and decay. The cost of restoration may be prohibitive, the end result further centralization of power in the federal government, less freedom where it counts—at the local level, where the individuals are.

7. When graft or corruption is present, people are apt to shrug and say, "That's politics for you." It is if we are lax enough to permit it. Laissez-faire in such matters is the reason why the Mafia could preempt certain businesses (laundry, trucking) and services (garbage collection) in our larger centers. Permissiveness, lack of interest, and failure of local government to do its job well allowed the intruders to get started, then get a stranglehold.

8. The heart of organized crime is income from gambling, loan-sharking, prostitution, and dope. The answer is largely a matter of law enforcement. There can be no permissiveness. In some way the cost of control of crime must be accepted and paid.

9. The Census Bureau gives us a population figure of 203 million; 46 percent of these are under 25 years of age; 23.6 million, or 11.6 percent of the population, are between 18 and 24. Their voices *will be heard.* It is their future they're thinking about and they don't see much in it. They just may know something!

10. Racism isn't being resolved by integration, nor is segregation getting anywhere. The best long-range answer seems to lie in education, but means must be found to get along until that can be accomplished.

11. Inflation and Vietnam take the money and manpower we could apply to local needs. At some point we must make up our minds what we intend to do about belt-tightening and peace.

Now, from the eleven areas listed, I haven't thrown much light on jobs engineers can tackle. Nevertheless there are delineated in these subjects some first-class inhibitors. It's easy to produce more. If they're not all for the engineer to solve with his slide rule, they are something the engineer must face as a citizen, a man, a humanist. I see as much need for him in politics as in his normal pursuits. Isn't it his life, his family, his contribution to society that go down the drain if we don't solve our urban problems? Why are lawyers almost the only professional men to be found in local politics? Aristotle said: "Lack of experience diminishes our power of taking a comprehensive view." It is urgent to become involved at the local level, for if one is indeed searching for the pragmatic solutions, how else but

in this way can he know, with certainty, what will work?

We who are in local politics aren't just holding fingers in the dike; we're submerged to the neck. Six good experienced mayors of big cities quit in the last year because they were worn out, tired of taking a beating for people who didn't care, abused them, underpaid them, and turned their backs to what was going on. Priceless experience was lost and will be difficult to regain.

I try to accomplish what my alma mater, Rensselaer, is attempting to train its students to do, namely, to sort out from "what can be done" those things that "ought to be done"—and to do it. Some experiences may explain the emotional inhibitors through questions they raise.

Now I'd like you to imagine yourself in my shoes as a mayor for the moment, and I'll attempt to make you *feel* the job as I do.

Suppose you knew that a hundred people in your city would be murdered next year; another hundred would be killed in traffic. You haven't money enough for sufficient tools and men to do what you know can be done to cut these slayings way down. Which would you push? Are you sure?

One person tells you he wants more police protection, more law enforcement; and he's willing to pay the necessary taxes to get the job done. The same day a widow on a small pension and Social Security writes: "If you increase taxes, I'll lose the home my husband and I saved for all our lives. Please, Mr. Mayor, *don't* let them increase my taxes!" What would you do?

You see hundreds of children rush from a school in a slum, but there's no place to play. Parents are working or absent. You know the kids will grow up in the streets, unsupervised; most are unwanted and unloved. Do you think they'll mature as fine citizens, as disciples of the American way?

You have a code enforcement program to keep housing safe—with tolerances for inadequate wiring, plumbing, and hazards to life. You red tag a house that is unsafe in these and other ways; you know a carelessly dropped cigarette could burn half a dozen people to death.

On freezing nights, would you turn out people who sneaked into such a house for shelter, perhaps to acquire pneumonia, or would you let them risk being burned to death?

A rich parent tells you to arrest his teenage son who's taking dope. He says he can't handle the boy; he's through. Do you put him in jail with hardened criminals? There's no place to treat him as a sick person. What do you do?

You observe that squad cars are bringing in many children, from 3 to 12 years of age. You ask what offense they could possibly have committed so evil as to require arrest. The porter explains what you are not quick enough

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to sense: "Mr. Mayor, they are *abandoned* children." Dear God, how could a parent leave a child to his fate that way?

Well, there it is. There are no set hours on the job—just all you have—and there are quite a few vacancies. You'll shed a few tears for your country and a lot more for the humans you should be able to give a hand up, but can't. You'll wish you were more able, but will find you're just one guy, and pretty lonesome up there. There's not much fun, but you'll get a few laughs, mostly at yourself. You'll see your family now and then, and they'll see you, but mostly on TV. Your heart, you will learn, can take more than you thought. You'll talk to some widows of policemen shot in the line of duty, perhaps you'll see a fireman you knew was a fine person brought out of a blazing building on a stretcher, covered. He has fought his last fire; he left some kids, a widow, a small pension. The phone will wake you at 3 A.M., and a drunk you never heard of will ask you to get him out of jail. You'll try, you'll try; but you're never good enough. The days never have enough hours. You'll be tired, frustrated, angry. You'll find how easy it is to make someone hate you, how difficult to win a following, one you must have to do what must be done. Is it worth it? You bet! It's something those young and old who can't fight abroad for their country can do at home to keep home worth fighting for.

It is imperative that all of us experience this shattering side of the lives of the city's poor and forgotten, particularly the children. No computer can know it; no system is yet able to cope with it. Perhaps if we gain the humbleness and humility we need, we can see more clearly what can be, what ought to be done. Can't we learn to capitalize on Nature's assets, so richly bestowed, without destroying them wholly or in part? Can't we find a way to live in peace and harmony with our fellow men on this fast-shrinking little planet? Can't we slow our relentless pursuit of difficult goals long enough to determine their worth, readjust if we must? Can we imagine richer lives for ourselves, more worthy or desirable heritages to leave behind than to know that in our time we have done all that our knowledge and power made possible? I doubt it.

DISCUSSION

QUESTION: These community goals are commendable. Do they affect the building codes that so often allow the speculative builder who builds for profit, and not, as you say, people who build to serve people? As we all know, the economic power of the speculator enables him to bend codes and do almost anything in the city that he wishes, not always in concert with the community's needs.

ANSWER: As you probably know, the Department of Housing and Urban Development has a program in which it is proposing to help the cities aggregate the locations and then have housing produced in the mass by manufacturers.

I think it is a great idea. But it begins to get into trouble because many of the locations are picked because the land is vacant, or because you need a little housing today in an area where next month or next year it won't be needed at all or wanted. You may be creating housing in the wrong place in the wrong way, and yet something must be done.

The need for the housing is desperate. Secretary Romney is trying to get the cities to change these building codes and zoning regulations so that you can do a better job of this. Believe me, changing building codes will be fought by vested interests all over the lot. And as for changing zoning regulations, some cities have them and some don't. Houston has none, Dallas has many. We have spent two years changing every zoning regulation we had in order to try to improve it. With two years of intensive effort by dedicated people, we still have not found out how to avoid the perpetuation of bad slums.

When you get into civic affairs, be durable, stay with it, and change these codes as much as you can. In our case, we are trying to get them changed right now in ten counties through a ten-county council of governments that we created, because we knew it would do no good to try to change them in one place. If we are successful, we believe it will be possible to build better housing for less and do it quickly.

QUESTION: Do you see more of a need for us as engineers for our technical capability, or a need for us as human beings?

ANSWER: I see a great need for both. What little systems there are in the city halls of America were not designed by today's engineers using advanced technologies. In my case, for example, I am just getting at the use of the computer in combatting crime because it is the first time we have really had enough budget to do it.

And so it is a constant fight with the art of the possible. I would say we need you on the whole much more as concerned citizens. You take a part in seeing that it is done well, whatever the subject matter is.

QUESTION: Have you enlisted the efforts of engineers and scientists in Dallas, and for what specific purposes?

ANSWER: We have a quaint old custom in Dallas,

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which is how I happened to get into politics. You have a committee call on you and tell you you have volunteered. We do this to them!

The average corporation is a good corporate citizen and wants to help, but they won't if you don't let them know that you need them. Once you inform them of that, they will help.

For example, let me tell you what my own corporation did in the last year. We took about 35 people out of City Hall in responsible positions of management and we offered to teach them the techniques of goal setting and planning that Texas Instruments has.

We have a tremendous response from the city employees to this. They were really going back to school. But in the average city, you find no provision for paying for advanced education, no provision for paying for continuing education. In fact, there is very little in our civil system to help a man become better. These limitations to progress through additional training are frustrating and, at times, discouraging.

In the meantime, however, there are things to do. Ask people to help you. Most of them will, if they know you need help. They are good people, and the corporations have so many assets that are idle so much of the time that when they don't need them, they will lend you some.

They will even lend you computer time, and they will pay for it. But you must ask.

QUESTION: I would like to ask you to comment on how you are developing research and development programs within your community in solving pollution problems, particularly water pollution, because we want water in Houston.

ANSWER: You have hit on one of the outside forces that the local community really can't do much with.

Here is something the engineers can get a handle on. For example, the urgent problem of picking up garbage, brush, and bushes in areas where there are lots of trees, grass clippings, bottles, and all the other junk that people throw out.

It is awful to look at a machine that is put out by a commercial outfit that possibly has not been improved since a year later than Adam. There is no competition worth mentioning, so nobody thinks about it much, and they compress the stuff and cart it off. It is about the same way it was when I was a boy.

That solution isn't any good. We need engineers, and we don't have the funds to get them.

I think the federal government should help. I would suggest that one way to find out more about this is to go back to your own community and make your city people bring you the ways they think the engineers can get into the act.

They won't like you for that, not one bit. You know, if you can use the status quo, you solve most of the politician's problems. He does not figure to be there long. He is either using his office for a stepping stone, or he has decided to get out while he is alive. When you propose something like this, go in prepared to make it stick, and don't think politicians are not sensitive to letters, phone calls, or a glaring eye!

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A WILDERNESS OF MIRRORS

Martin Goland

The perspectives of history tell us that the city came into being in response to deep-seated human needs. Contrary to first impressions, the city is not a product of technology, although it is true that the frustrations of modern technology bear their bitterest fruits in the city. Lewis Mumford, in his treatise on the history of the city,* points out that the early wanderers first established fixed meeting places to do homage to their dead. In his words: "The city of the dead antedates the city of the living." Gradually, over the ages, the city evolved to its present form. Communal cave dwellings gave way to agricultural villages; religious shrines were joined by commercial centers; and an emerging industrial society accelerated the growth of today's metropolis. Increasingly, by virtue of its size and complexity, the city came to depend on technology to accomplish its vital functions. As a closed loop, technology made it possible for the city to grow, and the development of urban society in turn encouraged the advance of technology.

Recent events cause one to wonder whether the feedback loop involving the city and technology is in danger of becoming unstable; some would contend it has already reached that state. In such discussions, even deeper and more profound philosophical questions intrude. Octavio Paz, the Mexican poet and philosopher, appraises North American society in these words:

In the United States man . . . has built his own world and it is built in his own image: it is his mirror. But now he cannot recognize himself in his inhuman objects, nor in his fellows. His creations, like those of an inept sorcerer, no longer obey him. He is alone among his works, lost—to use the phrase by José Gorostiza—in a "wilderness of mirrors."†

To the engineer at work on urban projects, the city does seem to be a wilderness of mirrors. Technical feasibility interacts with social pressures, with politics, and with the peculiar economics of government to defeat the emergence of a seemingly consistent set of working objectives. By training, the engineer is remarkably well equipped to seek the best course of action among various alternatives that satisfy a visible end point. In the case of the city, however, the crux of the issue is usually the setting of wise goals, rather than in choosing the manner of achieving them. Pressure groups have conflicting interests. Urban mechanisms are poorly understood, and it may well be that a dependable theory of the city is still beyond our grasp, even in principle. Learning how to participate meaningfully in the process of goal-setting is the new dimension that the city engineer must include in his professional horizon.

There is much talk these days about the attitudes of engineers, and whether training as an engineer leads to personality traits that are unduly conservative and inflexible. Generalizations regarding so large a group of individuals are, of course, superficial and meaningless. We have our introverts and extroverts, our men of ideas and those with narrow vision, our broad humanitarians and those who cannot see beyond the machine. Nevertheless, some observations are in order as to who speaks for engineering in urban affairs.

In our form of government, public issues are resolved through the interplay of pressure groups. The climate for decision is one of conflict—hopefully, constructive conflict. It must be admitted that certain characteristics of the engineering profession tend to reduce the effectiveness of the engineer's voice in such an environment.

To begin with, the engineer is professionally committed to the realizable. From his earliest training, he is indoctrinated with the philosophy that the element of compromise, between what is most desirable and what is possible, is ever present in engineering decisions. Does this account in part for the conservative attitudes of most engineers—for the preference to extrapolate from the present, rather than seize on the bold new innovation?

The team nature of engineering projects also influences the engineer's outlook. Few of today's engineers

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*Lewis Mumford, *The City in History*, Harcourt, Brace and World, Inc., New York, 1961.

†Octavio Paz, *The Labyrinth of Solitude: Life and Thought in Mexico*, Grove Press, Inc., New York, 1961.

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can claim a project for their own; rather, advances are born from the cooperative efforts of groups of specialists. Valuable as this approach is, it tends to diffuse the impact of the individual voice and the strong personality.

The team concept is further enforced by the corporate environment in which most engineers work. Corporate careers are not enhanced by participation in public debate, particularly when political overtones are present.

These factors, it seems to me, account for the circumstance that relatively few engineers choose public careers. Even as private citizens, they seldom seek the crusader's role, preferring to avoid the limelight and work with the available facts in a more considered and deliberate fashion.

Does this mean that engineering attitudes and professional philosophies need recasting in the future? To some extent, the answer is probably yes, in order that the engineering viewpoint be enhanced by a greater political forcefulness and public impact. We should not be un-reservedly proud that engineering students are taking so small a part in today's liberal campus movements. No socially responsible person can condone the destructive and negative antics of the extremist student dissenters, but the positive side of the coin is the sincere searching by many students for a heightened sense of social values during unsettled times—issues in which an activist engineering participation is increasingly important for the future.

But if engineers do become more politically aggressive and more publicly vocal, this should not be the cause of a distorted engineering perspective. The engineer is a realist; his professional responsibility is to be a visionary in a real world. The problems of the city may be solvable through some grand plan, but it is more probable that there is no Utopian answer for the city—that its most optimistic future will continue to entail compromise, conflict, and an uneasy truce between new technology and older values. Engineering, in its ultimate definition, should make its contribution in precisely such an environment.

Session II
METHODOLOGIES
W. Deming Lewis, Chairman

SOCIAL AND POLITICAL REALITIES IN THE CITY

John A. Buggs

It is important, at the very beginning, to indicate to you that in talking about social and political realities of the city, I am not sure that either I or very many other people know what they all are. I have not come to perpetrate a fraud on you by suggesting that I am familiar with all of them.

What I am not here to do is best illustrated, perhaps, by the story of a man who was stepping down off a curb in order to cross a very busy intersection. He was very lightly brushed by an automobile; and he immediately looked around and saw that the car was being driven by a very opulent-looking man, and that the automobile was a Rolls Royce.

So like any red-blooded, quick-thinking American citizen, he collapsed to the pavement. An ambulance came and took him to the hospital. He stated that he had been struck in a vital spot and was unable to move. He stayed in the hospital six months, and was examined by all kinds of physicians. In due course he instituted suit in the amount of a million dollars against that opulent-looking man who had allegedly struck him.

When the case came to trial, the plaintiff was wheeled into the courtroom on his stretcher, still unable to move. Evidence was presented by the defense to the effect that the plaintiff had been examined immediately after the alleged accident; that no one could find any place on his body at which he had even been touched by the automobile, let alone severely injured. But here before the court was a man who had lain immobile for six months. So, the court found in his behalf, and granted him a judgment of a million dollars.

The man went home, where an insurance adjuster called on him. The adjuster threw a million dollar check on the man's chest and said, "I have been assigned to stay with you for the rest of your life. And if you ever get out of bed and attempt to spend any of this money, you are going back to court to be charged with fraud and misrepresentation."

Whereupon the man replied, "Well, if you are married, you had better call your wife and tell her to pack your things, because in about an hour an ambulance is coming for me, and they are going to put me on a plane and fly me to Paris. In Paris, I will be met by another ambulance, and it will take me to the little town of Lourdes. And when I get there, you are going to see the damndest miracle you ever saw. . . ."

How I wish that the social and political realities of the city could be taken to Lourdes! But they cannot; and we have to deal with them in a nonmiraculous way, I am afraid.

The greatest achievement of man, in the twentieth century, is megalopolis. It is not the invention of any one person, or of any one group, but rather a weaving together of all the various strands of modern technological achievement—the breakthroughs in mass communications, transportation, and construction—into a sprawling, complex entity that shapes the daily lives of all of us, and within whose booming, buzzing confusion we all increasingly live our lives and find our destinies.

At its best, it is a magnificent thing. Never before in the history of man have such riches been spread at the feet of us all. For the first time in human history, a society can provide food, clothing, and comfort for every citizen and make available the great storehouses of music, drama, and art to every man and his family.

It can provide recreation, excitement, and meaningful leisure for everyone. With a semblance of ease, you engineers, scientists, and planners have annihilated the gaps of time, space, and communication that formerly cut us off from one another and confined us to live in a rather narrow orbit.

Or so, at least, we like to think. We rejoice in the splendid buildings—public and private—that line our avenues; and we delight in the cultural and recreational facilities that have been built for us. Even though we grumble at them, we use the freeways, and our cars transport us swiftly in whatever direction we wish to go.

Is this the reality of the city? Or is there another city—unseen, hidden away—that belies our technology and our grandiose schemes, a city within whose confines life at

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its fullest is not possible; a mean, crabbed city, whose daily deprivations mock at all our concepts of the good life?

This we know: In the midst of plenty we are confronted by problems of hard-core poverty, by a mass of citizens for whom poverty is not an accident of economic stress but a way of life. Despite the greatest educational apparatus known, we must still deal with the functional illiterate and the culturally starved. We have in our midst a growing number of people who are technologically unemployable—men and women who cannot handle the simplest machines, but for whom there is no longer any fruitful work, since we less and less employ human beings as machines.

And tucked behind our avenues, and along our freeways, and amid our factories are the shacks and the hovels of the poor. In our central cities are the ghettos to which we relegate those to whom the dominant group in our society has denied the choice of living space. Every major city of our nation is plagued by the problems of urban blight—spiritual as well as physical—and by death and decay at its core.

Until we face these basic realities of urban life, all our efforts must be in vain; and all our window-dressing becomes the garlanding of an empty shell. Just as our democracy promises freedom and equality for all men, so must our cities make the good life a reality for all men. Otherwise, our cities have no reason for being, and must in time wither, as did some of the great cities of the past.

Stewart Alsop, in 1965, said that a kind of "outcast society" had been created in our cities. Harrington called it the "Other America," and with good reason, because it is quite different from normal American society, this "Other America."

This "outcast society" is being perpetuated, and is even being made quasi-hereditary, because, as Harrington says, the children of this "Other America" are not being equipped, either by experience or by education, to escape from their "outcast" condition into the normal currents of American life.

Why is this true?

In 1962, a little over seven years ago, Charles Silberman, writing in FORTUNE, had this to say about why this is true. I should like to read several paragraphs, because I do not know that anyone could have said it better.

At the outset, Silberman quotes Paul N. Ylvisaker, then of the Ford Foundation, who at the time had observed:

The approved way to talk about cities these days is to speak solemnly, sadly, ominously, and fearfully about their problems.

You don't rate as an expert on the city unless you foresee its doom.

Silberman then continues:

Doom is easy to foresee in the spreading slums, the increasing crime rates, the public disaffection of almost every large city. And yet the city can survive, as it has survived for a century and a half. Indeed, American cities today have a chance to achieve their greatest success and their greatest glory.

For this to happen, however, city planners and civic leaders will have to understand better than they do now what their cities' greatest problem is. It is not, as so many assume, to bring the wandering middle class back from the suburbs.

The large city, as Jane Jacobs in ARCHITECTURAL FORUM has put it, cannot import a middle class; it must manufacture its own. And, indeed, most of the huge middle class that dominates American life today was manufactured in the big-city slums of yesteryear.

Cities always have had to create their own stable, cultivated citizenry out of whatever raw material lay at hand. For the American city during the past 150 years, the raw material was the stream of immigrants pouring in from Britain, Ireland, Germany, Norway, Russia, Italy, and a dozen other lands.

The city needed these immigrants to build its streets and offices, to man its factories, service its homes and hotels and restaurants, and do all the dirty and menial jobs that older residents disdained.

But the city did more than use its newcomers; it equipped them to take their place as fully participating members of U.S. society. Doing this—bringing people from society's backwaters into the mainstream of American life—has always been the principal business, the principal glory, of the American city.

It isn't any longer; the city is in trouble today because it isn't dealing successfully with its newcomers. They are still pouring in—not from County Cork, or Bavaria, or Sicily, or Galicia, but from Jackson, Mississippi, and Memphis, Tennessee, and a host of towns and hamlets with names like Sunflower, Rolling Fork, and Dyersburg.

The new immigrants are distinguished from the older residents not by religion or national origin, but by color. Between 1950 and 1960 the twelve largest U.S. cities lost over two million white residents; they gained nearly two million Negro residents.

It is the explosive growth of their Negro populations, in fact, that constitutes the large cities' principal problem and concern. When city officials talk about spreading slums, they are talking in the main about physical deterioration of the areas inhabited by Negroes.

And when they talk about juvenile delinquency, or the burden of welfare payments, or any of a long list of city problems, officials are talking principally about the problems of Negro adjustment to city life. For the large city is not absorbing and "urbanizing" its new Negro residents rapidly enough; its slums are no longer acting as the incubator of a new middle class.

One reason for this failure is that city planners have been more interested in upgrading the value of the city's real estate than in upgrading the lives of the human beings who inhabit the real estate. They have tried to create middle-class neighborhoods by driving lower-class Negro residents out of the neighborhoods being renewed, and bringing white middle-class residents in;

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Negroes bitterly refer to urban renewal as "Negro removal."[*]

The effort is doomed to failure. Driving the Negroes out of one area merely creates a new and frequently worse slum somewhere else in the city.

The city can be saved only if it faces up to the fact that "the urban problem" is in large measure a Negro problem. But the Negro problem is more than just an urban problem; it is also the problem of all the U.S. rural or urban, North or South—though it is in the large northern cities that the solution is most likely.

That last point is one on which Silberman and I have disagreement. I tend to think that it will be perhaps in the large southern cities that the problem will most likely be solved first.

He is saying, in effect, that delinquency of all kinds is to some extent a function of social class, social values, and the environmental situation in which people find themselves.

And he is saying that if environment can change, social values have a better chance to undergo a change. But a decent physical environment, although it is desirable, will not in and of itself stimulate significant changes in social values, particularly if—as is true in some public housing and urban redevelopment projects—that better environment is surrounded by dilapidated slum areas, and if the people inhabiting the "new" environment are of the same class and the same race and holding essentially the same social values.

The city, in short, is not serving its historical function, because it has undergone a qualitative change. It is no longer merely a larger version of the traditional city, but a new and different form of human settlement.

A major characteristic of this city, which may be referred to as a megalopolis, is low-density development, a phenomenon that has been going on for the past 30 to 35 years, which is encouraged by a lack of popular support for an attack on the problems of the causes and of the region as an entity.

The growth of suburbia speeds up the decline of the city. Slums grow faster than they can be cleared. This is true even in New York City, which has the largest slum-clearance program in the nation. It is true because, as a result of slum clearance and the construction of public housing, the tax base is lowered; services are curtailed because the tax base is lowered; deterioration is speeded up; and the cycle is continued.

Our cities today, the central cities, are being left without children, except minority group children. In most major cities the percentage of Negro children in schools far exceeds their percentage in the general population. White families that can afford to do so are moving to the suburbs

[*] An estimated 80 percent of the families relocated by urban renewal projects have been Negro.

or sending their children to private schools.

The federal government has not been bereft of its input into some of the problems that our cities now have. The political decisions and actions of the federal government have contributed substantially to the decline of the city.

The FHA is workable primarily in low-cost land areas, and is not viable, really, in the high-cost areas of the city. Public housing has rejected all those whose incomes exceeded a prescribed limit.

This, coupled with what was and still is in many areas a deliberate program of segregation, has created in many places an environment lacking all the positive attributes of urban life. The fact that more and more Negroes, Mexican-Americans, and Puerto Ricans inhabit the central city has resulted in public housing being primarily an area of low-income minority-group families. Dispersal of the urban population has not come about solely as a result of a free and open market.

Government has induced people to buy in the suburbs, through FHA and VA loan guarantees. It has also provided subsidies for conventional loans for suburban development, by insuring investments in savings and loan institutions that must be invested in home mortgages.

Public housing itself has been a prisoner of its opponents, who have largely determined its character. Locating public housing in the inner city has contributed to keeping lower-income families in the city and has strengthened the patterns of segregation, while another arm of the same government has financed housing for the elderly, in suburban areas.

One might ask, "Why is this not the case with public housing?" Suburban housing is going up now. However, we can still alter the site selection policies that crystallize public housing in our central cities.

Other federal subsidies have helped the decline of the inner city, also. Subsidies, and the mechanization of agriculture, have pushed black people, poor white people, and Mexican-Americans off the farms and into the cities.

The late Catherine Bauer pointed out that the desire of the New Deal was to do something about that one-third of the nation that was "ill-housed, ill-clothed, and ill-fed"; and that the efforts to do this resulted in a standardized, one-age group, one-color district, devoted wholly to residents. She said, however, that this was not the result of any conscious overall plan or public decision to encourage maximum social segregation. It came about, she felt, as a side result of forces and policies employed for quite different and often distinctly progressive and idealistic ends.

I somehow doubt that. If you look at a little book entitled *How the Federal Government Has Helped Create*

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the Ghetto, you will discover that the FHA, in its manual, back in 1938, made it very clear to private builders that it would not view with great favor guarantees for loans on property that permitted a mixed character of ownership.

Our metropolitan areas have become more and more fractionalized from the point of view of race, economic status, and to some extent, political affiliation. Politics, as almost anyone can see by reading the newspapers these days, is becoming structured along racial lines.

One of the major objections to the "one-man, one-vote" dictum of the Supreme Court was related to the growing strength of the big-city black vote. Such a political schism is fast rendering state political processes almost immobile in some instances, unable to resolve community problems because of conflicting values of the core city (black) versus the surrounding suburbs (white).

Here in Washington we have a problem of that nature. It has been going on for a long time. The debate of the Freeway, the Three Sisters Bridge, in which everyone living in the suburbs wants the Freeway, in order to get into Washington to work, but which the black people oppose. Their position is that "You will put 25,000 of us out of our homes, and you have made no plans—and we don't expect that you will—as to where we are going to go." It is a problem, I think, that is developing in many communities throughout this nation.

In recent years the developing tensions have resulted in one of the most troubled periods in our history since the Civil War. Government at all levels appears to want to deal effectively with the problems highlighted by the events of our recent past; but it has not been very successful even in sustaining an initial commitment to do something, or in many cases even in making the initial commitment necessary to change our national and our local priorities, that would permit us to do something.

For example, in the field of housing, in the Model Cities Program, in the Rent Supplement Program, in the new 235 and 236 Programs—all were funded below the authorized level; and the authorizations were generally well below the recommendations of the executive branch with respect to funding, so that the funding represented no change at all in our priorities and, to some extent, a withdrawal from priorities that had originally been set forth. And so, even when the objectives had been set, they have not really been realized.

I don't know how many of us are aware that of the 810,000 public housing units allocated to be built in this nation between 1949 and 1955, only 460,000 were completed by *1967.*

Other kinds of priorities concern us, too. The government spends $564 million annually on commodities and food stamp programs, and we have recently been told of the widespread hunger that exists in many parts of this country; but $4.5 billion is invested on agricultural price supports, which means that we spend eight times as much making food scarce as we do in making it available to those who need it. That $4.5 billion goes largely into the hands of wealthy corporate farmers.

We say that many of our social and political problems could be solved through education, housing, better health, and more jobs. But the Department of Defense each year spends more money than all of the federal, state, and local governments combined spend on education, housing, health, old age assistance, poverty programs, and manpower training.

Based on hard evidence, the National Urban Coalition steering committee has unequivocally stated that $5 billion to $10 billion could be cut out of the Defense budget without injuring our ability to defend ourselves, and that this money could go into some of the kinds of programs that people in this nation need and want.

The spread of the cities, the change in their relationship to their geographical surroundings, the growing fragmentation of local government, the competing needs for resources, the growing polarization of our citizenry—have all created the fearful reality that is today's city.

Our first job, therefore, is the reordering of our priorities to meet the needs of the people. In this connection it is interesting to note, from the recent NEWSWEEK special report on the white majority, entitled "Troubled America," that the priorities of the white middle-class people of this country are startlingly similar to those of the black people.

They were more concerned about how their tax money was being spent than they were about the tax burden itself. They wanted more money spent on job training, medical care, fighting crime, improving schools, better housing—especially in the ghetto. These people wanted more money spent on these things than is spent on defense, space exploration, and foreign aid.

But this alone will not solve our problem. All poor people—regardless of whether they are black, brown, or white—must feel that if this country is going to change, they have a real stake in helping it to change; and to help them, we must forge a partnership between elements that in this country have rarely worked together before.

This is the whole purpose of the development of the coalition concept. Let me tell you what I mean by "getting people together." About a month ago I visited a relatively small, highly industrialized midwestern town that has a good urban coalition. And I saw something happening around the table in the board room of one of the largest companies in this country that frankly, as a little boy from Brunswick, Georgia, I never expected to see.

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I saw the chairmen of five major corporations sitting around a table, and sitting at that table with them were four black people and two white people. Two of the black people were lawyers; one was a tool and die maker; and one was just an ordinary workingman who worked in one of the plants of one of the chairmen of the board sitting at that table, as did also two of the white people sitting there, regular lower middle-class individuals. The atmosphere was one of complete acceptability on the part of all the people sitting at that table, people who were calling each other by first names, and acting as though they were close friends, good friends, bound together in a commitment to do something about the problems of their city.

Now you know, it really didn't matter very much to me whether the programs that coalition was involved in at that time were good or bad. The thing that impressed me was that the process taking place in that room was a process that I had never seen before, one involving people who had never worked together before in any way, people whom all of us, I think, must begin to emulate if the problem in our cities is going to be successfully attacked at all.

It illustrated more than ever before that resources just aren't enough, that there are other things equally as important as the resources that we bring to bear upon the problems that we seek to solve.

What this instance said to me was that for the first time, people are beginning to recognize that there are other needs that poor people and black people and brown people have. What I saw there was the fact that an opportunity was being extended by that community for people to have an ownership stake in that which they had always lived—their community—but which they could never before call their own.

But there they were, making decisions about it. This gave them the feeling, I am sure, that there was a resurrection, or in some instances the birth of a belief that America held a promise for them; and that room was the place in which that promise was being fulfilled.

It provided them with a real and a psychological relief from the chains that had bound them in anonymity because they owned nothing, because they could contribute little to their own progress or to that of their fellowman in the past; but now they were doing so.

It gave them a handle that they could use to gain a feeling of equality with those who had been more fortunate than they. It gave them an incentive to sharpen their efforts, and to express their appreciation for living in a society of men. It provided them a vehicle through which they could be known as assets in their community. It gave them a role in determining their destiny and the destiny of the community of which they were a part.

I think these are the real benefits that relieve the deep and hidden hunger of the people about whom we are concerned—the hunger for dignity, for respect, and for being viewed as real rather than as obscure people in the society of men.

Howard Thurman was a chaplain at Boston University, and perhaps one of the greatest preachers of our century. He used to tell a story of what it means to be *real.* It involved a nine-year-old boy, his mother, and his teen-aged sister, who went into a restaurant for dinner one Sunday. The waitress came around and took the mother's order and the teen-aged daughter's order, and then she said to the boy, "Young man, what will you have?"

The mother started to give the order for the boy. The waitress chose not to hear the mother. Then the daughter started to give his order for him. The waitress didn't hear her, either.

For the third time the waitress said, "Young man, what will you have?" He said, in a timid voice, "A hamburger, with lettuce and tomatoes."

Then the waitress went back to the kitchen, and gave the mother's and the daughter's orders in a normal voice, and then in a loud voice said, "And the young man will have a hamburger with lettuce and tomatoes."

The little fellow opened his eyes wide with wonder and joy and said, "Mama, she thinks I'm real!!"

That is the problem, I think, that is to be faced today. If there is any one reason for the holocausts that have gripped this country in the last five years—and I am making no excuses for them, only interpreting them—it is because that was the only way some people felt they could make other people feel that they were real.

Our job is to help them find a better way to do that.

We are in the midst of a controversy as to whether our economic, our social, and our political systems are equal to meeting the needs of these trying times. The success of all our efforts depends, I think, on the extent to which ghetto people, poor people, and those people who particularly feel now that they are the forgotten Americans—the white middle class, the blue-collar white worker—believe that they are indeed part of the structure that makes the decisions that affect their lives and their destiny. They do not now believe this.

Change, therefore, is the key word upon which the answer to our dilemma rests. The inertia against change is a natural human tendency, especially when that change challenges traditions and attitudes and threatens the structure, and requires the sharing of power.

That is really what people are saying: "Power has got to be shared."

Change we must have, and I think we all know it. We must have it in the interest of peace and progress, or we may very well face the specter of chaos in our internal

social system. The city, and what happens to it and to its people in the next five years, will perhaps be America's real test of its ability to change in a systematic, orderly way.

As engineers, your commitment is needed to this process, and your involvement in it is crucial to its success.

The purpose for the Urban Coalition, the purpose for many such organizations today, is to help this country make orderly, systematic change, to provide the people with an opportunity to feel that they are a part of the process. But human relationships represent the crucial point at which we will succeed or fail.

In the world in which we live today, it is sheer folly to resist inevitable change, which must occur in man's relationship to his fellowman. In the eighteenth century, Rousseau wrote that provided a man is not mad, he can be cured of every folly save vanity; and Rousseau was probably right. Perhaps we can change; and perhaps we can change in time. That is, of course, unless we all be mad.

DISCUSSION

QUESTION: I think we all agree with your premise that the social conditions must change. The question really is: Suppose we were fortunate enough in the next few years to create such a climate, would the cities then be a viable place to live, or is this a necessary condition?

ANSWER: It seems to me that it is necessary to the ability of the city to get the resources it needs for the purpose of making the changes required or to get the kinds of support that people in this nation are willing to give to a reordering of priorities so that that can happen.

So, if the social situation does change, and by "social situation" I have reference to the kinds of attitudes that we have toward each other and the kinds of attitudes we have toward the needs of this country, I think the resources in this country, perhaps more than any other, are available to do this.

The reason that we have not gotten a shift in our priorities is because there has been no overwhelming demand for it.

QUESTION: What do you think that each of us, as engineers, can do to alleviate the problems in this nation? Also, in answering that question, do you believe in a social engineering team, a team made up of social scientists like yourself, who know the problems at hand, who have dealt with them, plus engineers like ourselves, with the expertise that we have in our respective fields? Can we, as a team, work together to solve the urban problems at hand?

ANSWER: I think the answer to your question is "Yes." Albert Einstein once said that the only thing incomprehensible about the universe was the fact that it was incomprehensible.

We have to some extent made ourselves believe that the social universe is incomprehensible, that we really don't know how to do it. I don't think that is true, at all. I think that it is possible for us to take into consideration as social scientists all of the human variables in terms of why people behave as they do. I think it is possible for us to put all of those variables, no matter how many they are, into some

kind of a logical systematic context and analyze it.

No one of us in his own mind has a capacity to do that, because the variables are so great and so different. This, I think, is where we need the technological expertise of those of you who are engineers, because we in the social scientific field just don't know how to do that.

I think I could point out to many engineers, upon the basis of 25 years of experience, how people are likely to react under a set of given circumstances, and I suspect that practical social scientists throughout the country could add to that list, and you would have one as long as this room. But putting them together, making sense of them, developing the relationships that exist between them, and arriving at some conclusions as to what would happen (if you do "A," what do you get, and on the other hand . . .?) is, I think, the real question. We need the practitioners, the theoreticians, and those who have the capacity to work with machines and to do programming.

I would like very much to see the problems we face in the cities reduced in the kind of manageable fashion that scientists reduced all those variables in getting those men to the moon. I think it is possible. I may be naive, but I don't know how else we ought to go about it.

QUESTION: I am engaged in building cities, and I would like to ask if engineers and sociologists are sufficient? Could I add bankers, lawyers, and builders? You might be able to add others, but it is a completely interdisciplinary approach that I think is required. Would you give us your viewpoint?

ANSWER: I would not disagree, except at one point. I think that one cannot expect a businessman to do much more than understand and to provide the resources that are available to him.

One of the problems, for example, we have discovered in the Coalition—which consists primarily of businessmen, labor leaders, ghetto people, religious leaders, and political leaders—is that if you tell a businessman to come and be a member of a continuing committee in housing to try to

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discover what problems there are in the community in the field of housing, and to assist in devising solutions to meet those problems, you will lose him if he has to do this over a rather protracted period of time.

If, on the other hand, a group of people who know something about housing would outline to that businessman what the issues really are and how best they might be solved if his influence and the resources that he would be able to bring to bear on that problem could be utilized, you have it, and he will do it, because he is interested in his community.

So you are quite right; there are roles for all people in society to play in dealing with the problems of the city, but I think we have to be pretty explicit as to what those roles really are.

QUESTION: Are we approaching even the definition of the problem, and are we defining it for this assembly in the right way?

You say we need all disciplines, and that is true, but speaking for the engineer-oriented, might it not be more beneficial to examine the extent to which the engineers are a part of the problem when we are talking in terms of the engineer mentality?

There has been enough documentation on the microscopic level as to how engineers in the system actually aid or, rather, add to the problem. Might we suggest that engineers ought to be educated, postgraduate or in the engineering schools, that there might be some validity in the social cost to a society? For example, if you move out 500 families to build a freeway, because that direction happens to be cheaper in terms of dollars, should you not also add the cost to the families and the cost to society for doing that to the families?

What I am asking is, should we narrow our concerns and not take in the whole urban problem? "How do engineers add to the problem?" might be something that we could handle. What do you think?

ANSWER: My basic reaction is that there is such a thing as an engineering decision and that there is such a thing as a political decision. I think what you are really talking about is a political decision that the engineer was never involved in.

A political decision was made, on which engineers act. Mayor Jonsson raised the question as to whether engineers were more important as human beings interacting in the city or as technicians. He said, "Both."

I think they do have to be both, and I don't think that they have, to a very large extent, been both in the past.

Now if what you mean is whether engineers, as citizens who have a concern for their community, now have a responsibility to involve themselves in the political decision-making process that creates the situation in which they as engineers move 25,000 people out of the way, I suspect you are right.

QUESTION: If you had a limited pie, and since you are in somewhat of an institution that tries to influence policy, what would be your foremost goal in trying to affect the urban environment? Secondly, if you could take only your top priority, what problem would you try to attack first?

ANSWER: I would probably try to attack that problem, or those problems, that had the greatest spin-off value to all the other problems in the community.

Let me explain what I mean. We are toying with the idea in the Urban Coalition to try to get cities to do several kinds of things. One is to take a comprehensive look at the city and try to deal with all the problems that they can identify as having contributed to the problem that exists there—that would be housing, jobs, education, economic development, crime and delinquency, the whole institution of justice, law enforcement—and see whether it is possible to deal with all of them on a comprehensive basis. That is what a Model Cities program attempts to do. I am not sure that that is always possible, that the resources are available to do it.

But I am not answering your question. I am telling you what we are thinking about.

It might be that you could say to a city and to a coalition, "Let's put every dime, and all of our intelligence, into the whole question of finding decent livable jobs for people," and just go all out on the problems of underemployment in this country, on the assumption that if individuals are able to provide effectively for themselves, they can then solve most of the other problems that exist.

Or you might say that that is not viable, that you ought to take three problems—housing, jobs, and economic development—all for three different kinds of reasons:

• Economic development, entrepreneurship, to give people an opportunity to be part of the decision-making process, a part of the economic system, which a person really isn't, just having a job, and that is a need.

• Jobs, which is important, in order to live.

• Housing, to create a different kind of environment. With those three things, we should focus in with all our resources and energy and effort, and all the problems will be solved.

I don't know that I can answer your question. I am only telling you what we have been thinking.

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WORKING WITH THE CITY GOVERNMENT—RAND'S EXPERIENCE IN NEW YORK

Peter L. Szanton

By now you have something about the contribution that engineers can make to urban life and about the problems involved in making that contribution effective. I would like to add some detail to that picture by reviewing with you the experience of The Rand Corporation in New York City. That experience may be of interest for several reasons: it is an attempt to apply analytic skills to real problems in a major city; it is unprecedented in scale, at least in the United States; it has taught us something about relating research to decision-making; it has produced a new kind of institution: "The New York City-Rand Institute." Some clear results are beginning to emerge.

Let me briefly sketch the background for you. Late in 1967 Mayor Lindsay and his Budget Director, Frederick O'Reilly Hayes, asked Rand whether it could provide analytic support to a number of city agencies. For some years Rand had been interested in domestic problems, and it had sponsored research on urban transportation, water supply, mental health, and other problems, but its attention had been directed primarily to national security affairs, and it had never worked with a municipal government. There followed a period of three or four months in which small groups of Rand researchers met with members of the Mayor's staff and with officials of various city agencies to see whether there was any match between the interests of the city in analytic work and the problems that we felt able to address. Agreements with four agencies emerged from those meetings; the agreements became contracts, and in January 1968 Rand established a New York office and set to work on problems of health, housing, fire protection, and police. Since that time we have also begun studies on water pollution, correctional institutions, welfare, and the New York labor market. The research now involves some 85 professional analysts—roughly 60 full-time equivalents. And we ourselves have been transformed from the New York office of a California corporation to a new entity: essentially a joint venture of the city government and Rand, a New York nonprofit corporation, governed by its own board of trustees.

The staff is drawn from a wide range of academic disciplines. Economists, mathematicians, operations researchers, and engineers predominate; they account, between them, for just over half our number. But they are joined by four political scientists, two biologists, four lawyers, five city planners, two psychiatrists, four sociologists, and a number of others, including a student of Chinese and the author of an unproduced musical comedy.

The work of this staff, now being conducted with nine city agencies, involves some 40 or 50 separate studies—studies that are extraordinarily varied in purpose, intensity, significance, and method. Some are quick operational analyses produced by one person over a two- or three-week period; for example, an analysis of the varying number of telephone operators required to handle the shifting pattern of calls for police service. Others, such as an analysis of the economic and demographic forces at work on the city's housing stock, have occupied four or five researchers for eighteen months. Some employ new technology, as did the experiments showing that the addition of long-chain polymers to the waterstream in a firehose could, without any change in pumping pressure, increase by more than half both the amount of water discharged and the distance the stream would travel on leaving the hose. Some analyses attempt to extend the boundaries of an analytic art, such as the work that produced a mathematical model able to specify in detail how, at various points in Jamaica Bay water quality is affected by polluting discharges of changing composition, timing, and location. Some merely establish basic information: the analytic catalog that describes in compatible terms the various housing programs at work in New York; or a count of how many patients seek mental health services within their own neighborhoods, and how many go elsewhere, and where. Some try to estimate the probable costs of future programs; others design new operating policies, such as a method of routinely augmenting the police patrol force during high-crime hours. In short, the studies vary widely, and the analytic procedures they employ are correspondingly diverse.

I will return to some of these studies—and to others—but my purpose in this paper is not principally to

talk about the substance of the research, or about its methods, but to describe the ways in which we have tried to link up our research with the decision-making processes of the city, and to suggest how our work has been accepted and used.

Let me turn to that subject by noting first that there have been strong forces working with us toward that end. Most important, we have had the steady support of the Mayor and the Budget Director. Without that, our work would probably never have begun; certainly it would not have been undertaken on the current scale or received with the same attention. Secondly, the city's administration was committed to changing the way governmental business is done. It had early recognized that the costs of governing the city were growing by some 15 percent each year, while the city's revenues were increasing by roughly 6 percent. It responded in two ways: by trying to secure greater financial assistance from the state and federal governments, and by determining to use the available funds with far greater effectiveness. Dominant in the second effort was the development of planning, programming, and budgeting systems for the city's operating agencies; also important were the expansion of analytic staffs within the government and the use of outside consultants. The city has turned not only to Rand, but also to McKinsey & Co., Systems Development Corporation, The Vera Institute, Meridian Engineering, and a number of other organizations. The point here is that an environment had been established in which analysis had to precede decisions, especially decisions to allocate funds. Planning, programming, and budgeting systems, as many of you well know, are management routines requiring departments to accompany their annual budget requests with papers that specify departmental objectives, identify alternative programs for meeting those objectives, analyze the relative costs and benefits of those programs, and make clear what they expect their recommended programs to accomplish and at what costs. We have assisted the agencies in all phases of this work, and in the recruiting and training of their analytic and management staffs as well. In this way we have been able not only to perform studies of particular problems, but to help strengthen the *process* by which the agencies routinely make decisions.

Third, the city itself is paying for most of our work—at an annual level of roughly $2.5 million, to which Rand is adding about $150,000 annually, and foundation support another $300,000. The financial stake involved has had the effect of quite powerfully concentrating the attention of both producer and consumer on the quality, relevance, and utility of the research.

And finally, New York is a city whose bureaucracies, for all their problems, nonetheless contain many men of

ability and dedication. The generations of civil servants who entered city service in the Depression and just after World War II seem to have been especially able.

We began, however, with some disadvantages as well. For one thing, there were few analysts at Rand in 1967 who were deeply familiar with many urban problems, or who were knowledgeable about New York City. Our relative ignorance was matched, moreover, by a considerable scepticism in the city government concerning research consultants. The experience of some administrators was that researchers tended either to inform them of what they already knew, or to produce in fat volumes full of Greek letters and Latin words findings that might not be familiar but in any event could not be understood. They were familiar with research whose principal result was public criticism of an agency's performance. And above all, they had observed that consultants liked to address problems in their pure and uncontaminated form, thereby ensuring conclusions that no city government had the money, the managerial talent, or the political power to put into effect. And consultants of whatever variety, having delivered their conclusions, typically went away.

In addition to that scepticism, we also faced, at least, a wary attitude from some of the municipal employee unions. They regarded us as efficiency experts who might seek either to impose tighter management or to substitute capital for labor.

Finally, we faced mixed feelings even among some of our natural allies. These were the officials of scientific and analytic backgrounds who were already charged with research tasks in the agencies. They saw us as fellow analysts to be sure, but some also feared—reasonably enough—that we would become rivals for the time and attention of decision-makers and for the limited analytic budgets then available.

It may be worth noting that, apart from these patterns of support and opposition, we found ourselves dealing with municipal functions with very different intellectual histories. The water resources field, for example, had a well-developed analytic tradition and the department was technically sophisticated. The fire-fighting function, on the other hand, had been virtually ignored by analysts for the last century, and the fire department therefore had no experience with formal analysis of major questions. Police work had behind it a literature on the sociology of crime, and had benefited greatly by the work in 1966 and 1967 of the President's Commission on Law Enforcement and the Administration of Justice. Nonetheless, many important problems remained unanalyzed, including the basic efficiency question of whether and to what extent increases in police manpower, or alternative methods of deploying it, deterred or apprehended criminals.

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What we found, therefore, in the agencies we began to work with were sharply varying degrees of technical competence, of familiarity with research, and indeed, of commonly accepted intellectual premises. But it was not true that tolerance for outside analysts varied with the strength of a prior analytic tradition. Indeed, it is tempting to conclude that the relationship was inverse; the fire department, in any event, is clearly one of the agencies that has most fully participated in the analyses we began, and has used them most effectively.

Let me try to comment now on the way in which we attempted to adapt to this environment, and to adapt in such a way as not only to be able to do research, but to enlarge the chances of it being useful. The first point to make is that we began by addressing ourselves primarily to problems that then concerned responsible officials. We did do some lobbying for studies that seemed significant only to us, and we undertook some. The city has since come to regard several of them as important. But most of our first year was devoted to problems of more or less immediate interest to agency heads or to the Mayor's office. We did not, then, meditate about ultimate solutions to fundamental problems. Nor did we attempt to outline a systematic view of the city. We accepted the risk of suboptimization in return for the chance of immediate utility. It would have been hard to do otherwise, for two reasons. The first, of course, was that the agencies were our clients, paying for the research and expecting something usable from it. In addition, we were not then competent to do otherwise.

Next comes what was probably our major lesson of the first year. We learned to involve city people deeply in the work. We found it necessary to do more than to get data from staffs and present briefings to their chiefs. Wherever possible we now attempt to have agency people themselves participate fully in the work—checking our assumptions, challenging our hypotheses, proposing alternative lines of inquiry, noting barriers to implementation. It has not always been possible to find city officials or staff members willing to involve themselves so deeply. But where this kind of joint effort has evolved, it yields benefits hard to overstate. It improves the quality and realism of the research; it creates small groups of city officials with stakes of their own in the success and utility of the studies, and it helps to stimulate in the internal processes of the agencies a more analytic approach to other issues as well.

Thirdly, we have looked at some of the organizational changes that new policies might require, and have helped to bring them about. The Housing and Development Administration, for example, has available a number of quite distinct policy measures that it can apply to badly deteriorated buildings: code enforcement, rent reduction, receivership, tax abatement, loans for rehabilitation, and so forth. But a deteriorated building typically comes to the attention of the city in only one connection at a time: tenants' complaints of lack of heat in the winter, for example. Investigation then discloses a violation of the housing code, and the process of code enforcement automatically follows. But a straightforward enforcement of the housing code may have exactly the reverse of the effect intended. If the economics of the building make major repairs a losing investment, an attempt to simply enforce the law is likely to induce the landlord to walk directly away from the building. More than 7,000 buildings in New York are now abandoned, and after abandonment they are very quickly vandalized and burned out. It seemed clear to us, therefore—as it did to many in the agency—that when such a building came to the attention of the city, it ought to be treated first as a problem of evaluation. Someone should decide, in each particular case, whether the city ought to impose sanctions, or offer assistance, and under which programs, and to what extent. This necessity suggested the creation of an evaluation unit whose purpose was to provide this kind of building diagnosis, and only then to refer the building to the appropriate office for action. Such a unit required much better information than was readily available, and we therefore helped design and test the necessary information system.

Here we were able to go farther. The problem of deciding which city program should apply is not simple. The economic effects of alternative programs and combinations of programs can be estimated in advance, but only at enormous effort if the calculations are made by hand. What we went on to do, therefore, was to build a computer model. The model estimates the future financial characteristics of any given building after the application of each of some alternative forms of city action—calculating probable rent levels, cash flows, loan pay-back periods, discounted present value, and so forth. It then automatically rejects those programs whose effects fail to meet prespecified criteria and prints out, in a form readily usable by the evaluation staff, a document summarizing the effects of the various feasible programs. The model is just now going into use, operating by means of a remote terminal from the offices of the new evaluation unit.

A similar effort was undertaken for the police department. When 3,000 additional patrolmen were provided to the force, we were asked to suggest how they should be deployed. Together with the department's planning staff, we identified eleven neighborhood characteristics that seemed important to the question of police deployment: total population, crime rate, number of street miles, arrest-rate, number of calls for police services, and so forth. We then developed a simple computer model that allows

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anyone using it to assign to each of those characteristics any relative weighting he considers appropriate. Given weightings, the computer automatically types out a detailed set of deployment figures, by precinct, for the 3,000 men. At the same time it calculates some predicted indicators of police performance under such a deployment, for example, mean time for a car to respond to a call, and workload per patrolman. A number of police officials have sat at the computer, supplied their own weighting schemes, and examined the results.

These are interesting examples, I think, of decision-makers working quite directly with computers. They also suggest our interest in providing analytic methods that city officials can readily use on their own.

Next, as I've already suggested, we have tried to help make the city government a more effective consumer of research. We have argued that the small analytic staffs within the city agencies had to be expanded, and we have assisted in that expansion through recruitment and training. In some cases their growth has been dramatic. In the Housing and Development Administration, a central research group that numbered 6 or 7 two years ago now has a staff of 45 or 50. But more important than size is influence. Analytic staffs have come to occupy a much more powerful role in the making of decisions within their agencies. That has resulted largely from the insistence by the Mayor's office that major programs and especially new programs be thought through before they are funded. But it has also followed from the growing capability of the analytic staffs themselves and from their ability to make effective use of consultants.

Finally, we ourselves have undergone a major change. The longer our work went on, the clearer it became that its full value would accrue only if it were sustained over an extended period of time. A permanent institution, devoted solely to the analysis of urban problems and oriented specifically to New York, seemed a useful instrument both for symbolizing our commitment to serious, sustained, and relevant research, and for undertaking the responsibility for carrying it out. The Ford Foundation most generously agreed to commit $900,000 to such an institution over the first three years of its life, and last Spring New York and Rand jointly established the New York City-Rand Institute. It is a New York nonprofit corporation intended, in the language of its Certificate of Incorporation, "To conduct programs of scientific research and study, and to provide reports and recommendations relevant to the operations, planning or administration of the City of New York." It is the first attempt by a major city government and a research institution to establish a center for the continuing applica-

tion of science and of analytic techniques to problems of urban life and local government. The creation of the Institute seems to me one of the most hopeful and significant outcomes of our activities so far.

Perhaps I have emphasized too much what we have accomplished. Obviously, it is only a beginning. We have yet to attempt any work on many major problems: transportation, education, air pollution, and waste disposal. We will want to explore such areas because they are important in their own right and because, of course, they interact with many of the problems we are already addressing. Nearer at hand, we want to press inquiries into relationships between the various subjects we are working on. Narcotics addiction, for example, obviously affects and is affected by law enforcement, health care, unemployment, housing deterioration, and the rising incidence of fires. Moreover, we will continue work already begun on the interactions between housing and welfare policies, and unemployment rates.

We will also want to attempt analyses that cut across our other topics: to look freshly at which services a city should itself provide and which should simply be purchased; and at the utility of publishing statistical indicators of the quality of life in the city.

We will also want to develop much closer ties to the local universities where—especially among graduate students and the young faculty—considerable analytic skill is eager to work more directly on problems of social importance. Perhaps the Institute can serve as one bridge between government and academia, to the advantage of both.

And finally, we must address a problem raised by John Buggs. Our presence in New York reflects a deep-rooted and pervasive tendency: a tendency for cities, like all large organizations, to base their planning increasingly on technical studies, detailed analyses, expert advice. Given the complexity of the problems that cities face, and the size and importance of the investments involved, this development is inevitable and proper. But it is on a collision course with another tendency, equally deep-rooted and equally legitimate: the growing unwillingness of nongovernmental groups—neighborhood and ethnic groups particularly—to accept decisions that affect their lives but that they have no part in making. That collision cannot be avoided, but the conflicts it produces can be cast in much more manageable and indeed, perhaps, creative terms if groups other than government agencies have access to technical advice and analytic procedures. Over time, one of the important tasks of the Institute will be to explore the possibilities of building that bridge as well.

So there is much yet that remains to be done, but we may have made a useful beginning.

DISCUSSION

QUESTION: Are the results of your research available to the public at large, or is it required to be available?

ANSWER: It is required to be available, if I understood you correctly, but much of it is not unavailable. The unavailability comes in several forms.

The most ominous form is probably in fact the least important. Under our contracts with the city, anything we wish to publish must be approved and cleared for publication. In actual fact, I don't think that is going to be an enormous bar to the dissemination of our work.

What turns out to be a much more operational disincentive is simply our style of operation. Although an enormous number of internal working papers are produced, and the number must be well over 500 by now, these were not designed and were never thought of by the authors as publishable papers. Publishable papers are very slow in being developed, simply because the organization is not oriented toward the production of a finished paper but toward a kind of interaction with the governmental body that produces decisions.

I think at this moment there are only five published documents that have also been cleared and are generally available. There are going to be many, many more than that. A lot of these are coming out of the pipeline, having entered it a year and a half ago.

QUESTION: Is the participation of the local groups just a matter of a feeling of participation, or is it a way that they have of assuring themselves that you are accomplishing the objectives that they would be interested in having you accomplish, as opposed to those that might be identified by some agency head?

ANSWER: I didn't mean to convey that we are working with local groups. In fact, we are not. What I did intend to say solely was that our organization and all others like it are going to have to come to grips, as governments are coming to grips, with the problems of creating an informed and analytically equipped set of nongovernmental interest groups.

QUESTION: Would you be willing to describe the evaluation process that is involved? Presumably, some people look at predictions and look at what has happened after you have made your analyses. Is there a city group? What is the process that is involved?

ANSWER: There is no formal city group that is explicitly charged with the evaluation of what we are doing.

There are two kinds of evaluation, but by far the most important is the evaluation made by the clients. One of the characteristics in trying to work in this way is that when you make recommendations, they have a higher than normal probability of getting tested. One has a chance not only to talk about the suitability of the research methodology used, as against alternative methods, but one can actually talk about whether the recommendation works. There is something as to which agency heads themselves, the people signing the contracts with us, have some feelings. But they are in a moderately good position, better than they are with respect to most researchers, to evaluate the utility of the work.

Secondly, two organizations that report directly to the Mayor—the Science and Technology Council and the Operations Research Council, both of them composed of distinguished men with analytic backgrounds—have once in awhile cast an eye at us, and the Operations Research Council has made an effort, looking in the beginning at our design, and sitting in on our formal briefings.

QUESTION: There are a few students here who, I am sure, are concerned about urban problems and want to deal with them. I am sure that their concern is manifested in their curricula. What would you recommend as a good preparation as to going into what is now becoming to be known more and more as "urban engineering"? How should the undergraduate, from your viewpoint, prepare to deal with the problems?

Secondly, in many circles, it is being discussed that maybe a project like NASA, in which people from various disciplines, that is, applied sciences, are brought together to deal with one problem, one goal. Do you think that a task force like NASA could be developed to deal with urban problems, that would provide this technical knowledge to urban centers or that may do some type of work in urban centers?

ANSWER: My answer to the first question comes in several parts. I think it is hopeless to think that any of us can individually come to grips with each of the relevant analytic methods. We are going to have to accept the fact that all of us, while we may have a smattering of various disciplines, are primarily economists, sociologists, or whatever, which begins to suggest an answer to your second question.

But let me go on a little bit with the first. It is a question I happen to think a good deal about, because my own background is entirely nonquantitative. I am a lawyer, and beyond that, a historian, two almost useless disciplines. I know what I would do if I went back to school. I would do work in economics and statistics, and it seems to me that the perspectives of economics and the discipline of statistics provide between them, I think, a more powerful single perspective on a variety of problems than any other that I know. But I am sure you could get a range of

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opinions on that.

As to the second question, it seems to me that the enterprise I have described is like NASA in one respect. That is to say, it does involve a pooling of a wide variety of disciplines around a common set of tasks. I think that is very useful, and I think there are ways of systematically pooling talents, only just a beginning to be explored.

Such an effort ought to be unlike NASA in that it is not dedicated and cannot be dedicated to a clearly defined straightforward goal set well into the future. Getting to the moon is difficult, but at least you can be sure that this is what you want to do. You can be sure for ten years at a time, anyway.

We are at a stage in our thinking about the cities where it is a good deal less clear what our priorities will be ten years from now. To gear up one huge overriding effort tied to one goal, such as housing or providing a minimum of fourteen years of education to everyone in the country, is to risk a massive "missing of the point," as we will discover later, after a decade of lost time.

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SYSTEMS ANALYSIS AS A TOOL FOR URBAN PLANNING

Jay W. Forrester

New ways are becoming available for analyzing our social systems. These permit the design of revised policies to improve the behavior of the systems within which we live. Many of the ideas discussed here are treated more fully in my book *Urban Dynamics*,* which shows the city as an interacting system of industry, housing, and people. The book presents a theory, in the form of a computer model, that interrelates the components of a city. It shows how the interacting processes produce urban growth and cause growth to give way to stagnation. Various changes in policies are examined within the laboratory model to show their effect on an urban area. A number of presently popular proposals are tested—a job training program, job creation by bussing to suburban industries or by the government as employer of last resort, financial subsidies to the city, and low-cost-housing programs. These all are shown to lie between neutral and detrimental in their effect on a depressed urban area. The evolution of an urban area from growth into stagnation creates a condition of excess housing. Housing is excess compared to the population and compared to the availability of income earning opportunities. To reestablish a healthy economic balance and a continuous process of internal renewal, it appears necessary to reduce the inherent excess housing of depressed areas and to encourage the conversion of part of the land to industrial use. By so doing, a large enough wage and salary stream can be brought from the outside economy to make the area self-sustaining.

As you can see, these results are controversial. If they are right, it shows that most of the traditional steps taken to alleviate the conditions of our cities may actually be making matters worse. The book first appeared this last May; it is already in the second printing. Although it has so far received little public notice in this country, it has become the center of a political tempest in Canada. North of the border, newspaper headlines, editorials, and radio and television panel discussions are debating its merits.

Urban Dynamics is based on methods for studying complex systems that form a bridge between engineering and the social sciences. Although I will present here some results from the book, my principal emphasis will be on the importance of the methods to all social systems.

Over a decade ago at MIT we began to examine the dynamic characteristics of managerial systems. The field known as "industrial dynamics" resulted.* Industrial dynamics belongs to the same general subject area as feedback systems, servomechanisms theory, and cybernetics. Industrial dynamics is the study of how the feedback loop structure of a system produces the dynamic behavior of that system. In managerial terms industrial dynamics makes possible the structuring of the components and policies of a system to show how the resulting dynamic behavior is produced. In terms of social systems it deals with the forces that arise within a system to cause changes through time.

A design study of a social system seeks changes in structure and policies that will improve the behavior of the system. Some people recoil at the thought of designing social systems. They feel that designing a society is immoral. But we have no choice about living in a system that has been designed. The laws, tax policies, and traditions of a society constitute the design of a social system. Our available choice is only between different designs. If we lament the functioning of our cities, or the persistence of inflation, or the changes in our environment, we mean that we prefer a social system of a different design.

In the design process, the behavior modes of a system are first observed to identify the symptoms of trouble. Second, the system is searched for the feedback structures that might produce the observed behavior. Third, the level and rate variables making up that structure are identified and explicitly described in the equations of a computer simulation model. Fourth, the computer model is then used to simulate in the laboratory the dynamic behavior implicit in the identified structure. Fifth, the structure is modified

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*Jay W. Forrester, *Urban Dynamics*, The M.I.T. Press, Cambridge, Massachusetts, 1969.

*Jay W. Forrester, *Industrial Dynamics*, The M.I.T. Press, Cambridge, Massachusetts, 1961.
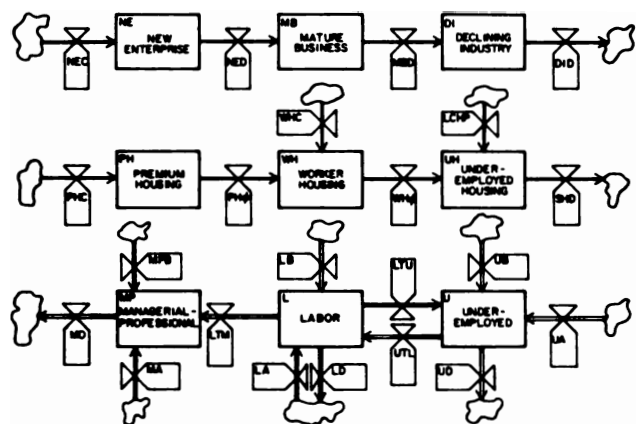
Figure 1. Urban structure.

Figure 2. Information links to the underemployed-arrival rate.

until components of the structure and the resulting behavior agree with the observed conditions in the actual system. Sixth, modified policies can then be introduced into the simulation model in search of usable and acceptable policies that give improved behavior.

This design process brings the essential substance of a social system into the laboratory where the system can be studied. Laboratory representation of a social system can be far more effective than most people would expect. Anything that can be stated or described about a social system can be represented in such a laboratory model. The major difficulty is the rarity of skilled professional talent. There are very few men with a knowledge of the proper guiding principles and with experience in perceiving the pertinent feedback structure of complex, poorly defined systems. Whatever one may say about the shortcomings of the process, there is no comparably effective substitute.

Surprising discoveries come from this combination of theory and laboratory experimentation. We observe that relatively simple structures produce much of the complex behavior of real-life systems. We find that people's skills in perception are very different from those commonly supposed. It is often asserted in the social sciences that people are unreliable in analyzing their own actions, yet we find time and again that the policies and practices that people know they are following are the ones that interact to produce the most troublesome consequences. Conversely it can be clearly demonstrated that the vaunted powers of judgment and intuition usually deceive the person who tries to guess the time-varying consequences that follow even from a completely known system structure. We find that the modes of behavior that are most conspicuous in managerial, urban, and economic systems are produced by nonlinearities within those systems. The linearized models that have been used in much of engineering and the social sciences cannot even approximate the important modes of
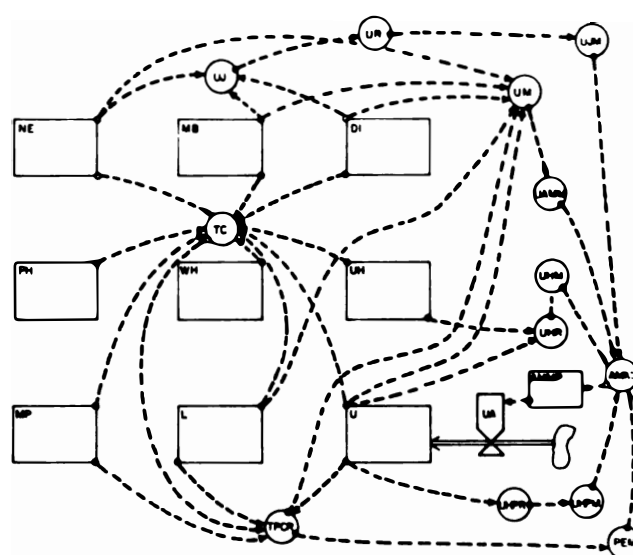
behavior in our social systems. The most visible and troublesome modes are manifestations of nonlinear interactions. We find it relatively straightforward to include the so-called intangible factors relating to psychological variables, attitudes, and human reactions. Again, if the influences can be discussed and described, they can be inserted in the policy structure of a model. Any person who discusses why people act the way they do, or explains a past decision, or anticipates a future action is relating the surrounding circumstances to the corresponding human response. Any such discussion is a description of decision-making policy. Any such policy statement can be put into a system model.

A body of dynamic theory and principles of structure is emerging that allows us to organize and understand complex systems.* For example, the feedback loop becomes the basic building block of systems. Within the feedback loop there are two and only two kinds of variables. One is the level variable produced by integration, the other is the policy statement or rate variable that governs the changes in a system. The level variables are changed only by the rates of flow. The rate variables depend only on the levels. Any path through a system network encounters alternating level and rate variables. These and many other principles of structure are universal in the entire sweep of systems that change through time. Furthermore, the structure of a system determines its

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*Jay W. Forrester, *Principles of Systems* (preliminary printing of first ten chapters), Wright-Allen Press, Inc., Room 516, 238 Main Street, Cambridge, Massachusetts 02142.

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possible modes of behavior. Identical structures recur as one moves between apparently dissimilar fields. These identical structures behave in identical ways wherever they are found.

The same principles of structure and the same relationships between structure and behavior apply to a simple swinging pendulum, a chemical plant, the processes of management, internal medicine, economics, power politics, and psychiatry. A universal approach to time-varying systems is emerging that seems capable of dealing with systems of any complexity. We observe that students, as they master the principles and practice of dynamic analysis, develop a remarkable mobility between fields of endeavor. The same person can clarify the dynamics of how a transistor functions, organize the processes of a public health epidemic, design new management policies to avoid stagnation in product growth, discover the sensitive factors in ecological change, and show how government policies affect the growth and decline of a city.

Some diagrams showing urban behavior will illustrate these ideas. Figure 1 shows the central structure of an urban area. The nine rectangles represent the selected level variables. The 22 valve symbols represent the rates of flow that cause the nine system levels to change. Engineers often refer to these level variables as the state variables of a system. The distinction between level and rate variables is also familiar to anyone who examines financial statements. Balance sheet variables are always separated from variables on the profit-and-loss statement. They are separate because they are conceptually quite different. The balance sheet variables are system levels. They are created by accumulating financial flows. The profit-and-loss variables are system rates. This sharp distinction is found in all systems.

In the simplified urban system of Figure 1, nine levels are grouped into three subsystems. Across the top the industrial sector contains commercial buildings in three categories distinguished primarily by age. Across the center are residential buildings in three categories, also distinguished by age and condition. Across the bottom are three economic categories of population. Because of their complexity, the information linkages connecting the system levels to the system rates are not shown on this figure. In this figure one can begin to detect the reasons for urban decline. The age of a building tends to determine the character of its occupants. A new commercial building is occupied by a healthy, successful commercial organization that uses relatively more managers and skilled workers than those who are unskilled. As the building ages, it tends to house a progressively less successful enterprise with lower employment skills. In addition to the changing employment mix as the industrial building ages, there is a tendency for total employment per unit of floor space to decline. On the other hand, as residential buildings age there is a tendency for occupancy to increase as well as to shift to a lower economic category of population. One perceives then a condition where the aging of buildings in an urban area simultaneously reduces the opportunities for employment and increases the population. The average income and standard of living decline.

Figure 2 shows the same nine system levels and one of the 22 flow rates. The dotted lines are the information linkages from the system levels to control the one flow rate, here the arrival of underemployed population into the urban area. The various levels of the system combine to create a composite "attractiveness" that determines the inflow rate to the area. If the area is more attractive than those from which people might come, a net inward population flow occurs. If the area is less attractive, an outward flow dominates. Five components of attractiveness are shown in Figure 2. In the upper right corner, UJM is the underemployed to job multiplier that relates the population to the available jobs and represents the income-earning attractiveness of the area. The circle UAMM generates the attractiveness created by upward economic mobility. In other words, an area with high upward economic mobility is more attractive than one offering no hope of advancement. The circle UHM relates the underemployed population to the available housing. The area becomes more attractive as housing becomes more available. UHPM represents the attractiveness of a low-cost-housing program if such exists. And in the lower right corner PEM is the influence on attractiveness of the public expenditure per capita. As per capita expenditure rises, it means better public services, better schools, and higher welfare budgets.

The concept of attractiveness is fundamental to the population flows. All of the characteristics of an area that make it attractive, these five and many more, combine to influence migration. An attractive area draws people. But almost every component of attractiveness is driven down by an increase in population. If there is an excess of housing, the area is attractive, but a rising population crowds the housing. If there is an excess of jobs, the area is attractive, but the incoming flow of people fills those jobs. In other words, migration continues until the attractiveness of the area falls and becomes equal to all other places from which people might come.

An important idea follows from examining these components of attractiveness. In a condition of population equilibrium, all areas must be equally attractive to any given population class, otherwise net migration would occur. If one component of attractiveness is increased in an area, other components must necessarily fall to establish a new equilibrium. Compensating changes in the components of attractiveness explain many past failures in our cities
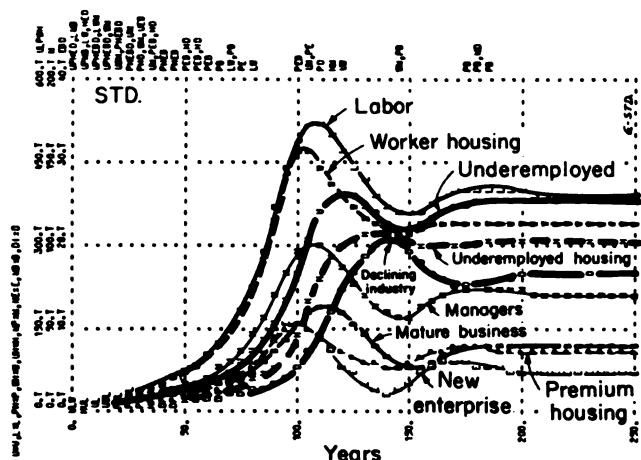
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Figure 3. Growth and stagnation.

Figure 4. Compensating changes in housing and employment.

wherein we attempt to improve one aspect of the city only to discover that other aspects have become worse.

In making a laboratory model of a social system one should not attempt straightaway to solve a problem. Instead one should generate a model that will create the trouble symptoms. Only if one fully understands the processes whereby difficulties are created can he hope to correct the causes. This means that we want a model of an urban area that can start with empty land, grow a city, and show the processes whereby economic health falters into stagnation and decay.

As another guide to modeling, one should not start by building a model of a particular situation, but instead should model the general class of systems under study. This may seem surprising, but the general model is simpler and initially is more informative than a model of a special case. Here we wish to model the general process of urban growth and stagnation. It should be a model that, with proper changes in parameters, is good for New York, Calcutta, a gold rush camp, or West Berlin. These all seem to have very different characteristics, but they have certain elements in common that describe their urban processes. There are fewer concepts that are common to all than are to be found in any one. The general model can strip away the multitude of detail that confuses any one special situation. The general model identifies the central processes and is a statement of the theory for the entire class of systems.

Figure 3 shows the behavior of the laboratory model of an urban area. It presents the nine system level variables over 250 years. The first 100 years is a period of exponential growth but then the land area becomes filled, growth ceases, and the aging process begins. At year 100 near the end of the growth phase, the labor population is almost double the underemployed population. This is a
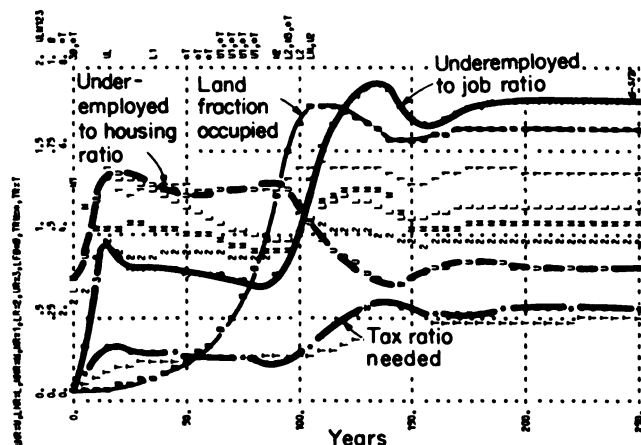
healthy mix that is well matched to the job distribution in the area and that gives a high upward economic mobility to the underemployed population. But by year 150, the labor population has fallen and the underemployed population has risen until these two groups are almost equal. Business activity has declined and the area has taken on the characteristics of a depressed city. This has occurred because of the way that the industry, housing, and populations in Figure 1 have interacted with each other.

Figure 4 shows other variables during the same 250 years. Notice especially the underemployed to job ratio and the underemployed to housing ratio. During most of the first 100 years of growth these two ratios were almost constant. The underemployed to housing ratio was high (above the center of the figure) meaning that the population is large compared to the housing. In other words, during the first 100 years there was a housing shortage for the underemployed population. On the other hand, the underemployed to job ratio was low, meaning that the population was below the job opportunities, jobs were readily available, economic opportunity was good, and upward economic mobility was high. During this early period of growth and high economic activity, the underemployed population was being effectively adjusted in relation to other activity by balancing good economic opportunity against a housing shortage.

But between 90 and 140 years, notice the sharp reversal of the curves for underemployed to job ratio and underemployed to housing ratio. Within this 50-year span, the underemployed have increased while available jobs decreased; the result is a precipitous rise in unemployment. But in this same period, the housing that is aging and becoming available to the underemployed is rising even
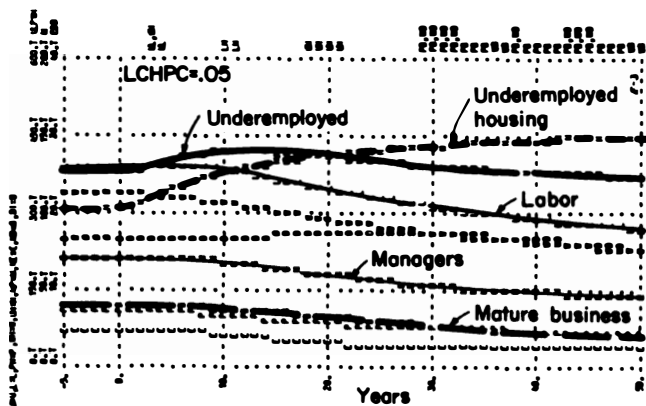
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Figure 5. Decline of urban area caused by low-cost-housing construction each year for 2.5 percent of the underemployed.

Figure 6. Rising unemployment and falling occupancy of housing.

more rapidly than the underemployed population. Jobs have become scarce while housing has become surplus. The model is behaving the way our cities do.

Many people seem not to realize that the depressed areas of our cities are areas of excess housing. The economy of the area is not able to maintain all of the available housing. Because of low incomes, people crowd into some dwelling units while other buildings are abandoned, stand idle, and decay.

Recall the earlier comments about compensating movements in the components of attractiveness. Here, as housing becomes more available, jobs become more scarce. The stagnating urban area has become a social trap. Excess housing beckons people and causes inward migration until the rising population drives down the standard of living far enough to stop the population inflow. Anything that tends to raise the standard of living is defeated by a rise of population into the empty housing.

Figure 5 shows 50 years beginning with the conditions found at the end of Figure 3. At time 0, a low-cost-housing program is introduced that each year builds low-cost housing for 2.5 percent of the underemployed population. Observe what happens. Underemployed housing, which is being actively constructed, rises 45 percent, but premium housing falls 35 percent, and worker housing falls 30 percent. New enterprise declines 50 percent and mature business declines 45 percent, all in the 50-year period. Economic conditions become sufficiently worse that even the underemployed population, although it rises initially, eventually falls to slightly less than its beginning value. These changes are a result of the low-cost-housing program.

In Figure 6, the corresponding underemployed to job ratio has risen 30 percent indicating substantially higher unemployment while the underemployed to housing ratio
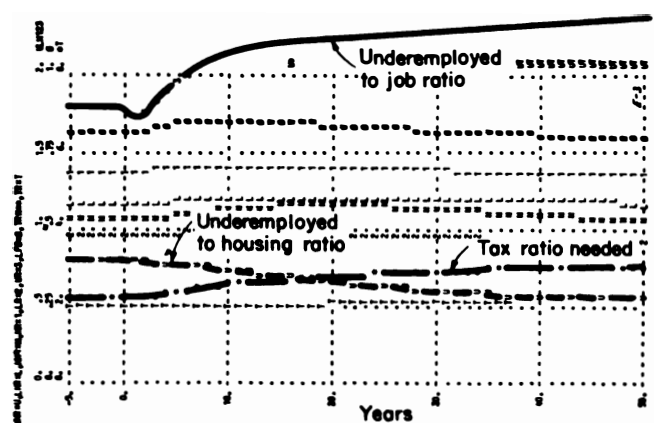
has fallen 30 percent indicating a still higher excess of housing. Again, the two components of attractiveness compensate for one another with better housing and a falling standard of living. In the long run, the low-cost-housing program has not served the interests of the low-income residents. Instead, it has intensified the social trapping characteristic of the area. Over the period, the tax levies rise 35 percent. The area has become worse from almost all viewpoints.

In this same manner job training programs, job creation programs, and financial subsidies were examined. All lie between ineffective and harmful. The low-cost-housing program was the most powerful in depressing the condition of a stagnant urban area.

The depressed areas of our cities seem to be characterized by excess housing compared to jobs and by excessive concentration of low-income population. These conditions, created by aging industrial and residential buildings, interact to drive out the upper-income population and business activity, and to reduce the tax base. Once the decline starts, it tends to accelerate. Unless one can devise urban management policies that produce continuous renewal, difficulties are inherent.

Figure 7 shows an urban condition that begins with stagnation and then changes toward revival. Here 5 percent of the slum housing is removed each year and the incentives for new enterprise construction are increased somewhat. The result is a cascading of mutual interactions that raise the economic activity of the area, increase upward economic mobility for the underemployed population, and shift the population internally from the underemployed to the labor class. This is done without driving the existing low-income population out of the area. Underemployed housing is reduced. Initially this reduction comes largely
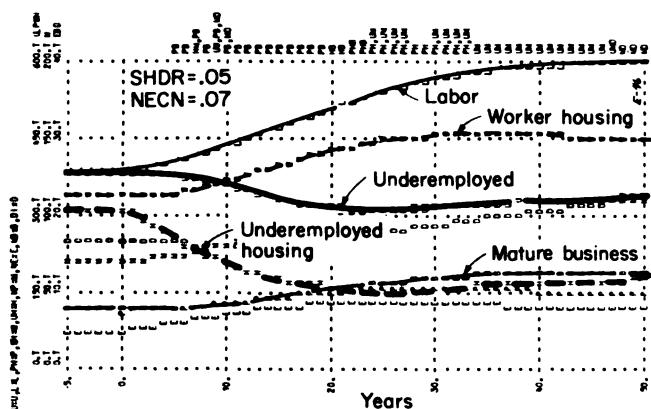
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Figure 7. Revival caused by removing 5 percent of underemployed housing each year and encouraging business construction to generate jobs.

Figure 8. Falling unemployment and rise in housing occupancy.

from the empty housing. The resulting housing shortage restrains the population inflow that would otherwise defeat the revival of the area.

Figure 8 shows the same 50-year span as in the preceding figure. Here again, employment and housing move in opposite directions. The underemployed to job ratio falls, which means more jobs and lower unemployment. On the other hand, the underemployed to housing ratio rises, which means a tighter housing situation. If the economic circumstances are to be improved, we must accept some compensating change in other components of attractiveness. Here it is the increased tightness of housing that allows job opportunities to increase faster than population until a good economic balance is reached. I stress economic revival as the first stage of rebuilding a depressed area because it appears that an economic base must precede social and cultural development.

It is simply not possible to increase all of the attractiveness components of an area simultaneously. Attractiveness is here defined in a very broad sense. For example, legal restrictions like an immigration barrier into a country can produce enough "unattractiveness" to inward migration so that other components might be maintained at a high level. But wherever one component of attractiveness is high, others will be found low.

Engineers, especially, should consider the compensating changes that will occur in the attractiveness components of an area because engineers tend to deal with economic considerations and technology. Economic and technical factors are more concrete than the intangible "quality of life" variables. The economic and technical aspects of a city are the ones we most easily see how to improve. Our technological society tends, therefore, to observe, react to, and improve the economic and technical
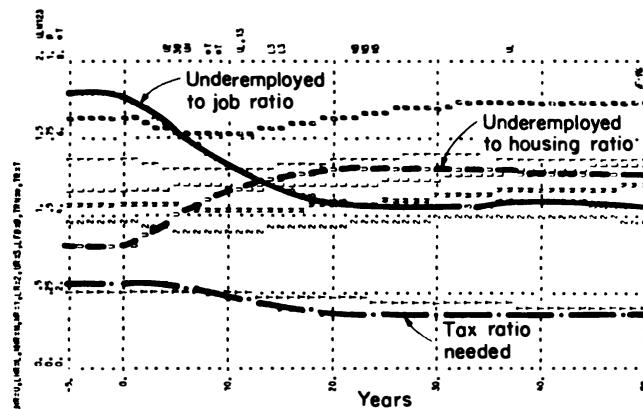
aspects of a city. Such improvements increase the technical and economic components of urban attractiveness. But as a result, population density rises until the urban area once again reaches attractiveness equilibrium with its environment. The burden of forced reduction in other components of attractiveness falls on the quality of life variables—crowding, pollution, and psychological stress. These less tangible variables have been weak, hard to measure, and defenseless against the persuasiveness and the certainty of improvement shown by the technical and economic considerations. But we are entering a time when a reversal will occur between the formerly weak and strong variables. For a substantial fraction of our population, the standard of living is already high enough so that more gain in the economic and technical areas will come at too high a price in the quality-of-life components of our environment. The engineer, if he continues to serve society, must balance a greater number of social needs against one another. At one time his task was simply to balance financial cost against economic performance of his technology. Now the product and also the medium of payment are both expanding. Social value and quality of life become part of the product. Psychological stress, ugliness, and crowding become part of the cost. Engineers who fail to recognize this broadened role will be vilified and castigated by a society that perceives them as narrow and insensitive to the demands of the times.

When a system misbehaves, we should ask ourselves what policies within that system cause the undesirable characteristics. If we examine the laws under which a city operates, we see a structure of regulations that could hardly be better designed to create stagnation and decline. The aging and decay of buildings is central to the urban decline process, yet we see throughout our tax laws and regulations numerous incentives to keep old buildings in place. As the

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value of a building decreases, so do the assessed taxes. The reduced expense makes it possible to retain the old building longer. For income tax purposes under some circumstances, the value of a building can be depreciated several times. This produces incentives to keep an old building in place. Here is not the place for detail, but it seems clear that a different set of tax laws and city regulations could be devised to produce the individual incentives necessary for continuous renewal. As an example, I recently saw a suggestion that each building have a mandatory trust fund into which the owner must pay a levy each year. At any time, whoever owns the building can draw out the money in the trust fund if he demolishes the building and clears the land. This, you see, would create an earlier incentive for replacement. Property tax levies and income tax accounting could both be changed to produce pressures in the same direction.

Our studies of managerial, urban, and other social systems have uncovered many general characteristics of complex systems to which we must be alert if we are to avoid continuing to create detrimental modes of behavior.

First, complex systems are counterintuitive. They behave in ways that are opposite to what most people expect. They are counterintuitive because our experience and intuition have been developed almost entirely from contact with simple systems. But in many ways, simple systems behave exactly the opposite from complex systems. Therefore, our experience misleads us into drawing the wrong conclusions about complex social systems.

Second, complex systems are strongly resistant to most policy changes. A new policy tends to warp the system so that slightly changed levels present new information to the policy points in the system. The new information, as processed through the new policies, tends to give the old results. There are inherent reasons within complex systems why so many of our attempts at correcting a city, a company, or an economy are destined to fail.

But, third, the converse is also true. There are points in systems from which favorable influence will radiate. Often these points are difficult to perceive. Often the action required is the opposite to that which might be expected. But when these points are found, they tend to radiate new information streams in such a way that the new circumstances, when processed through the old attitudes and policies, produce a new result.

Fourth, complex systems tend to counteract most active programs aimed at alleviating symptoms. For example, Chapter 4 in *Urban Dynamics* shows how a job training program can increase the number of under-employed in a city. When outside action tries to alter the condition of a system, the system relaxes its own internal processes aimed at the same result and throws the burden ever more onto the outside force that is attempting to produce a correction. The internal need for action is reduced and the external supplier of action must work ever harder.

Fifth, in complex systems the short-term response to a policy change is apt to be in the opposite direction from the long-term effect. This is especially treacherous. A policy change that improves matters in the short run lays a foundation for degradation in the long run. The short tenure of men in political office favors decisions that produce results quickly. These are often the very actions that eventually drive the system to ever-worsening performance. Short-run versus long-run reversal processes are all around us. If an agricultural country is to industrialize, it must accumulate railroads, factories, and steel mills. This capital accumulation can only be done by forgoing consumption and reducing the standard of living first in order that the standard of living may rise at a later time. If a company faces declining earnings because its products are obsolete, it must invest more heavily in product research and incur even deeper short-term losses if it is to recover in the more distant future to a profitable product stream. A student forgoes short-term earning opportunities by attending college in order to increase his longer-term earning capability. This reversal between the short run and the long run occurs repeatedly.

Sixth, a system contains internal dynamic mechanisms that *produce* the observed undesirable behavior. If we ignore the fundamental causes and simply try to overwhelm the symptoms, we pit two great sets of forces against one another. In general, our social systems have evolved to a very stable configuration. If the system is troublesome, we should expect that the causes of the trouble are deeply embedded. The causes will outlast our persistence in overwhelming the symptoms. Furthermore, the internal pressures usually rise to counteract a corrective force from the outside. We can expend all our energy to no avail in trying to compensate for the troubles unless we discover the basic causes and redesign the system so that it spontaneously moves to a new mode of behavior.

For the last of these characteristics of complex systems, we must recognize that a certain ensemble of conditions goes with each possible mode of a system. More specifically, each mode of a system is accompanied by a set of pressures characteristic of that mode. We cannot sustain a particular mode unless we are willing to accept the corresponding pressures. For example, contrast the depressed mode of a city in Figures 5 and 6 with the revived mode in Figures 7 and 8. The depressed mode is one characterized by the pressures that come from decaying buildings, low incomes, and social disorientation. But the revived mode also contains pressures. The revived mode is

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sustained by the housing shortage and the legal and tax pressures that generate a steady demolition and replacement of old buildings. But everyone in the system will want to alleviate the pressures. Active industry will want more employees; residents will want more floor space; and outsiders will want housing so they can move to the attractive job opportunities. Rents will be high. These pressures are easy to relieve by increasing the fraction of the land area permissible for housing, by keeping old buildings in place longer, and by allowing taller apartment buildings. But such moves will start the area back toward the depressed mode. We must decide the kind of system we want with knowledge of and acceptance of the accompanying pressures. Instead, much of our social legislation of the last several decades has consisted of trying to relieve one set of pressures after another. The result is a system mode characterized by inflexibility, conformity, crowding, frustration, supremacy of the organization over the individual, and a choking of the environment. And the resulting pressures, acting through the counterintuitive and short- versus long-term reversal characteristics of complex systems, may well move us further in the same direction.

I am suggesting that the time is approaching when we can design social systems to obtain far better behavior. Different policies could change our urban areas from ones that are designed to deteriorate into ones that are designed for self-renewal. One can foresee a time when we will understand far better the relationships among monetary policy, interest rates, unemployment, and foreign

exchange. Already such studies have thrown new light on the processes of corporate growth, on the reasons for product stagnation and loss of market share, and on the growth and decline of cities.

But to design new policies for social systems requires a level of skill that is rare. The kind of system modeling and policy design that I have been describing requires a professional training at least as extensive as that in any of the established professions. The proper training requires theory, laboratory, case studies, apprenticeship, and practicing experience.

But in the area of designing the dynamic behavior of social systems, there are as yet no adequate professional schools. The educational materials are still in the development stage. The few who show skill in this area have learned by apprenticeship and by trial and error.

This audience, interested as it is in the long-run improvement of society, can make its greatest contribution by encouraging research and educational programs aimed at developing a high level of talent. Again, the long run competes with the short run. Creating educational materials and teachers will at first absorb money and talent that in the short run might instead be devoted to solving particular present social problems. Unless a proper balance is maintained, with substantial energy devoted to establishing an educational capability for enlarging the future pool of skills in social system design, the time when we can master our own systems will be further delayed.

DISCUSSION

QUESTION: If you are essentially looking to the design of an open system, when you take into account the entire system, do the answers turn out to be the same?

ANSWER: The terminology "open or closed system" is used in a variety of ways, and used in quite opposite meanings by different people, so that it is hard to use that phraseology in a meaningful way.

I can answer the substance of the question by saying that in this particular model we recognize that the surrounding world is always changing, but we are looking at how the city relates to the surrounding world. What are its characteristics relative to the surrounding world? Incidentally, I might say that I don't present the model as the main point here; I present the method. If one finds defects in the particular model statement, one simply corrects it. If one is really working in this field, a model lasts for maybe a whole hour, because it is continuously in the process of refinement and improvement but, actually, what is done

here, I think, is sound. It is a model of the city relative to the surrounding circumstances. This is the only way that one could have any sensible meaning to a 250-year time span.

QUESTION: Are you assigning equal weight to all elements of population, and, therefore, is the lower income group heavily penalized?

ANSWER: As a general comment, these systems are insensitive to parameters put in the models. One can change the parameters by a factor of 5 without changing the conclusions, and this is a characteristic on nonlinear multiple-loop systems.

These characteristics are not suspected generally, because they are not true in simple linear systems.

As one goes to a more accurate representation of a system, he finds that the need for accuracy in parameters comes in an entirely different order of magnitude than normally expected.

This throws, in my opinion, a great deal of doubt on the economy of the large data-gathering programs that go on in the social sciences, because I think they are gathering data that are not particularly pertinent.

QUESTION: It seems to me that the problem of excess low-cost housing might be relieved by portable, or transportable, housing. Have you considered the simultaneous modeling of two or more cities where the excess housing is juggled back and forth between the cities to stabilize the overall dynamics?

ANSWER: It has been discussed; it has not been done. One can propound hundreds of questions that one would like to explore, but until there are people and resources to examine them, only a very small number will actually be looked at. At this stage we can ask questions far faster than they can be coped with. I could discuss why I think that question would not throw a great deal of new light on the situation, but the only way to satisfy a question is usually to make the proper model change and see if it matters. This is the only way to satisfy the person that asks the question that either he has hit upon an important idea or to show that he has not. Basically, as I say, these systems are counterintuitive, and that applied to my view of them as well as other people's.

QUESTION: Would you clarify for us the extent to which you are telling us what the city is like or what your model is like? I ask that with particular reference to your ability to validate the model, particularly when you talk about the model of a system existing over a 250-year time span. We are interested in the future, and we must consider the fact that the structure of the model itself must be fundamentally changing in time.

ANSWER: As to whether I was discussing the behavior of the model or cities, I believe I was doing both, but other people may have different opinions and out of those clashes of opinion will come deeper understanding.

Let me say a word about the question of validity and some of the values of modeling. First of all, there is no possible conceptual proof of the validity of a model. There is only confidence in it to the extent that you have examined it and compared it to the system you are interested in. So validity is a relative matter. The standard for comparison here is basically a formal model versus the mental model that would otherwise be used for decision-making. It is not the standard of the model versus the model that people carry around in their heads, and this is not a very tough competition.

QUESTION: I would like to raise the question again of the open versus closed system, because I think it is important in the conclusions that you draw from the particular model you had.

Phrasing it another way, one might ask: are you after a national housing—a national policy—or are you after a policy that applies to a particular city?

Specifically, by reducing the amount of low-income housing in a city, you drive the underemployed in that city to some other city, which you then call the universe outside your model. If you are concerned with that other area, would you perhaps come to different conclusions as to what policy you should use in a given city?

ANSWER: This is one of the recurring misunderstandings that we don't know how to cope with, because we try to show that one doesn't have to drive the people out. This is a revival from the inside for the people there at the beginning.

You can carry old housing removal to the extreme that has been done in some urban renewal programs, wholesale demolition, which drives people out. The only thing we are suggesting is to keep the inflow from going up; we don't even reduce the inflow. We don't increase the inflow rate or the normal outflow rate, but you do keep inflow from rising above what it had been while this revival process gets started. The policy is independent of the scope of application. It works in one city without throwing a burden on others, and it can be applied as many times as you want to.

So, you don't really face that kind of a compromise. Generally speaking, in the redesign of policies for social systems, one does not initially face compromises, because the performance of most systems, corporate and governmental, are sufficiently low that you can begin by getting something for nothing.

In other words, you can begin to get improvements in some dimensions without trade-off. If one initially faced the problem of trade-off, it would mean we already had the best possible performance according to some set of criteria, but I am saying that we do not have the best possible performance by any criteria. Initially one can get improvements in some dimensions without a corresponding decline elsewhere.

Eventually, we will run out of opportunities that do not require compromise. Then we will find that trade-offs become necessary. I think that we are a long way from mandatory trade-offs in most of our systems.

QUESTION: Perhaps one of the most important statements you made was to the effect that in the very large systems we have a great insensitivity to the changes in parameters in the system. Many of our young revolutionaries claim that to a certain extent we are not going to get anywhere fiddling around with some of the parameters in our system, but we have to change the system as a whole. Would you please comment on that?

ANSWER: The biggest objection I have to the radical movement is that it is not radical. It is simply doing by

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slightly ruder methods what we have been doing for 40 years. It is following short-term intuitive objectives that will carry us farther down the very road that we have already been traveling.

Before these processes turn around, we must have widespread public understanding of the nature of complex social systems.

One cannot push such ideas onto the public. There will need to be a rather long process of examination and education, and a very large number of people have to come to the support of what I have been saying. If I am right, the indicated changes will come very slowly and only after widespread public understanding of the nature of the systems of which we are a part. I think the radical student movement is rebelling against the symptoms, but they are falling into what I said was the counterintuitive trap, the things that they are proposing to do are not going to do a thing for the symptoms that they properly enough object to.

QUESTION: Does your model have any way of handling irrational action on behalf of people, when the communication channels get clogged up and people perceive different things differently?

ANSWER: You have tied up a large number of concepts in that question.

Irrationality is certainly included in model systems and must be before you come to a full understanding. On the other hand, when you mention the question of perceptions being different from reality, that is a different matter, and also must be included in a realistic system model, because a model contains the real state of affairs and also the perceived state of affairs, and includes the discrepancies between these, and includes the bias, the cross-talk, the distortion, the delays.

There are six or eight kinds of information defects that are extremely important in the behavior of a system, and a lot of our systems can be understood only if one understands the realities of the information channels because it is in those realities or those deficiencies that the real explanation of many modes of behavior lie.

So a model deals simultaneously, with variables that are called the real system, but never do you make those available as part of the decision-making inputs unless the discrepancies are considered trivial, and usually they are not.

THE COMMUNICATIONS OF CONFRONTATION

Stephen F. Keating

It is an honor to be here to talk with you about our cities and the job we have to do in our metropolitan centers. It is appropriate, I think, that these issues be brought before an engineering forum. Engineers have always figured prominently in the big objectives Americans have assigned themselves.

If you look around this industrial civilization, you are impressed by what engineering can accomplish. It is only natural that we turn to you when our cities find themselves in urgent need. When you examine those needs, as you are doing here, you find that most of the questions ultimately resolve themselves into people questions. What do we want and what do we reject? What are our priorities and our values? Resolving questions of this sort demands effective communication. It requires participation.

This comes quite naturally to most of us, because direct democracy is the American ideal, which emerged from the democracy of the Greek city-state, where a system of citizens' councils passed laws, declared war, authorized expenditures from the treasury and decided court cases. The tradition has found its purest expression in America in the old New England town meeting. Here was direct communication, the immediate expression of the will of the people. In our folklore and in our self-image, we still picture the town meeting as a distillation of democracy.

Recently the town meeting philosophy has gained special new appeal for us. We have been made forceably aware of the troubles in our cities. And we have come to realize that everyone in the city demands the right to be heard in correcting these ills. Minorities want to be heard among the majority. The poor want a voice for the first time. The jobless and the uneducated, who have previously been silent, are now demanding the right to speak.

The affairs of the community, we found, can no longer be left up to the city council or the political leaders or the "establishment." Sections of the community who had never been heard from—people from across the tracks, or across the river, from the East Side or the Near South Side, depending on your city—all were demanding a part in deciding the new shape of the city and were making

themselves heard. Suddenly the town meeting idea had brand-new, twentieth-century appeal. Some answers to today's problems seemed to be firmly rooted in the most cherished tradition of our past.

We congratulated ourselves that we had an off-the-shelf answer to our crises. We would simply dust off the town meeting idea and put it to work in the neighborhood centers, the private social and welfare groups, and the government agencies that sprang up to correct urban conditions. These organizations stood outside the constitutional law-making and administrative machinery. But they work parallel to and in cooperation with government bodies at all levels and could provide a measure of immediate expression of the will of the people—direct democracy.

But we soon discovered that it's too late for the town meeting. In the past few years, thousands of meetings have been held to give everyone a voice in urban affairs—and some people have been surprised to find that they have been not at all like the New England town meeting. Instead of logical discussions and orderly balloting we have often had bickering, shouting, demonstrations, and, sometimes, violence.

This has been looked upon by some people as failure of the whole idea of applying direct democracy to urban ills and has made them not only discouraged with the process but has even, in some cases, turned their goodwill into hostility. It's as though they saw the town meeting idea as the answer to the whole question and, when reality did not fulfill their ideal, they lost interest and gave up on any possible solution.

We should not, however, be discouraged by the anger and emotion nor even by the violence that attend today's participatory democracy. And perhaps we won't be quite as hostile to the idea of direct participation if we understand why the meetings we hold today can't possibly work anything like our cherished ideal of the town meetings of the past.

It was basic to the town meeting that the people shared a community of thought, a common background. If they did not all stand on the same side of every issue, at

least they could readily agree on what the issues were. And their value judgments were closely parallel. There was basic agreement on goals and the means available to reach them. It made it possible to clarify issues quickly and, with little rancor, come to agreement and plan a program.

But today the city represents a wider variety of people, voices, opinions, goals, and aspirations. Our need today is *not* to restrict representation to a few people of like background and similar views, but to open the forum to a wide range of heritage, attitude, and social motivation. We want as many people as possible to be represented. The Urban Coalition, with which much of my own work in this area has been identified, was designed expressly as a forum for the silent minorities who had not had a chance to be heard.

But in the town meeting, the emphasis was not on difference but on sameness. In many town meetings you didn't get a vote if you weren't a property owner. In Greece, all citizens could sit in the peoples' council, but citizenship was not extended to slaves, servants, women, or those born outside the city. Perhaps only 50 percent of the population were citizens. With this kind of selectivity, there was bound to be wide areas of agreement that could serve as a base for logical procedure, reasoned discourse, and orderly decision making. On the most basic questions, consensus had been formed years before the meeting opened.

Our purpose today is to make our urban councils not homogenous, but as heterogeneous as possible. We should not be surprised or dismayed if we find clashing differences of goals and opinions. The clashes do not mean however, that we can't communicate. They simply show that our job of communication is different now. We cannot depend on the rigid town meeting formula, and if we are going to make our communication effective, we must understand how it works today.

My purpose is to make some observations about the communication of confrontation and to point out some of the tasks it can accomplish and *is* accomplishing.

To begin with, most of us believe that communication is more necessary than ever. You have always needed communications to keep a city operating. Today we need communications to keep it from flying to pieces.

All the parts of our urban societies recognize this. Minorities place such a high value on communications, in fact, that they now award top positions of leadership to those who are the most articulate. Black people, for instance, want to be heard. They want to make people pay attention. It is almost as though they were saying: "All right, after all these years, white America now has to listen; let's find spokesmen who can make them sit up and take notice."

When such high value is placed on being heard, then, of course, articulate spokesmen will emerge. Whether you agree with the variety of positions they take, they illustrate the importance placed on speaking up. Stokely Carmichel became a leader because he talks in terms that are strident and straightforward. The Rev. Jesse Jackson also comes through loud and clear. And Rap Brown got his name from his ability to rap out the black viewpoint with boldness and determination.

It often appears that the urban poor and the minority groups are so pleased with having an audience, after all these years, that they place a high premium on the simple pleasure of speaking up and being heard. We all enjoy getting something off our chest. And, at this point in history, who can blame them? Their spokesmen are naturally strident and insistent—and if it often seems they are speaking more to their own constituents than to the rest of society, then perhaps they are. But the job of the rest of society is not to grow indignant or defensive, but to use this channel of communication to accomplish the task our whole society has to do.

The communications of confrontation may be unpleasant, even offensive, to some, but at least it *is* communication and we can use it most profitably if we understand how it operates.

All communications start with an agreement that there is something to talk about, a problem (to apply the word that is in ubiquitous use today). This agreement has been forthcoming in every city. We all recognize that urban society is seriously off balance. And although we don't know exactly what the trouble is, we all agree that a problem exists.

The next step in communication is to define the problem. This is where the work begins. And this is where so much of the hang-up occurs in the talk and writing about our cities. The complexity of the problem is almost bewildering. Incidents that occur are difficult to evaluate:

- After the Newark rioting a magazine published a picture of a rioter running out of a store carrying his loot; he had his arms full of Tide detergent. Is the problem here a decaying respect for law and order, or is it a problem of human need?
- An out-of-work father leaves home because his wife and children can live better on a steady welfare check without the drag of his joblessness. Is this a problem of breakdown of traditional family bonds, or is it a problem of economic opportunity?
- A black high school student comes home and tells his father he has become interested in accounting. His father discourages the boy from taking it because he knows the disappointment and heart break that black workers have experienced in trying to get office jobs.

Is this a problem of education, or a problem of race prejudice?

The complexity of the situation also shows through in the language we use to discuss it. We use words like ghetto, prejudice, opportunity, poor, law and order, black community, lily-white, conspiracy, and poverty psychology The language gives you a feeling not only for the difficulty of understanding the subject but also for its high emotional content. (Words like these also illustrate the inadequacy of the language we use to talk about urban social ills. In all times of radical change—such as the scientific revolution of the eighteenth century and the industrial revolution of the nineteenth—new concepts are developed and new words are invented or adapted to discuss them. Perhaps the social revolution of our century will also develop a more serviceable vocabulary, which will help us to better understand urban society.)

A third step in any communications process is to define goals. You and I, when we face a business problem within our companies may have all kinds of hurdles to overcome in reaching a solution, but at least we normally know where we are trying to go, we have a reasonably clear vision of our business goal. In the short term, the goal may be to design cost-effectiveness into a new product. In the longer term the goal may be to increase the profitability and economic security of the firm. We agree on the goal because it's a part of the business.

In the communications of confrontation, common goals are not so readily apparent. This is true because of the widely ranging background of spokesmen, and their wide differences in constituencies, points-of-view, and objectives. Contending factions cannot easily be identified. It is a temptation to describe the urban problem simply as a rivalry of the haves versus the have-nots or the blacks versus the whites or the left versus the right. But such over-simplification does not lead to understanding. If you want to make any sense of the urban dialogue, you have to determine who is talking to whom. This takes time, but until you know this, it is hard to figure out what goals and objectives people are trying to reach.

It is a general rule that in any group—a club, a political party, a business, or a nation—there is always less organization than there appears to be from the outsider's view. The group always seems to have more uniformity of opinion, more cohesiveness of spirit, and more singleness of purpose than really exist. A group may be violently torn on many issues, but from outside the group, we tend to minimize the division. We don't see the differences because the organization will normally prepare a solid front for the view of outsiders. Furthermore, we tend to identify people by pasting organizational labels on them, then we look at the labels instead of the people. Naturally, they all look alike.

Thus, the majority population of a city tends to view the minority as a single group working with coordination and discipline to change our urban societies. But this view is off target. It assumes an organization and agreement that does not exist in the movement. In Minneapolis, for instance, if you speak of the "minority" as a homogenous group, you fail to take into account the differences between the black part of the minority and the Indian part of the minority. Their goals are quite different, almost directly opposed to each other. Black citizens generally want a more secure and dignified place in a homogenous society. Indian spokesmen, on the other hand, seem to be asking for a chance to develop separately in something approximating the traditional Indian culture.

Indian residents are also divided among themselves on some issues. Recently there was a clash between two Minneapolis Indian groups over which organization should develop plans for an Indian community center. Rivalry between the groups was centered on the view that one was best able to express Indian claims and complaints while the other was most representative of the broad range of the city's Indian population.

The same lack of organization exists on the side of the white majority, too, and black people are sometimes surprised to learn that there is no solid, well-disciplined white conspiracy operating against them. An example of this division in Minneapolis was the Ron Edwards case, an explosive issue for three months early last year. The mayor nominated Edwards as one of the 15 members of the new Human Relations Commission. Nominations had to be ratified by the city council. Edwards is an intense young black man whom the mayor believed could well represent the militant factions in the black community. He also had a record of four misdemeanors, and he was rejected by a majority of the city council. The mayor continued his support of Edwards, however, and a stalemate developed. A number of Minneapolis businessmen became increasingly concerned as time went on. Some sided with the council majority, some with the minority, but all recognized that the question had to be resolved quickly. Accordingly, they began to work with spokesmen on both sides of the issue to create an area of agreement. Eventually, without a sense of loss or embarrassment for anyone, Edwards was approved and took his seat on the commission.

The division and the contention over this issue among whites was something of an eye-opener to many black people who had looked upon the white community as a monolithic structure. When it was all over, Edwards said, "Man, before this thing started, you couldn't have made me believe that white cats like Plank, Cowles, and Keating would have come out and supported me. When the councilmen first hollered on me, I figured, 'Here we

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go—they're going to put me out to the wolves.' I was surprised when that didn't happen."

Thus it may be slow work to establish goals in urban conflict situations because of the difficulty in defining positions, even among groups that would appear at first glance to constitute a solid body of philosophy and opinion. It is necessary to establish who is speaking for whom before you can crystallize goals and aims. In business it's called identifying market segments. In politics it is determining the views of the constituency.

Lacking clearcut definitions of urban problems and consensus on urban goals, it is not surprising that we are having a great deal of difficulty arriving at the next stage of communications: the process of measuring trade-offs and selecting the appropriate options.

In old New England, almost all of this process would have been complete before the town meeting began. Nearly everyone made about the same living and made it in about the same way; it must have been fairly easy to decide on whether or not there was a problem with the town well or grazing sheep on the common. Likewise, there would have been general agreement on goals. Everyone would have agreed that they needed water and wanted their fair share of grazing rights. Most of the town meeting would have been spent considering the trade-offs: What to do about the pump, how to write the grazing laws.

In the cities today we have far to go before we reach the point of deciding trade-offs. I suspect that when we have progressed that far, much of the thunder and lightning will disappear from the confrontation—because problems and goals are matters that generate feeling and emotion, while trade-offs are more objective, are quantified more easily, and are decided more often as a matter of logic.

The emotion aroused by value judgments over problems and goals creates an atmosphere of confrontation in urban communications. Added to this is the feeling among many minority spokesmen that it is necessary to establish a power base in order to get everyone on a footing of equality before the talking starts. There is a feeling that it is necessary to "catch up" with the white majority in terms of power and respect in order to have equality at the bargaining table.

Militancy is seen as one answer to the need to catch up quickly. Every city has developed minority leaders who use aggressiveness to assert the power of their constituency. In Minneapolis, one such leader is Matt Eubanks, who has said he employs confrontation and demonstration to press his demands and keep local institutions on the defensive. Last month he told the Minneapolis Urban Coalition: "We'll never come back down here. We're going to do what we have to do. We've got to build our black people. We cannot build our black people, our revolutionary forces, through groups devoted to the status quo." Matt believes it is the black man's first duty to gain power—and the most effective route to power, he believes, is confrontation. Only after you have grasped the handles of power can you negotiate successfully, in his view. He has said that the way to gain control is to *assume* control.

It is clear that, although not all the black community goes all the way with Eubanks, there is a good deal of minority sympathy with his view that confrontation is a route to power. One Negro leader believes that Eubanks is too militant, but even he has said, "It takes people like Matt to make others move. What I say to Matt is 'thank you,' because we're going to start to move."

Matt Eubanks and hundreds of other black leaders are using confrontation to build their power base—not to replace communication, but to help them make sure communication is effective.

You could sum up the difference between the town meeting and our own urban communications by saying that today we are trying to catch up with the times by taking all the steps of communications at once. We are trying to identify problems, establish goals, and evaluate trade-offs, all under the pressure of urgent circumstances. The poor and the racial minorities are trying to speak from a power base and build the base at the same time. In the communications of confrontation we are trying to make the hose while we put out the fire. We should not be surprised if there is more confusion and if results come more slowly than we could wish.

In spite of this, however, our halting, suspicious, and sometimes hostile communication is accomplishing something. While we are developing our techniques of talking and understanding in the cities, we are also showing some progress. We have to; if we wait until the hose is made, the house will have burned down.

All over the country, we are seeing heartening results. But for examples I will confine myself to the city where I have been involved, Minneapolis. And I will refer to just those activities in which the Urban Coalition has taken part, because those are the activities that I am most familiar with.

I assure you that whatever progress the Coalition has made has been through the activities of a great many organizations. The Coalition identifies its own role as being that of both a forum and a catalyst. As a forum, the Coalition is a place where all points of view may be heard. As a catalyst, Coalition committees try to determine priority needs and help public and private agencies on needed programs.

The Minneapolis Coalition worked with other agencies to place 1,300 young people in summer jobs last year. There were 2,200 jobs filled with hard-core unemployed.

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This summer 1,800 young people were placed—and we could have filled more, but we ran out of kids. Every boy and girl from target areas who wanted a job, got a job. Of permanent jobs, we have a goal of 4,500 disadvantaged employees on board by June 30, 1971. Today we are about 20 percent ahead of our monthly schedule toward that goal.

Over the long term, the answer to many minority and poverty problems lies in education. The University of Minnesota and other colleges have set up programs to work with Minneapolis schools in training teachers to better understand the special educational problems of minority groups and disadvantaged neighborhoods. A program at both the University of Minnesota and Augsburg College provides financial and tutorial help for disadvantaged students. At the University, the faculty started a fund for direct financial aid to needy students. At Augsburg substantial funds were committed to a program to provide both financial and academic assistance.

Recently, the Coalition began a project, in cooperation with the Urban League, which could be one of our most fruitful programs. A business development task force was set up to aid in the development of minority-owned businesses in two ways: First, by helping to arrange bridging, or complementary financing, for existing companies; and secondly by helping to create new minority-owned businesses in selected market areas. To date, approximately 30 bridging loans involving direct financing in excess of $100,000 have been arranged. The availability of this privately contributed money has made possible conventional financing of these same companies in an amount well over half a million dollars.

The Coalition has also been instrumental in turning the attention of the Minneapolis United Fund toward the inner city and the needs of ghetto neighborhoods. Early last year, the United Fund undertook a special priority drive to raise funds earmarked for a summer program. The project was a success and was credited with doing much to keep it a cool summer in Minneapolis. One of the most successful parts of the program was the Summer Olympics, an inner-city neighborhood athletic program that has now become an annual event. Following this special drive, the United Fund distribution policies were changed to channel a greater portion of funds to agencies working with the poor and the disadvantaged.

Programs like these are helping us to make the social adjustments our urban societies have to undergo. They are being created because we have proved that we can communicate in the city. Direct democracy is at work, even though participation is not much like a town meeting or a council of citizens in the Athens of Pericles.

In spite of an environment of tension, we are learning how to talk to each other and how to listen. We are coming to understand how the communication of confrontation works. And the most important lesson is that confrontation is itself a form of communication. Certainly there is friction. There is indeed abrasion, violent language, and demonstration. It is frustrating and sometimes enraging. But we are learning that communication itself is valuable. In this area, certainly, the medium is the message. And we are discovering *how* to communicate with each other. And we are learning how to crystallize opinion so that we can turn words into helpful programs for social change and urban progress.

Perhaps in the near future our urban dialogue will be quieter, more polite, and more amenable to Robert's Rules of Order. In the meantime we will have to learn from confrontation. Perhaps the friction we are experiencing today produces the heat that will weld this country into a unified and cohesive society—the kind of society that made the town meeting possible.

DISCUSSION

QUESTION: I would like to ask you a question on the Vietnam Moratorium, not in connection with Vietnam, but in connection with forms of communication. Would you give us an overview of what you think this might mean as far as people communicating better?

ANSWER: You are asking, obviously, a nonexpert in the field of communications. As I have said, confrontation and differences of opinion is a part of the very fabric of our life in this country. All of us don't have to agree.

I think that any vehicle that in a constructive fashion—a relatively peaceful fashion—identifies the feelings and beliefs of some of our people is a valid form of communication.

It doesn't necessarily represent the fact that the great silent majority has to agree, but it is a form of communication, just as the communication in the ghetto, and the communication 70 years ago in the union movement, has been a form of communication that has proved its usefulness.

I am not here as an expert on the Moratorium. I think that as a vehicle of communication it must have been somewhat effective. Whether it was completely is for

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someone else to judge.

QUESTION: We have heard the minority spoken of as an identity and the majority spoken of as an identity. I am rapidly approaching the view that there is no majority, unless one says there are more women than men, and they constitute "the majority." Would you comment on whether there is a majority?

ANSWER: One of our problems is that we have pasted labels on people. We have assumed that all the Indian people in Minneapolis have the same aspirations and priorities. They don't. The same is true of many of the black organizations. The minorities are slowly learning the fact that the establishment, or whatever you want to call that white majority, doesn't exist.

In Minneapolis, a number of people expressed some surprise that fourteen businessmen who created the original Urban Coalition had widely differing views on what should be done. It is one of our problems that we listen to the first loud voice and assume that if it says we want housing, we want housing. Increasingly we are sorting out some of these voices, and until we do that on both sides, we are going to have trouble communicating.

QUESTION: Do you think that the engineer has any particular function or role to play in the confrontation that you mentioned?

ANSWER: Every citizen has a role. I was asked to come here to speak to this basically engineering audience, and I obviously don't speak from the background of an engineer. To the extent that you all have a stake in this country, whether you are engineers or lawyers or whatever, you must become involved. Professor Forrester illustrated more effectively than I could that the engineer has a special talent in terms of seeing through, and in terms of logic of things that could be done.

I say with great humility before this audience that you are going to have to get in and get a piece of the action. You cannot wait until the systems are designed, or design them from the outside and then come in and implement them. You are going to have to feel some of the heat so that you understand not only the logic, but some of the emotion of the problem.

QUESTION: When confrontation was mentioned, the thing that came into my mind is the kind of group-therapy psychology that has been tried out, for example, with blacks and policemen speaking out what they feel. Has Minneapolis included this kind of approach?

ANSWER: I would have to say in all honesty that there has been some of it, but it hasn't been intentional. We are experimenting in some areas along these same lines. The confrontation, however, to which I was alluding has been much more basic and gutsy, if you will. These issues come out.

Although there is a role to be played, I think that may tend to oversimplify the problem. I think you would have to see it in its real light, as it really is, and there are some great people all over the country who are very idealistic, who feel that if we could sit down in a comfortable environment of their own choosing and discuss racism and so forth, that we might solve these problems.

Over a long, long period of generations this might be so, and it certainly would help. It will not, however, in the near term do much toward solving the nitty gritty that we have to solve if we are going on to solutions in the years to come.

Session III
CASE HISTORIES

Thomas C. Kavanagh, Chairman

CHICAGO'S CROSSTOWN EXPRESSWAY:
THE TEAM CONCEPT IN ACTION

Milton Pikarsky

Can we have modern expressway transportation in the city—the kind we all need for jobs, business, shopping—without tearing up the city to put it there, and without displacing great numbers of residents and local enterprises? Can we weave it into the city so that it does not divide neighborhoods and separate neighbor from neighbor? Can we make the expressway a neighborhood asset, a linear community center that provides community facilities, stimulates community improvement, increases property values?

Can we, in order to accomplish these things, enlist the active interest, support, and participation of local residents and communities, bearing in mind that without that local interest and participation, not only are we not going to have significant community improvement no matter how good our plans are, but we will not be constructing any of the sorely needed expressways in populous urban areas?

These are the questions and reactions that seriously concern designers and builders of urban highways today. The questions are those we are going to have to be able to answer "Yes."

Can it be done?

We think it can, and we think Chicago is showing the way. The planning of the Chicago Crosstown Expressway, which is going on right now, is one of the first attempts in America to answer positively the questions I have raised. And the initial results of that effort offer some very promising answers. We will focus on the question of community participation, including public meetings, but first we will review the preliminary planning for the Crosstown. The reason for this will be obvious as we progress, but it bears stating here: Simply to undertake to provide modern highways that improve the adjoining urban communities requires some basic changes in highway planning before any official public hearings have been held at all. Community needs have to be studied and community responses anticipated; and these needs should be reflected in the initial planning for the expressway. In the case of the Crosstown route in Chicago, our planning efforts reflect our understanding of these needs.

LOCATION OF THE CROSSTOWN

A circumferential boulevard of monumental scale for Chicago was first envisioned in the broad concepts of the renowned Burnham Plan of 1909. At present, Chicago's transportation network contains a series of radial routes that converge slightly to the west of the central business district (Figure 1). The proposed highway, which in recent years has been termed the Crosstown Expressway, would start on the northwest side of the junction of the Kennedy and Edens Expressways and would run south to connect with the Eisenhower Expressway, then with the Stevenson Expressway, and then with Midway Airport. South of the Airport, the route would turn east to connect with the Dan Ryan Expressway and the Chicago Skyway on the southeast side. Its course, incidentally, would not be too different from that of the existing railroad bypass, an existing transportation corridor.

The general location of this bypass is not arbitrary: it reflects a need. Figure 2 is a chart on which the Chicago Area Transportation Study matched street capacities against amount of travel along a line running west from the Loop. It shows a surplus of street traffic-carrying ability near the Central Business District and out in the suburbs, and a deficit in between. The biggest deficit is between Kedzie and Harlem Avenues, an area that includes such major arterial streets as Pulaski Road, Cicero Avenue, and Central Avenue.

Cicero Avenue alone, for example, has to handle more than 30,000 cars and trucks per day.

THE CORRIDOR CONCEPT

Providing an expressway for the corridor—any kind of expressway—would be an improvement. It would reduce the peak-hour expressway traffic jams downtown and it would reduce, by as much as 50 percent, the traffic burden

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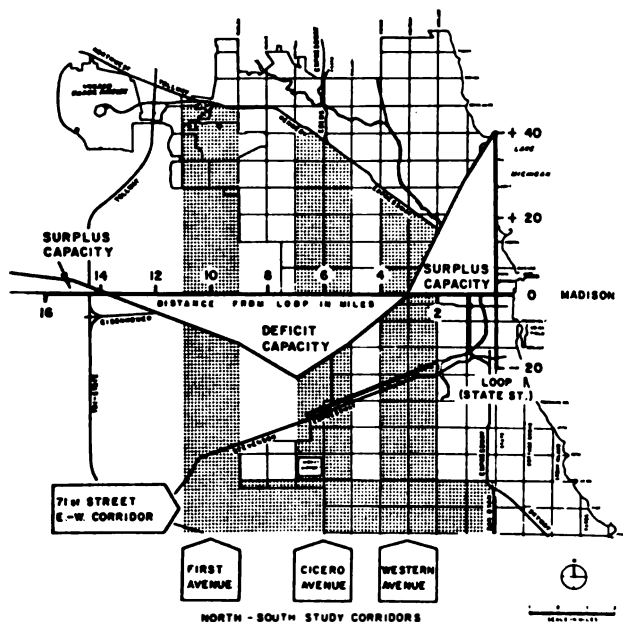Figure 1. Crosstown route and existing radials.

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Figure 2. Crosstown Expressway study corridors with roadway capacity-demand differential chart superimposed.

on Cicero Avenue and on other major West Side streets—streets that otherwise would continue to show *increases* in traffic load every year.

In Chicago, our philosophy requires the Crosstown Expressway to serve another function, namely, to be a community facility and a backbone for community improvement. We shall concentrate on that purpose of the Crosstown in reviewing the plan for the Stevenson-Midway Segment.

To start with, the following criteria or ground rules were established:

- Minimum disruption of communities
- Minimum displacement of homes and other structures
- Accommodation within their own community of all displaced families, stores, industries that chose to stay
- Adequate compensation for those who did not choose to stay
- Provision of space for mass transit as part of corridor development
- Allowance of adequate space for joint development projects
- Provision of a secondary transportation system to integrate the expressway and the surrounding communities

As a final ground rule, we set up a planning principle to answer the question, "What should an expressway be to a community?" We decided to initiate the Chicago Comprehensive Plan's proposal to concentrate Chicago's growth along "corridors of high accessibility."

In too many cases in Chicago, commerce, industry, and residences are intertwined as in Figure 3a. This results in confusion, traffic, noise, and even danger—with trucks cruising through residential blocks and with school children having to cross heavy-traffic streets.

The corridor concept shown in Figure 3b proposes that we equip a few main transportation routes with a full range of transportation options, then concentrate our high-traffic activities along them: shopping centers, industrial parks, high-rise apartment projects, and community centers. This is not only more convenient for these activities; it also means less traffic, less noise, less danger in the blocks of single-family homes and low-rise apartments away from the corridor. At the same time, the corridor can become a new kind of main street for those residential areas.

To satisfy all the ground rules established actually required two plans: (a) an alignment plan that was a layout of the actual expressway, and (b) a development plan that suggested ways of using the new highway as a basis for community improvements.

For a 22-mile expressway it was also necessary that we work by segments, developing and proposing a set of plans for each segment. Geography suggested four segments:

(1) From the Kennedy-Edens Expressways to the Eisenhower Expressway
(2) From the Eisenhower to the Stevenson Expressway
(3) From the Stevenson to Midway Airport
(4) From Midway Airport east to the Dan Ryan Expressway and the Chicago Skyway

STEVENSON-MIDWAY AIRPORT SEGMENT

In August 1968, we completed a preliminary study for the Stevenson-Midway segment and submitted it for consideration by local communities and public agencies. It received final approval in December 1968.

In April 1969, we began a public discussion of preliminary planning for the east-west segment between Midway Airport and the Chicago Skyway, and we will soon be doing the same for the remaining segments.

We will review for you the plan for the Stevenson-Midway Airport segment, where the outcome is known, and then conclude with a consideration of the Midway Airport to Chicago Skyway segment, where public consideration is still very much in process.

THE RECOMMENDED ALIGNMENT

First, the alignment plan:

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In all, sixteen different alignments were considered for the 3 1/2-mile Stevenson-Midway segment. Most of them followed one of two main paths through the community:

- Cicero Avenue, which the City has been committed to replace with something better, both as a traffic artery and as a shopping strip.
- A quarter-mile east of Cicero Avenue, there is an industrial belt, largely vacant, along the Belt Line Railway.

But a modern expressway is big. With eight lanes, a median strip, a mass transit facility, and frontage roads alongside for access, it is more than a block wide—too big to fit in either plan without removing a lot of adjacent property.

So the suggestion was made: *Use both paths.* Split the alignment, with one part going down Cicero Avenue, the other alongside the Belt Line. In this manner, neither path would be much wider than our existing major arterial streets.

Another suggestion was made: *Transpose the alignments,* so that the western one ran north, the eastern one south. This would put the frontage roads in between the major paths, giving the interior area the accessibility needed for a high-accessibility corridor and at the same time providing desirable landscaped buffers for the existing interior residential areas.

We believe that this concept will become the national pattern for highways through densely populated urban centers. The divided alignment with interior access—the "reversed split" alignment—was the one recommended (Figure 4). It satisfied the ground rules. It provided a high-accessibility corridor. It displaced only 69 dwellings in 3 1/2 miles, and proposals were made to relocate those families, houses and all, on nearby vacant lots. And it protected and enhanced the existing residential areas both within and adjacent to the expressway corridor.

The wavy lines at the top and bottom in Figure 5 represent this buffering effect in which the depressed roadways insulate the surrounding community from the impact of traffic on the interior frontage roads. Or, as indicated at the left of the diagram, similar protection can be provided to residential areas within the inter-roadway

Figure 3a. Disruptive land use.

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island by means of landscaping and limited access between the frontage roads and residential streets.

The reversed split alignment was also able to make maximum use of existing rights-of-way and adjacent underused land. Figure 6, for example, is a view of the Belt Line Railway with its fringe of largely vacant industrial land. Figure 7 is the same view as proposed, showing the railroad, one leg of the divided alignment, and adjacent park development.

Similarly, present-day Cicero Avenue, flanked by underused commercial strips, is used to accommodate a community play area, rapid transit line, expressway leg, and frontage road.

Figure 8 illustrates another advantage of the split alignment. As most people know, it is easier to cross two creeks than one river. The split alignment made bridging much easier, and for the first time air-rights development over an expressway became really feasible. To put an air-rights structure over a conventional expressway 300 ft wide is quite a project; but air rights construction over the 100-ft and 150-ft channels of the Stevenson-Midway

Alignment is not only practical—it is probable.

THE COMMUNITY DEVELOPMENT PLAN

The community development plan, shown in outline in Figure 9, went beyond the expressway to propose eighteen different projects for street improvement, new shopping centers, and other community facilities in a 2-mile width of city.

Why? Because an expressway has an impact on the adjacent community, and it should, therefore, at the same time, provide new opportunities for improving the quality of the environment for the residents and workers in the area.

One effect of an expressway is that traffic is reduced on parallel streets but increased on major cross streets leading to and from the highway. So the community plan proposed widening of those cross streets. It also proposed a whole new circulation scheme, with local streets protected from heavy traffic and with a pedestrian walkway system connecting shopping centers, parks, playgrounds, schools, and the expressway edge. The expressway edge, incidental-

Figure 3*b*. High-accessibility corridor concept.

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Figure 4. Artist's view of Stevenson–Midway Airport segment.
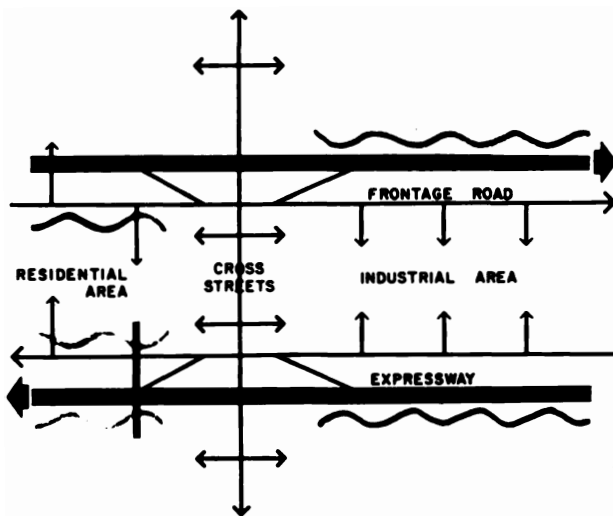
Figure 5. Buffering effect with "reverse split" alignment.　**Figure 6. The Belt Line Railway industrial belt at present.**

Figure 7. The Belt Line Railway roadway leg as proposed.

CROSS SECTIONS   CROSSTOWN EXPRESSWAY
MIDWAY STEVENSON SECTION

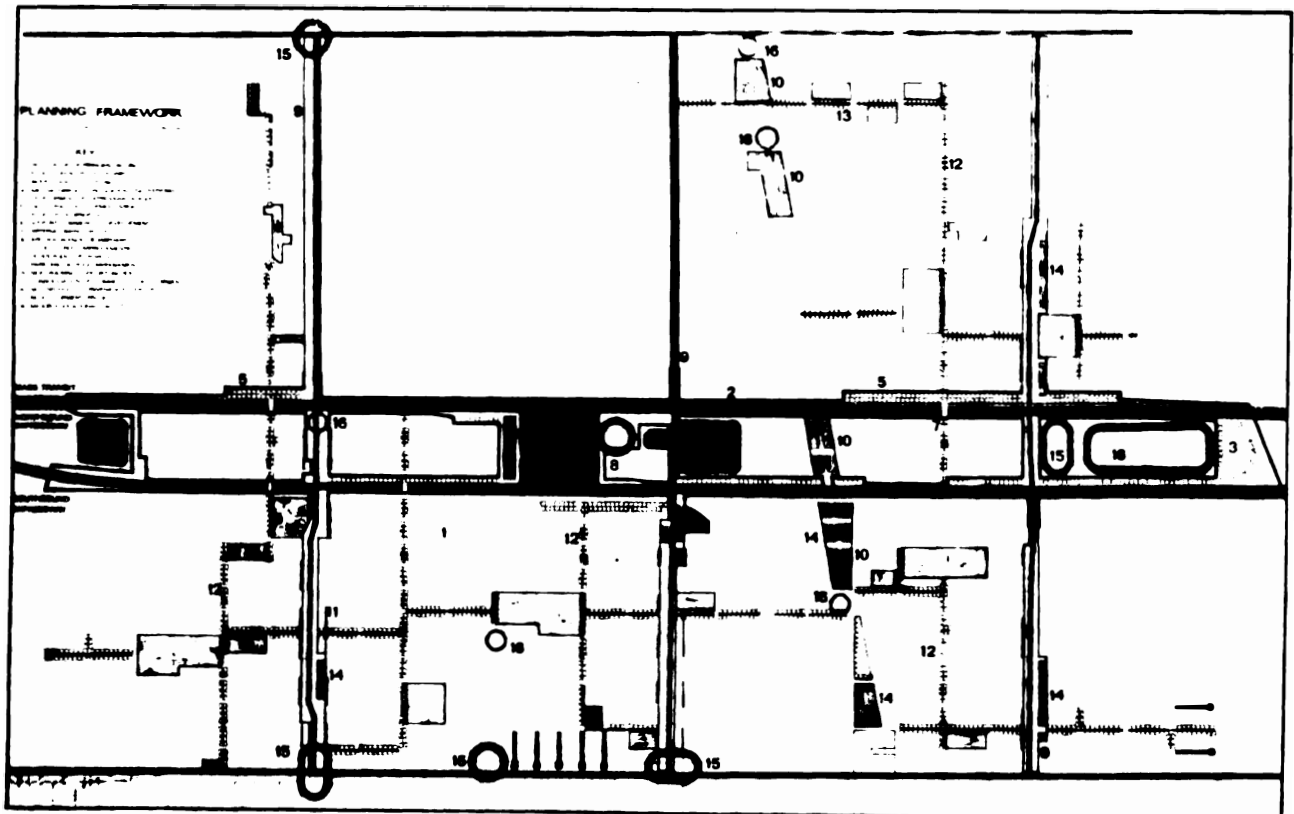Figure 8. Cross section of the divided alignment: (above) east roadway; (below) west roadway.

Figure 9. Community improvement plan: Stevenson—Midway Airport segment.

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Figure 10. Proposed recreation hill–park.

ly, should be worth walking to. It will be like the low bluff along a stream, this time a stream of traffic; and it will be a point of interest, a place to meet, even a playground and park.

Parks, in fact, are one of the great needs of the Stevenson-Midway area, and the Crosstown Project can provide them through joint development. A new federal ruling allows acquisition of land remnants for nonexpressway uses and the split-alignment plan was especially strong in joint development opportunities. Forty-eight acres of land would be acquired for parks and green spaces.

At the north end of the expressway section, where it will interchange with the Stevenson, a hill-park was one of the proposals (Figure 10). It could be made of earth removed in building the highway, and the savings in earth-hauling would probably pay for it. In winter, it would provide a sled and toboggan slide half again as high as the

highest one now available in the Chicago area.

In addition to park space, the Crosstown Project would provide 43 acres of land for other purposes, private as well as public. Pointing out a few of these suggests some of the possibilities in the proposed high-accessibility corridor.

A new parking lot would be provided for Midway Airport, and it would run on an air-rights structure across the highway right to the terminal. Nearby would be a small industrial park and a small shopping center, both for airport-oriented activities.

North of 47th Street would be a major shopping center, and along with other proposed centers it would give the Stevenson-Midway area modern shopping facilities in place of the old Cicero Avenue strip. At the foot of the hill-park mentioned is land for a proposed high school or college campus that the Board of Education is studying.

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Figure 11. Standard design model of footbridge.

To sum up the proposals in the Stevenson-Midway plan:

- A modern, fast transportation system will be provided for the area, thereby materially reducing through traffic on local streets.
- This will be done with minimum dislocation of families without exiling anyone, and without cutting a canyon through the community.
- Above the expressway and within its two paths will be a corridor that can become a center of community activities. This corridor will have easy access to the expressway without being strangled by through traffic.
- Much needed parks and recreation spaces will be provided, and with them a new local street system that will provide access to the expressway and peace and quiet on residential streets—both at the same time.

THE DESIGN TEAM

In the Stevenson-Midway design we see an expressway that is a real asset to the community it traverses, offering great opportunities for continuous community improvement. To achieve it, it was necessary that the responsible cooperating agencies develop a whole new method and organization of highway design, one that would include the range of skills needed in community planning, as well as highway design—in brief, a systems approach.

Two interdisciplinary groups are involved. An inter-agency group, which includes city, county, state, and federal planning and transportation agencies, is responsible for coordinating the project and ensuring consideration in it of all urban development interests. This group is served by an interdisciplinary design staff assembled by four private architectural and engineering firms acting together in a joint venture, Crosstown Associates. The combined staffs include engineers, architects, landscape architects, urban designers, city planners, lawyers, sociologists, right-of-way specialists, marketing analysts, traffic analysts, and other transportation specialists.

CONSULTING THE COMMUNITY

We gave our combined staff full freedom to try new ideas, asking only that they justify everything in detail and that they *know* the communities they were serving.

Response to the Stevenson-Midway plan at public hearings indicates that the designers did do their homework and did know their community—and in fact our public meeting process put them to a very thorough test.

In summary, we discussed the plan at a series of local open meetings attended by some 2,000 residents. We displayed a model at Midway Airport and at Ford City Shopping Center that was viewed by more than 300,000 people. We asked for questions and suggestions and we received hundreds. We have answered more than 300 written queries and comments. Some of the suggestions were, in fact, very good and were adopted. But nowhere, to my knowledge, did people object to what we were trying to do or to our basic plans for doing it. These they liked.

CROSSTOWN DESIGN STANDARDS

Following approval of the Stevenson-Midway study

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Figure 12. Standard design model of bridge and retaining walls.

plan by the communities, the Bureau of Public Roads, and local agencies, we were able to advance into the second phase for that segment of highway. Detailed design standards and preliminary engineering plans and profiles were prepared. Specific urban development project designs and feasibility studies are also well under way.

I would like to highlight some of the careful and thoughtful visual design standards for you.

Uniformity was one principle. Design a fine structure and stay with it. We are considering both steel and concrete, but will avoid arbitrary shifts from one material to the other. One reason for this is that decoration can be distraction at high speeds.

Openness was a related principle. We are proposing that bridges span the whole width of expressway to maintain an open feeling and avoid driver sight blockage. Using the split alignment, this can be done with spans of 150 ft or less.

Continuous use of the New Jersey type of barrier as a highway edge and separator is another design feature, and the barriers are also designed to protect ground cover from salt spray.

Concrete parapets will turn the corner and cross a bridge to avoid the mixture of fencing types found along many expressways. We are also considering a 6-ft mesh fence above bridge parapets to prevent littering onto the expressway. And although we have not yet developed our signing system, we are already giving careful attention to sign structures.

For foot bridges, we are proposing a low rise-to-tread ratio of four to one, so it will be possible to push a bicycle up the stairs, or even a baby carriage. Hence, the easy double flights shown in Figure 11, instead of the usual steep stairs combined with ramps.

Figure 13. Park Manor Neighborhood.

Lighting was another concern, and light standards were designed to be simple in form. At the same time, we have worked closely with major lighting manufacturers to develop a mainline lighting system that will aim forward and be glare-free. The split alignment, of course, helps us in this.

Landscaping is a vital design element to soften the severe lines of the expressway. Therefore, as shown in Figure 12, we are proposing vines along retaining walls, trees above retaining walls, and ground cover on slopes, rather than concrete. Landscaping, of course, is at least as important for urban communities along the expressway as it is for the motorist.

In even a sketchy survey of these provisional design standards, one fact stands out above the others: There is no conflict between good aesthetics and good engineering design. The two reinforce one another. Visual standards can be grounded in construction and operational needs, and when they are, they can mean better highway performance, fewer distractions and obstructions for the driver, while permitting economies in materials and construction. Visual standards are also one of the principal means of really knitting an alignment into the urban community, as a positive community asset.

MIDWAY AIRPORT-CHICAGO SKYWAY SEGMENT

Neither design standards nor the success of the Stevenson-Midway study plan is likely to result in carbon copies as we move from segment to segment along the Crosstown. For this is not formula planning; this is planning to meet particular community needs, and needs differ, as our experience with the east-west segment demonstrates. The east-west, or Midway Airport to Chicago Skyway, segment differs in several ways from the Stevenson-Midway segment. The east-west segment is more than twice as long

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Figure 14. Proposed alignment: Crosstown Expressway to Chicago Skyway (Photo courtesy of Limbaugh Engineers, Inc., Albuquerque, New Mexico).

as the Stevenson-Midway segment with correspondingly more communities to cross, and with much wider social and economic variations between communities. We could anticipate greater difficulties this time in informing communities, enlisting their participation, and reaching a planning solution agreeable to all.

On the positive side, the east-west segment does have an existing transportation facility, an existing railroad bypass, previously mentioned, for most of its length that is capable of accommodating an entire expressway.

In a study of five alternative routes through the east-west segment, we have recommended a route that follows a rail-industrial corridor in which much of the land is vacant and much of the industry is deteriorated. The route offers an opportunity not only to avoid residential displacement, but also to employ joint development for industrial renewal as well as community improvement.

East of the Dan Ryan Expressway, however, there was no transportation corridor and we were faced with the prospect of crossing a well-maintained community (Figure 13) through which there were no satisfactory paths.

We met this problem by ending the Crosstown Expressway with an interchange with the Dan Ryan. Then we proposed, Figure 14, that the system of collector-dis-

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Figure 15. Artist's view of Midway Airport–Chicago Skyway segment.

tributor lanes, which flank the Dan Ryan express lanes between downtown Chicago and 65th Street (a mile and a quarter north of the Crosstown intersection), be extended south to the Crosstown and a mile beyond. Crosstown users would employ these collector-distributor lanes in reaching the Chicago Skyway—and, in addition, the Dan Ryan's through traffic movement would be improved.

These route location decisions tended to determine highway cross-sections also. This is obvious in the case of the Dan Ryan improvement, but it was true also along the western part of the route. We considered, as alternatives, both split alignments and an elevated alignment.

The existence of a corridor capable of accommodating a full expressway below grade led us to the combined alignment shown in Figure 15 as the one that would cause the least community disruption and dislocation. To the left in the illustration is the railroad; to the right are parcels of largely vacant industrial land that would be available for community development. In the center of the expressway is a public transportation facility that would initially be served by express buses.

Major differences between the Stevenson-Midway and the east-west segments also required that we modify our public meeting procedures. In the Stevenson-Midway segment, only 69 families would be dislocated and there would be good opportunities for major commercial and industrial development. The Midway Airport-Chicago Skyway segment would displace more than 450 families while offering comparatively limited commercial and industrial opportunities. We knew that we would encounter a more militant response along the racially changing east-west segment than in the more homogeneous Stevenson-Midway segment. We could anticipate that more meetings would be required, over a longer time span, to communicate the city's programs and goals.

CONSULTING THE COMMUNITY

We decided to begin with a series of public meetings in the local communities prior to the total completion of our study plan, but with our planning far enough advanced that we could not only outline the alternatives, but also express our own preferences. Although there are no guidelines for community involvement prior to official public hearings, we felt that we were observing the spirit of the U.S. Department of Transportation's policy and procedure memo of January 1969, on public hearings and location approval that encouraged local highway agencies to hold informal public meetings "whenever such action would further the objectives of this PPM, or otherwise serve the public interest."

Our purpose at these preliminary meetings was not to conclude anything, but to start something—the necessary dialogue between communities and public agencies, without which no large-scale public project can succeed today. We emphasized that no decisions had been made. But we also made it a point to meet our professional obligations to make a proposal. We took considerable pains in developing a presentation and information materials, and we gave the meetings maximum publicity starting with an announcement by Mayor Daley at a preliminary meeting attended by local community leaders.

Until our official public hearings have been held and

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Figure 16. Waving protest signs.

evaluated, it is too early to assess the results of this initial planning dialogue. But from meetings held, I can testify that the response was interested, massive, and concerned— as indicated at one meeting by signs such as those shown in Figure 16.

There were plenty of questions to answer. And plenty of feedback, as shown in Figure 17 taken by the *Chicago Today* newspaper in which we are being told off. In one case there was a tumult when attendance exceeded capacity by two or more to one. We had to recess that meeting and have followed it up with a series of more than twenty smaller meetings.

In general, we continued to meet until everyone had an opportunity to participate so that a workable basis on which to complete a plan would be in hand. We have modified our original recommendations to reflect several excellent suggestions received from interested community organizations.

The official public hearings for this Midway Airport-Chicago Skyway segment will be held in January 1970.

CONCLUSIONS TO DATE

What can we say about our public meeting experience so far?

First, we are engaged in a process of large-scale public decision-making, which requires exposure, time, and a trigger to set it off. Our trigger is community and public agency dialogue, based on an initial proposal that focuses public attention, stimulates public thinking, and prepares the ground for acceptance of a modified plan.

Second, there are thresholds against communication between planners and public, which we simply have to reckon with. One of these, which we are all aware of, is a

Figure 17. Getting told off.

bad image of urban expressway building, neither totally deserved nor totally undeserved.

There is another threshold that we encountered as part of the price of becoming concerned with community improvement. This threshold appears as an initial reaction against urban change of any kind—good, bad, or indifferent. It reflects, probably, a lack of confidence in the possibility of significant urban improvements. Back of it, of course, is a long history of society's failure to meet certain essential needs.

Housing, in particular, is a symbol. Our national inability to develop new inner-city housing on the scale required has made it that way, and we expressway builders are simply going to have to take this particular bull by the horns. It is not enough to provide sites for housing; we are going to have to cause it to get built. And we will do well to build it first—before the highway—to demonstrate that replacement housing will be provided.

The long-term low-interest housing programs in Sections 235 and 236 of the Federal Housing Act should be combined with the Highway Act's relocation bonuses to make an immediate start in housing, and adequate funding must be provided. In Chicago, we feel that special funds should be made available immediately for highway-connected housing development, and we intend to press for this for the Crosstown.

In short, we have undertaken a big task in trying to use urban highways as avenues for urban development. We do not regret this, for it makes sense. We have had the pleasure of seeing the sense of it and the opportunities in it

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dawn upon local residents—and on road designers and builders—once their initial concerns and suspicions were allayed. But we must not deceive ourselves; if we intend to build urban highways, we must plan for housing, community improvements, economic development—and when we carry those plans to the public—we are making commitments, no matter how we may condition them.

The delivery date on those commitments is now, not ten years from now, and we must provide the resources with which to deliver on them. In Chicago, we intend to deliver.

In conclusion, with special reference to those who are in the road-building business, it is apparent that the time has run out when road builders could simply build roads to solve pressing traffic needs without giving adequate consideration to the social and economic impact of the road on adjacent communities.

Today we must build *roads plus.*

This means that we who design and build roads are also going to have to branch out and engage in the planning and coordination of collateral development—in the building of community facilities, parks, industrial centers, shopping centers—and above all housing. Unless we can manage to use our know-how in building low-priced and moderate-priced housing in the cities, we are not going to build urban expressways.

There is nothing unreasonable then in asking highway designers and builders for new enterprise, and a new emphasis on city building, as well as road building. Urban highways must become urban opportunities. Urban highways must become instruments of urban improvement.

This is our challenge.

DISCUSSION

QUESTION: In Los Angeles, we would ordinarily try not to put a park next to a freeway because of the air pollution problem. A good many noxious gases are still being emitted by automobiles. Would you have a comment on the idea of parks next to highways?

ANSWER: The area involved has a deficiency of parks. The local streets with stop-and-go traffic create more pollution. We have a buffer strip of landscaping along the line. Certainly, there are no absolutes.

QUESTION: I would like to ask about the facilities for financing the joint development and in particular the part that you would anticipate from the Department of Transportation.

ANSWER: On joint-development projects, such as the parking lot, a park alongside using other land, and the building of the parks and the parking-lot structure: to what extent do we expect participation? The question is really the basic issue as to whether we are going to build urban expressways in populated areas.

The present policy of the people in the Bureau of Public Roads is that these areas are nice and desirable, and funds are available for highways. But the funds are not sufficient to take care of the highway needs, and the Bureau is charged with stretching the dollars to get the most highways out of them.

The difference in opinion is that perhaps we are going to have to set back some of the priorities on highways and stretch those funds to take care of these needs—funds that are not available from local or other federal sources. In this area, we in Chicago have an advantage politically, and Secretary Volpe of the Department of Transportation is wholly in accord to this. We have issued the statement to the Bureau of Public Roads that we expect 100 percent of the improvement as part of the highway development. Without that, I have no intention of going forward.

At present, we are making those studies demonstrating why each individual joint-development project should, in our judgment, receive full federal funding. We will then pass it to the Bureau of Public Roads, to accept it or turn it down. If they turn it down, we are in a better position to bring it to Secretary Volpe.

QUESTION: Your answer to the last question is interesting in that joint development implies the involvement of several governmental agencies that are not really structured to work together.

The Department of Transportation will agree to support your joint-development efforts in Chicago, which has demonstrated political power to pull this off. What about the possibility of extending this to other cities? Can you indicate the kind of organization that might be required to pull it off in regional governments?

ANSWER: If we insist on a policy of full participation of the Department of Transportation, are we overlooking other departments? We have involved every planning agency that is in the area, the Department of Housing and Urban Development, the school districts, the regional planning agencies participating with us. The plans that are evolved are really a total planning effort with everyone that could be involved.

Now, as to the intergovernmental cooperation that should be brought to bear on this problem (and in fact there should be funds from other federal agencies co-

operating with this), Secretary Volpe has told me that he himself is aware of this. He has been meeting with Secretary Romney (HUD) and with several of the other department heads. He has been the informal chairman of a little impromptu group to try to develop this concept and instill it in what he says is the bureaucratic morass challenging him and the other Secretaries.

QUESTION: In going to the split alignment for the Stevenson-Midway section, what became of the plan for the mass transit facility?

ANSWER: The part along Cicero Avenue has facilities for mass transit. Initially, we plan for express buses. When funds are available, we hope to convert to a rapid-rail transit system. There is volume and demand for that now, but we do not have the funds. So we are making provisions for it. The question of paving the lanes for buses is a joint-development issue we intend to pursue.

QUESTION: Your comments indicate that you take a lot of variables into consideration. But as a citizen and as a driver in Chicago, I would like to know who is responsible for that unsafe S-curve on the Outer Drive, and the intersection, the connection to the northern expressway just west off the Loop.

ANSWER: The S-curve to which you refer is one that was built in about World War I days. It hasn't been completed in that area. The Illinois Central Railroad was involved in it, and there were obligations at issue. Our plans for the next five years make provisions to correct it if funds are available.

As far as the expressway congestion and interchanges, when we plan an expressway system, we plan it as a total system. We do not have all the elements in that system. This crosstown segment will help relieve the traffic not destined for the business area. Only 15 percent of the traffic going through the junction you mentioned goes to the business district. Eighty-five percent crosses beyond.

QUESTION: In mentioning joint developments, there is a legal problem with regard to ownership and all of its implications. What consideration have you given to this?

ANSWER: What we have done jointly with the public agencies involved has been effectively to give the state title, so that in that way we would have no specific problems. If you are talking about schools or public institutions having rights, we lease this property for $1.00 a year to these people and thus overcome that problem.

QUESTION: First, who started this design team concept? Was it Baltimore, or was it Chicago? And a second historical question: as I recall, only recently the idea of two public hearings (a preliminary public hearing and a final public hearing) has been inaugurated. Do I understand that one of these sections of your expressway came under the old ruling where you had only a final hearing, while the other section, yet to be developed, comes under the ruling where you are going into preliminary hearings? Can you comment on the difference in your reception by the public in your two schemes?

ANSWER: First, the team concept is one that I think many agencies in public and private business have used in the past. In Chicago we have been using it for some time. And Tom Kavanagh is aware that our approval of our design-concept team was one day ahead of the Baltimore one. However, we do not look at the Baltimore team as a proper approach, because they have a marriage of four firms with individuals working for each of the firms. We have imposed the requirement that the team rent separate space, and that the firms detach their professional personnel on a full-time basis to this project only. They work shoulder-to-shoulder in the same room and have cross-fertilization of ideas.

As far as the public hearings are concerned, we have always believed in Chicago that communicating more freely with the public has been helpful. We do not say that the public is the decision-maker. The elected officials are the only ones who have that responsibility, and they will have to suffer the responsibility for wrong decisions. Representatives of community groups are here today, and may be gone tomorrow.

But it is important to explore and communicate all of the public's fears, reservations, and suggestions. Many suggestions from people living in the community are excellent, and some items had been overlooked, as normally would be done, so that this approach is certainly a desirable one.

We believe that the dual public hearings (the corridor concept and the design-hearing concept) are applicable in urban areas. Our initial hearing is one in which we go down to actual taking lines—the lot lines that would normally be expected to be involved. Then we intend, before we go into construction, to have another public hearing, in which case we would show the aesthetic considerations to the community—where the interchanges are, how they will be handled, etc.—and even on the Stevenson-Midway section, where only one hearing was required, we intend to have another official public hearing. On the other segments, we are following exactly the required procedure of having two public hearings.

One of the strongest advocates we have for the welding of an expressway into the community is Secretary Volpe. His background as a highway man, tempered by his having been Governor of Massachusetts, has given us a tremendous ally.

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HOUSING TRENDS AND STRATEGIES

Joseph H. Newman

Before I go into trends and strategies in housing, I feel I should briefly trace the course of events from the Second World War to the present time to set the stage for a look into the future.

After World War II, there was a unanimity of purpose and a pervasiveness of common effort aimed at catching up with the pent-up demands. Through the late forties and the fifties, the number of builders grew rapidly. The capacity of building product manufacturers and the supply of tradesmen expanded likewise. The emphasis was on the use of new or improved forms, textures, and materials; and in upgrading comfort and convenience—improved air conditioning, lighting, appliances, surface finishes, and insulating materials.

Government legislation and institutions expanded. The single-family home was the dominant residential unit. The city dweller fled to the suburbs. It was easy and relatively inexpensive to borrow money to buy or build. It was a seller's market.

In the early sixties, signs of change were evident. The producer found out he couldn't just sell basic materials and products, but he had to market function and take into account the interdependency of his product with that of others.

The multifamily structure started to take an ever-growing percentage of the market. Land and labor costs increased. Money became more costly. The emphasis shifted to luxury and middle-class housing. Red tape increased.

Many more builders turned to industrial and commercial building because it was more lucrative.

There was a reverse flow of people into the cities, but generally of a lower income bracket than those who left.

No new or improved materials appeared and the emphasis shifted to how better to put together what we had, particularly in the light of growing labor shortages and longer time to get projects off the ground.

Housing started to mean more than basic shelter. Its definition began to embrace education, style of life, community, transportation, and health services.

The Housing and Home Finance Agency became the Department of Housing and Urban Development (HUD). Some states and cities set up miniature HUD's.

A housing crisis became an urban crisis. Constraints that people had tolerated became deterrents.

The mobile home industry mushroomed.

Money became still more costly and tight. On October 14, 1969, only 55 percent of the FHA's regional offices reported an adequate supply of funds.

People started to worry about poor environment. The behavioral scientist grew in stature.

More and more housing became subsidized through a host of devices ranging from low interest rates to tax abatement to outright rent supplement.

The rate of decay in older buildings increased.

The talk and literature on housing and the cities, ecology, and poverty proliferated. As this symposium was held, another conference—on "A New Politics for Housing"—was held in New York City with sessions entitled "Impasse in the Kitchen: Which Cook Is Chef?" "Can Construction Really Be Industrialized?" "Help, Help, Help, for the Sick, Sick Building" with speakers and chairmen from institutions that did not exist in the early sixties.

On the roster is the president of a state Urban Development Corporation; the executive vice president of a development company concentrating on inner city activities; the officer of a Citizens Housing and Planning Council; and the director of a Joint Center for Urban Studies.

The stage is set for the seventies.

Now, what about the plot? Our nation needs 26 million housing units in 10 years or about 10 million more than recent historic production for a similar period of time.

If we look at this goal through the eyes of the cast of characters on stage, we see different things, but basically all—the builder, the occupant, the building product producer, the financier, government, labor, and others involved in the housing process—are concerned with the questions: "What does it mean for and to me?" and "How may I help beneficially?"

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The villain of our play is the built-in conflicts among the diverse interests, the complexity of the tasks, and the institutional constraints.

The preamble to this symposium stated that the engineer's technical expertise and knowledge of systems engineering make him one of the valuable forces in effecting meaningful urban change. Enter the hero.

Before I incur the wrath of the scientist, the urbanist, the architect, and members of other disciplines, I must hasten to point out that when I refer to the engineer, I do not solely mean one formally trained in this discipline. "Engineer" means any qualified professional who practices the engineering discipline or who is on a multidisciplinary team that is guided largely by the principles of this applied science concerned with utilizing all our nation's resources effectively for supplying human needs in the form of physical things such as buildings.

To help effect meaningful change, the engineer tries to express the complexities and different viewpoints as value variables that he can examine, arrange, rearrange, integrate, and ultimately optimize in an orderly way.

The kind of thing I have in mind was expressed elegantly by Messrs. J. Van Ettinger, Sr. and Jr., of the Bouwcentrum, the building research institute of Holland, in their paper "Problems And Methods Of Low Cost Housing" when they were discussing the meaning of quality:

The quality of a product is defined as the measure in which its properties are adapted to the needs of the user. In order to judge the quality of a product it becomes necessary, besides analyzing the characteristic properties of the product, to also analyze the actual situation of the user. Quality in this relative sense can be defined as a "fitness for purpose."

In a purely functional sense, abstracted from economic considerations, quality is the use-value of a product to a given user, that is, the attuning of its properties to his needs. This quantity is called "abstract quality." By comparing the use-value to a given user with the importance to the same user of the necessary sacrifices and, in this way, including such economic quantities as the cost of the product and the financial capacity of the user, one arrives at the definition of "economic quality" as the difference between use-value and sacrifices.

The Van Ettingers go on to talk of use-value and sacrifices not being functions that are stable in time, saying that the displacement of the use-value function is a result of social and technological changes while the displacement of the sacrifices function is the result of increased efficiency of design and production. These notions and others are familiar to the engineer and they help establish optimal or preferential strategies. They can help answer the kinds of questions that need answering: Do we want housing that lasts longer or that obsoletes sooner? Do we want low- or high-density housing? How much conformity or variety should we have? What degree of industrialization is best? There is full recognition that many options are available for achieving a given result and that the housing and urban situation is a dynamic one full of social and human variables requiring the attention of all kinds of engineers including social engineers.

If we are going to be concerned about use-value and economic quality, let's briefly look at one variable in building that appears to be more significant in affecting costs than product or system innovation, i.e., dwelling unit size, particularly in light of the trend to the purchase of more mobile homes by the housing consumer.

To illustrate what I have in mind, I will state an oversimplified case. Assume the following constants: abstract quality, amenities, family size, location, and building type.

Suppose one was planning a 120,000-sq-ft housing project of say 100 dwelling units whose total projected cost was $2,400,000 and say the average unit area per dwelling unit was 1,200 sq ft. This means the average unit cost is $24,000 or $20.00 per square foot. By cutting the area of the average dwelling unit in half, to 600 sq ft, we could fit 200 units in a given cube at, say, an increased cost equivalent to the added cost of a kitchen, bathroom, related plumbing and mechanical work, and other needed items, or, say, another $650,000, for a total cost of $3,050,000, reducing the cost per apartment by about 24 percent to $15,250 and raising the cost per square foot to $25.42.

If, in the real world, the potential occupant had a choice between the kinds of situations I described, what would he take? If he lived in dilapidated housing and he could afford only a $15,000 home and he had to sacrifice area for modern appliances, new fixtures, better recreational facilities, and an environment similar to that in the homes of his more financially comfortable friends, I believe he would sacrifice the 600 sq ft. It can't be coincidental that the mobile home population is growing. I have cited an extreme example. However, the principle applies at intermediate examples.

What is "livability" and what price livability are the questions.

What does all this have to do with trends and strategies for the seventies? In my opinion, the trends and strategies of the seventies will be determined from the systematic studies, analyses, dynamic modeling, experimentation, and other engineering methodology aimed at simplifying the understanding of complex problems that seem to defy simple solutions.

Notwithstanding this, there are trends now identifiable that form the basis for my predictions and recommended strategies that will follow.

We are moving toward fashioning our home building industry more like a factory industry. Today companies can manufacture housing and bring it to the site as complete living units. Others can supply large factory fabricated modules that go together fast and simply in the field to form finished dwelling units. Still others produce a variety of factory fabricated components that go together efficiently and effectively to provide housing.

It is likely that each one of you have seen or heard about the preformed component systems, the stacked boxes, factory fabricated utility cores, stacked mobile homes, sectionalized homes, large-size panels, and other components that go together in a variety of ways. Not a month goes by without the popular press, and particularly the trade literature, publishing something on this. I would be wasting your time to give you example after example and then analyze each case history. You can read about them in reports and publications such as "the New Building Block," a report on the factory-produced dwelling module that is essentially a review of what is happening in the field of modular construction prepared by the Center for Housing and Environmental Studies of Cornell University; in "An Analysis of Twelve Experimental Housing Projects," a report by the MITRE Corporation to HUD; in the June 1968 issue of PROGRESSIVE ARCHITECTURE; and in countless other publications.

Is the trend toward fashioning our housing industry more like a factory industry a clear one? Will it persist?

Almost all industrialized housing experiments have shown that drastic savings in construction time are possible; a variety of architectural designs are possible; labor will cooperate in different ways, in different places; a variety of quality and installation problems exist that are of the type to be expected when any new approach is being tried for the first time.

However, the questions of achieving real cost savings and meeting national goals must still be answered. Industrialized housing means mass production. Mass production implies significant cost savings. Except for the mobile home industry, which has become a major factor in housing production statistics, I know of no mass production housing operation in this country. I know of no industrialized housing system produced and built in a quantity that exceeded or came anywhere near the quantity of nonindustrialized housing in the same state or even county. Perhaps there is one, but I know of no single housing project that exceeded several hundred industrialized or partially industrialized units. There are only companies producing industrialized housing in small quantities or recently formed and ready to take custom orders.

According to the MITRE report: "Up to this point, none of the new construction technologies examined has demonstrably cut direct construction costs below those of conventional methods." My own observation on a broad base has been similar.

In effect, we are in the midst of a growing experiment in industrialized housing trying to find out on a small scale what large-scale housing is all about. I contend that this may be difficult to do. Let us examine some of the factors. (See Figure 1.)

If curves A, B, and C represent different industrialized building systems, which one would you select? If you were an entrepreneur, it would depend upon your production capability, availability of money, and market and the like. If you were a public official concerned with short-range goals—e.g., what can be done between now and election day—you would be interested in systems B or C depending upon the time factor. If you were a young family wanting a new low-cost home now, only C would have meaning to you. If you were schooled in the engineering discipline, you would want to see the curve for conventional construction. In real life, constant abstract quality does not really exist and as a variable it clouds the issue. I have maintained it as a constant to make a point.

The important thing is for the nature of mass production to be recognized. If our goal is 10,000,000 more dwelling units in the next decade than in the previous one, it would be more prudent to experiment on the far right of the curves.

We have come to expect unrealistically that any industrialized housing experiment is really a demonstration and when the cost benefits are not apparent or are modest, cries of disbelief are heard and unwarranted pressures are put upon the entrepreneur. We must learn that several hundred or even several thousand dwelling units do not represent true industrialization and that, therefore, such endeavors cannot be expected to show the same economic benefits as true mass production.

Also, we must not forget that different subsystems, components, or products that make up a dwelling unit, no matter how these pieces are put together, require different production quantity runs for optimum production. A bathroom fixture or a kitchen appliance's optimal cost happens in production runs of tens of thousands while kitchen cabinets or window frames at substantially less—in only the thousands. As we put together smaller pieces to make larger ones in a factory, we achieve certain obvious basic economies but we incur certain penalties, e.g., those relating to transportation, distribution, and logistics, not to mention increasing sensitivity to market demand.

We must not overlook that given mass production, the market may not be able to absorb it in an orderly fashion.

Intuitively, I believe the industrialized house or apartment of the seventies will ultimately fall somewhere
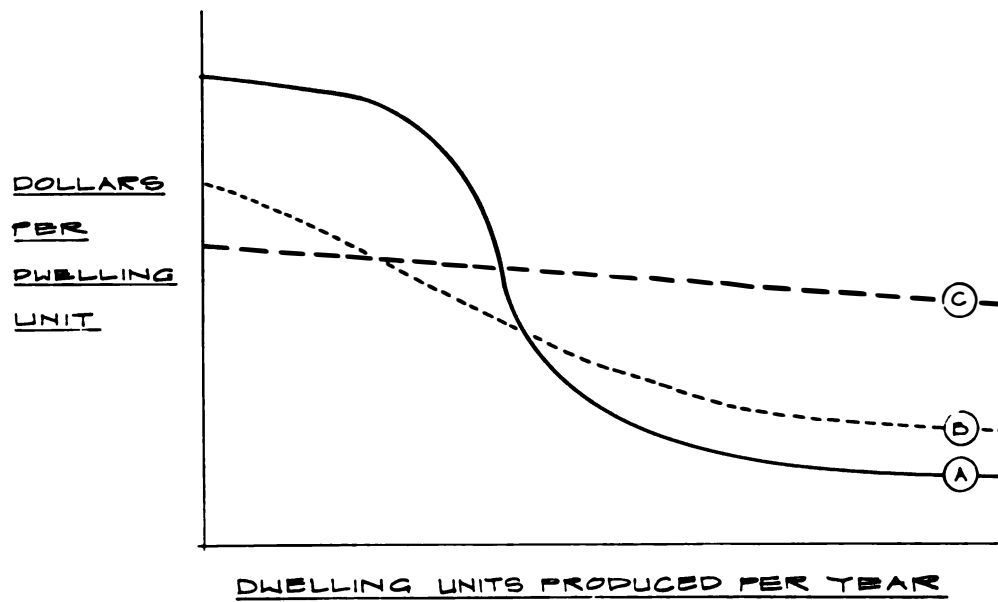
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Figure 1

between the fully factory-fabricated unit ready to move in and the conventional one of today. In addition to the factors already mentioned, we are dealing with conflicting forces—the technological forces that direct us to total conformity and rigidity in the pursuit of total industrialization and the opposing social and institutional forces that direct us to flexibility in the interest of unlimited choice and accommodation of diverse interests.

It is apparent to me—especially in the framework of the construction industry's fragmented character, today's social imperatives, the dynamics of the marketplace, and competitive requirements—that any strategy regarding industrialization must strike some kind of a balance between these opposing forces.

The emphasis logically belongs on factory construction of the systems that now most critically effect the construction cycle and that have a relatively high field labor content, which cost is now rising at a faster rate than factory, fabricated material, viz., electrical, mechanical, plumbing, and wet systems. If a system can be built in the field more logically, it shoudl not be forced into the factory.

Partial industrialization provides a prudent base from which to seek change because it gives some flexibility in negotiation among diverse interests. It offers a greater opportunity to provide style and functional options more readily and a greater degree of freedom in establishing fall-back or optional positions. It also provides an opportunity to spread the development activity and the

entrepreneurial carrot among a broader base of the building product producers' community. The enormity of the task and the time factor cannot ignore the need for widespread participation.

I see readily and easily available new subsystems and products that can be used efficiently in field or factory or both, which can make housing more industrialized now while we find out what is the optimum degree of industrialization or the best "product" mix. Finally, we stand a better chance of ending up with subsystems capable of being used in low-, medium-, and high-rise housing than of finding a universal large module suitable for all types of housing.

Getting any new subsystem or product into the mainstream in a quantity to be most effective to the user and preferable to the producer has been and is a time-consuming task suggesting we first look at the mechanism for introducing relatively simple available technology before we jump into a study of more complex systems. We cannot fully benefit from mass production unless we have a mechanism for getting the factory-fabricated subsystem placed where we need it, when we need it, and at the right price.

What good is it to have a successful experiment in a given city with a new system if you have to repeat it again and again in different cities and with different contractors and subcontractors within each city before the public gets the full benefit of any innovation, and this assumes that the contractors are cooperative and without an opposing selfish
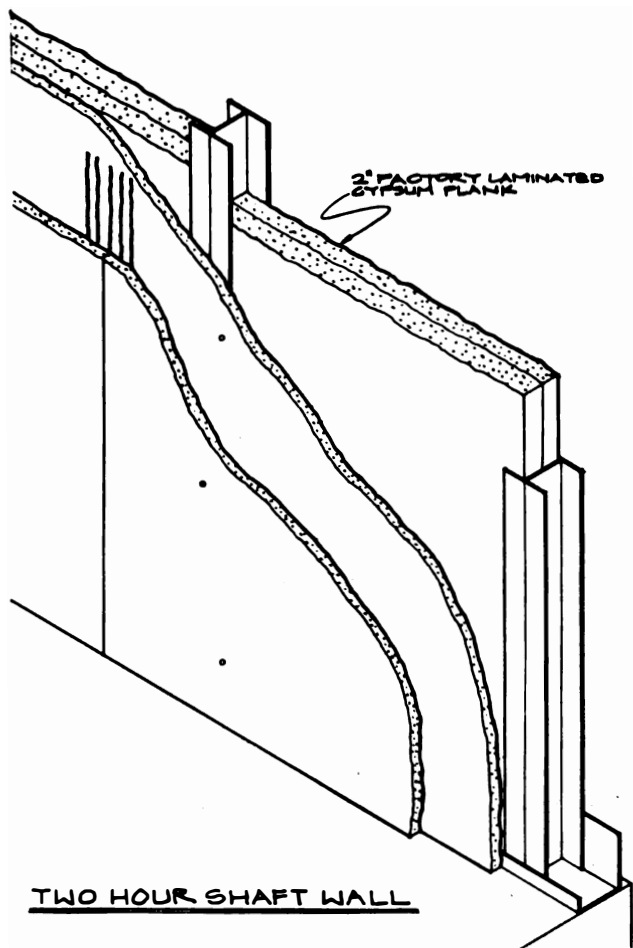
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Figure 2

interest. As the automobile manufacturer needs a dealer delivery system, so does the national system or subsystem manufacturer.

I will try to point up the nature of the gestation problem with a successful case history of a simple system with which I am personally familiar, viz., a gypsum board steel stud shaftwall of a 2- or 3-hour time-temperature rating developed to replace time-consuming, job-delaying masonry work in high-rise construction. See Figure 2.

The approach was conceived about five years ago. Mock-ups, development of all the details, performance testing, and the first full-scale field evaluation took about three years to complete in a cooperative climate. Then the slower steps of getting approvals from several building departments in cities where owners agreed to use the system. Then the orientation of different architects who never detailed such a system before. Finally, and perhaps the most agonizing process, the persuasion of subcontractors to put in the system at its optimum cost, and

getting enough installers to have competition. The man-hours, the aggravation, and the costs expended to bring on stream this relatively simple subsystem that is partially factory-fabricated point up the magnitude of getting more complex systems off the ground in a way that full benefits are achieved nationally.

The engineer can predict the cost of getting innovations off the ground as well as study the mechanism to achieve it all with a view to optimizing the process.

Another trend, the percentage of units in the multifamily category is growing and may well reach as high as 65 percent by the end of the seventies. When you couple this with the likelihood of more factory fabrication, this suggests less small home builders and more large home builders. To the building product commodity manufacturer this means a new breed of customer. The new purchaser will be the systems manufacturer, the large project builder, the mobile home manufacturer, all of whom will want to bypass traditional distribution channels that developed around the small builder. The new breed of customer will want his product shaped and shipped differently, or both, will demand a different kind and level of service, and will seek new purchasing arrangements. The commodity manufacturers will have to develop two distinct in-house organizations to service their big customers, who will be able to exert a major influence upon them as well as their small ones. Many will find it unprofitable to service the small customer. To a large degree the innovations of the 1970's will spring from cooperative endeavors while solving the problems and meeting the needs of the new builders and these innovations will be the commodities of the 1980's.

As components and subsystems are put together in new and improved ways and as experimental activities increase, a whole spectrum of new knowledge and information will be needed to establish evaluative procedures to determine compliance with performance, safety, and value requirements, to provide the technical expertise for making judgments in lieu of or for pending establishment of evaluative procedures, to aid in studying subjective human response to environment, to evaluate alternative methods and types of buildings, and to permit objective evaluation of experiments.

An authoritative national institution of some kind concerned with the building sciences will be needed to advise the public and private sectors on the challenges of the seventies. We can no longer afford to leave complex interdisciplinary technical decisions and judgments to people who are not qualified to make them or are concerned with parochial interests—at the expense of the consumer.

Not only will the builder of the seventies build more

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units, he will likely have greater financial resources than his historic counterpart and have on his team professionals representing all the disciplines. More often than not, he will produce one or more of the products of subsystems in the "house" he builds and he will build more than just the house, the total community. Project management in the sense of the aircraft and space industry will become commonplace. The signs of this are all around us; ALCOA, Boise Cascade, Westinghouse, ITT are but four examples of companies that are moving in this direction.

There will be no general contractor as we know him today. The general contractor will act as agent for the owner whether he be a government authority or agency or a private entrepreneur (unless of course the owner has such in-house competence.) He will perform all the functions of a general contractor at actual cost, but in a professional role, receiving a fee for his work. Savings resulting from his good management will accrue to the owner. In the nonresidential field, such is now commonplace on major projects; witness the John Hancock Building, the World Trade Center, the library at the University of Chicago.

The utilities may join the list of housing developers and they seem particularly well suited for such a role because, in the words of a spokesman for Niagra Mohawk (which recently agreed to build 134 low- and moderate-income apartments in Troy, New York), "their own prospects are bound up with the conditions of their regions." They can't pick up and leave if they get bad.

Two frequently asked questions are: "Will the private sector invest in housing in the seventies as he did in the fifties?" and "Why have they generally shyed away from investing in housing in the sixties, particularly the late sixties? When you ask the private entrepreneur, his answer usually is: "Housing is becoming less and less profitable and more and more risky than other alternatives." If this is indeed true—and it must be, because the number of dwelling units built, as an investment, by the private sector, continues to decrease (e.g., in Brooklyn, a county with more than 2 million people and an intense housing shortage, not a single permit for private apartment construction was issued in the first six months of 1969)—then why does the public official build up a bureaucratic system predicated upon the assumption that the private entrepreneur is going to become rich at the public's expense? The controls and red tape assume windfall profits, on the part of the private investor. If it were really so good, private entrepreneurs wouldn't be leaving the housing market.

What I have in mind is epitomized by the public employee arguing over a $200,000 contingency figure requested by a sponsor of a $50,000,000 project while costs due to inflation rise at 1/2 percent or $250,000 per month. Three months later the sponsor gives in and the official has served the public by saving $200,000 but at a cost of $750,000.

An examination of the magnitude of the housing task will also aid in understanding. If our goals are to increase the housing output by a million units per year, on a mass production basis this means that 100 entities will have to produce at least 10,000 units annually or 50 entities, at least 20,000 units annually. I have been told that the largest housing producer in the United States does not produce more than 6,000 units per year, and he is among a select small number, which means that we need to start again from scratch. This raises the questions of how do you get set up to do this; how do you get existing companies to increase their sales by $200,000,000 or $400,000,000 per year or new companies to reach that volume; are there that many companies who can undertake the task and, if so, under what ground rules.

The tasks that lie ahead are so great that the only way we can make any substantial progress is to divide the housing pie among the qualified and to train more companies to become qualified—on a negotiated basis and in accordance with established rules.

The so-called public protectors delude themselves by defending the competitive bidding process whether it takes the form of requests for proposals, sealed bids against an inflexible set of bid documents, or any other device. In the past, when there were more resources than work, this had its place, but today and in the coming decade when we will have more construction and urban building than the resources to do it, this doesn't make sense. Under the present-day circumstances, the best resources, given the alternative, gravitate toward the more lucrative projects, which are seldom housing for low- and middle-income families.

As scientists and engineers we must insist that any mass production experiment have a control. To really find out if 25,000 units of a new system are better by any cost-benefit measure established, one needs to build 25,000 conventionally produced units on a similar basis.

Finding the answers and solutions to the kinds of questions I raised regarding our housing goals will occupy the time of many professionals including the engineering fraternity in the coming decade and we are fortunate as a nation to have the mechanism of the National Academies and professional societies and a growing number of serious professionals in the private, public, and academic sectors.

The trends of urban change are clear and so must be our strategy.

In the seventies, we must change the housing industry into more of a factory industry, but not to the point of sacrificing flexibility of choice and the accommodation of

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diverse interests. We must establish a prudent base from which to seek further change.

We must make it an era when the engineering disciplines will optimize the "economic quality" of housing and the process for achieving it, as well as learn how best to combine our technological and management resources to meet housing needs.

It must be a decade when we take steps as an interdisciplinary professional community to organize a National Institute of Building Sciences to cope with the problems and questions arising from putting things together in new and improved ways and to address the full spectrum of needs on housing and the related environment.

It must be a time when we experiment on a large scale to answer large-scale needs. Franklin D. Roosevelt said, "The country needs, and unless I mistake its temper, the country demands bold, persistent experimentation. It is common sense to take a method and try it. If it fails, admit it frankly and try another. But above all, try something."

Our role in the professional community is to tell our country what methods and strategy they should choose because we have the tools to raise the probability of success as we strive to make the city an example of the American spirit.

DISCUSSION

QUESTION: To achieve your prediction for the 70's, how do you evision the role of the building-trades craftsman vis-à-vis the industrial worker?

ANSWER: I have perhaps more optimistic faith in our ability to solve this problem. I see some trends behind the scenes, and I think we will get down to serious horsetrading in the next eighteen months or so. Perhaps I am overly optimistic, but I see the signs.

QUESTION: Building 50,000 housing units is sort of a monumental task. A big part of that problem is financing, as I see it. Do you have recommendations on proposed changes in tax laws?

ANSWER: As engineers, I think we realize housing is one part of a total picture. Engineers in this country will not make the decision. Perhaps they should make it, but they will not make the decision on our priorities in the coming decade. Housing has a value in the social scheme of things, and so has war. So have some of the other elements. This will be decided on the political scene.

TOWARD AN INTEGRATIVE PROCESS FOR URBAN PROBLEM SOLVING

James B. Reswick

Sherman K. Grinnell

More and more people live in urban areas; rates of both environmental growth and decay increase; the challenge of providing human urban environments for humans grows. Urban planners and designers are faced with more complex problems: the need to deal with human needs in a human way, the need to collaborate with more people and organizations in order to accomplish results, the opportunity to use a wider variety of tools and materials in generating creative solutions. But how can this challenge be met effectively?

Most growth and development on the urban scale is not planned; it just happens. Much of what is planned stays in the files and is never implemented. Cleveland has had at least six separate sets of plans for a downtown subway ready to go during the last twenty years but today there is no downtown subway, and no plan to implement one. Most planning is piecemeal—for one building, one development, one transportation mode, or one subsystem of an urban environment. Consequently, the overall scheme of things is not an integrated plan but a resultant; the sum of many small plans and actions.

These conditions lead us to ask: What is the planning-design-implementation process on the urban scale? How does it happen? Who is involved? What makes it work? What makes it fail? What is the role of the professional engineer?

THE PLANNING-DESIGN-IMPLEMENTATION PROCESS

Four major elements are involved in the planning-design-implementation process that leads to solutions for problems on the urban scale. Those elements are (1) a problem area or focus, such as transportation; (2) the people and organizations that have money, knowledge, skills, or power that is relevant to problem solutions in the area of interest; (3) a series of problem-solving steps and cycles that, hopefully, lead to problem solutions; and (4) a linking process by which the first three elements are joined to accomplish the desired results.

Sociotechnical Problem Area

We have a growing list of sociotechnical urban problems with which those who live in urban areas are all too familar. Every list would include housing, environmental pollution, transportation, water resources, and environmental decay as significant areas for which problem solutions on a scale not yet achieved are urgently needed.

People and Organizations with Relevant Skills, Knowledge, Money, and Power

A factor that makes solutions to urban problems so difficult is the great diversity of widely dispersed skills, knowledge, and power that must be mobilized to produce significant solutions. At least three major categories of people and organizations have primary stakes in the solution of urban problems:

(1) Professional Experts— have the role of providing expertise in the many technical areas that are needed. Professional planners, designers, engineers, social scientists, architects comprise this group. Planning agencies, consulting organizations, nonprofit corporations, and universities are the kinds of organizations that tend to house these technical specialists and to take the professional expert role.

(2) Decision-makers and Implementers— have the role of setting criteria for the planning activity, of selecting among planning alternatives, and for setting implementation of plans into action. The leaders of public and private power groups tend to assume these roles. The organizations that have a stake include (a) government at the city, county, state, and federal levels, (b) the Chamber of Commerce, (c) foundations, (d) business, and (e) industry.

(3) Citizens— all those who comprise the affected community have the role of endorsing plans and

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actions (usually through a more or less indirect process) and living with the results of the problem-solving activity. There is both an individual role and a collective one; the latter may be exercised through such organizations as the American Legion and the League of Women Voters.

Problem-solving Steps and Cycles

Every engineer, planner, or designer has his own set of concepts and terms for describing the sequence of steps that he goes through in accomplishing problem-solutions. The set of steps that lead to solutions to urban problems can be described in many ways[1] and comprise a very complex picture. For purposes of analyzing the overall planning-design-implementation process in this paper, a simplified set of steps are used as follows:

(1) **Recognition of Problem.** Recognize the existence of a high-priority problem focus or area.

(2) **Initiation of Work.** Put up money and criteria for initial work on the problem area.

(3) **Identification of Planning and Design Alternatives.** Identify the large amount of study and research work that is needed for potential action alternatives.

(4) **Selection of Best Alternatives.** The task of making choices based on value judgments about which ideas and plans should be implemented.

(5) **Endorsement of Plans.** In the case of very large projects, the community usually has an opportunity to endorse or make possible the expenditure of large sums of money.

(6) **Detailed Design.** After the approval of general plans, the detailed design of specific structures, hardware, and places occurs.

(7) **Construction and Operation.** The system is built and operated for the benefit of the community.

(8) **Use of Avoidance of System.** The community either benefits from, makes use of, avoids, or is unaware of the system.

(9) **Evaluation.** Sometimes, but not always, there is a process of assessing the effectiveness of the problem-solving job.

Effective solutions to major problem areas usually require several cycles through these steps with an escalation to larger-scope systems and solutions after some initial pilot-scale and demonstration or learning cycles.

Linking Processes

Although our effectiveness in relation to need for solutions to urban problems has slipped in recent years, we have a wealth of experience and an analysis of our current situation to use in considering how to improve the processes by which we link problem area, relevant people, and problem-solving steps to achieve better solutions. In the balance of this paper, we consider two such linking processes. The first process is the one that is usually used to solve urban problems—the fragmentive process suggests some important qualities for an ideal process. Secondly, an idealized process—the integrative process—is proposed and analyzed as the basis for improved urban problem-solving.

The Fragmentive Process

The fragmentive process, which consists of a series of problemsolving steps, each of which is the responsibility of the experts, the decision-makers, or the citizens, is depicted in Figure 1. This process is characteristic of most of our present urban problem-solving situations.

Characteristics of the Fragmentive Process

Characteristics of the Fragmentive process include:

1. The process is discontinuous. It consists of a series of discrete steps, each of which is in the hands of one group—the experts, the decision-makers, or the citizens.

2. Each step is under almost total control and responsibility of the group responsible for that step.

3. No one is responsible for or involved in the total process needed.

4. The sell followed by accept or reject processes by which successive steps are linked tends to produce distortions and distance rather than trust and joining between the groups responsible for adjacent steps.

5. As a result of the above, there are major pitfalls to be overcome in completing the process. Some of them are:

(a) Since the steps are separated in time and space, each responsible group uses its own concepts, language, attitudes, myths, and techniques in taking the inputs from the previous step, operating on them, and preparing the outputs for the next step.

(b) The "baton passing" between steps is loaded with communications gaps and commitment vacuums.

(c) Each group tends to support its own concepts and meet its own needs during the accomplishment of the steps for which it is responsible, but no one group seems satisfied with its limited role and influence in the total process.

(d) Brief inaction or minimal resistance will usually stop the process at any step, whereas major energy and continuous effort are required to keep it going.

6. Almost all the real problem-solving activity is conducted by the professional experts with little more than
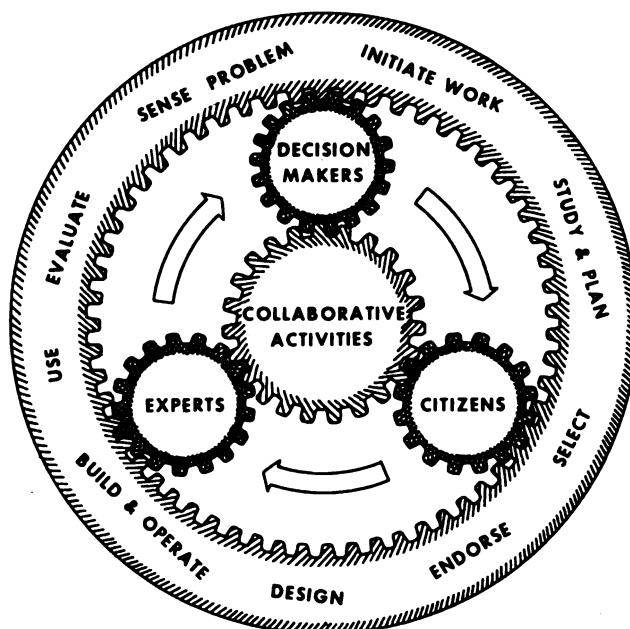
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Figure 2. The integrative process.

Figure 1. The fragmentive process.

choice-making, approval or rejection options left for the decision-makers and citizens.

7. The experts try, with increasing sophistication, to "psyche out" and anticipate the needs and problems to be faced by each of the other groups at each step. They try to produce a product by the end of the study and plan step that will carry the project all the way to the use step. So far, they have not generally been able to produce this kind of all-purpose plan.

8. There is almost no collective learning from the unsatisfactory experience of the total process that can be applied to the improvement of the next effort.

9. Assuming completion of the cycle and full-scale implementation of a housing, recreational, or transportation system, the ultimate nonuse or disuse of the resultant facilities can and does defeat the intent and utility of the whole fragmentive planning-design-implementation process.

10. In an area such as transportation planning, there is general dissatisfaction with the overall patchwork solution. People do not like the masses of concrete roadways cutting across their living spaces, and they suffer through traffic jams and parking problems; but neither do they choose to ride buses or rapid transit.

11. Not surprisingly, few major planning efforts make it through all the steps. Almost all undergo several cycles of sell and reject before acceptance at one or more steps. All experience major modifications to the initial thinking in going from start to finish.

The Integrative Process

Limitations in the fragmentive process suggest a number of characteristics for an idealized process that we have designated an integrative process. The integrative process has been the conceptual basis for the linking processes that have been developed in the Cleveland urban transportation projects designated Project DATA[2] (see Appendix A) and Project CTAP.[3] The integrative process is depicted in Figure 2.

The integrative process, which links the same problem-solving steps and groups described in the fragmentive process, emphasizes three key notions:

(1) Collaborative Activities— engage all three groups of people and organizations at each step of the problem-solving process provide the essential continuity, development, and growing processes for integration.[4]

(2) The Master Planning Concept— which is oriented to the development of a blueprint that will direct design work for decades, is supplanted by the notion of a master working process that will facilitate rapid, flexible problem-solving cycles that are geared to meeting changing needs of citizens.

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(3) Rapid Complete Cycles— of the planning-design-implementation process, which can be the basis for learning how to achieve effective collaboration, are emphasized.

Characteristics of the Integrative Process

Some of the key characteristics of the integrative process are:

1. All of the major groups are involved in each of the nine major steps.

2. Collaborative problem-solving activities that involve the participation of all of the groups are the vehicles for maintaining continuity of the process.

3. The linkage between problem-solving steps is of a different nature. Instead of sell, accept, and reject processes, the linking activity is one of organizing and deploying resources for the next step.

4. The collaborative activities provide vehicles for the two-way flow of resources and information needed to keep the process going.

5. The process is continuous rather than discontinuous. Each step is linked through people and continuing activity with the preceding and the next step.

6. Rather than divided responsibilities for separated steps, every group collaborates and is involved in each step of the process.

7. Selling and rejection are continuous and shared processes rather than discrete ones that each group does to the others.

8. Because of the continuous involvement and communication through all the steps in the process, communications gaps and commitment vacuums are minimized and can be dealt with as they occur as part of the total process.

9. Since the goal for all groups is not the completion of its own steps, but rather the completion of the total process, maximum energy and commitment can be focused on and mobilized to accomplish the end goal.

10. The product of each innovative problem-solving cycle is not an end in itself. It is the vehicle for proceeding to the next problem-solving cycle and expanding both the participation in and scope of the process.

Problems in the Development of the Integrative Process

The development of the integrative process in a community is hindered by several significant issues including:

1. Action models for this process do not exist. They must be invented, explored, and learned.

2. A redistribution of political power to a wider base of participation is involved. This can be viewed as a threat to "normal" political processes, to high-power people, and to those who are focused primarily on their own self-interests.

3. The success of the process depends heavily on the effectiveness of the collaborative problem-solving activities.

4. The effective involvement of the user and other individuals in the community represents a serious challenge.[5] New methods, processes, attitudes, and role definitions that facilitate the effective participation of community members in collaborative problem-solving teams are needed.

Engineers and the Integrative Process

Engineering know-how is essential in the solution of most sociotechnical urban problems. As a consequence, many engineers have the opportunity to take leadership in the development of integrative planning-design-implementation processes. Engineers, along with other professionals, in planning agencies, business firms, government agencies at all levels, and universities can join forces to initiate collaborative efforts that bridge jurisdictional gaps and conflict. Some current examples of such efforts are the DOT Central Cities Program, Urban America, Inc. Programs, and the Cleveland Transportation Action Program and Project DATA (Appendix A).

The pivotal issues that determine the extent to which these efforts can become visible models of the integrative planning-design-implementation process are their ability (a) to achieve sustained collaborative effort that is stronger than the devisive and fragmentive forces; (b) to gain active participation of large enough segments of the expert, decision-maker, and citizen groups to make a significant difference on the problem area; and (c) to accomplish early results through initial complete cycles of the problem-solving process. These cycles are the basis for learning how to collaborate together and generate the momentum for subsequent larger accomplishments.

Engineers and other professionals will be able to play significant roles in the development of these collaborative efforts to the extent that they and their organizations are:

(1) Free of the personal status and power needs that give a "my perspective" orientation to work rather than a "solution" orientation that is fundamental to good engineering practice.

(2) Equipped with collaborative skills and with knowledge of the social-psychological processes through which attitude, concept, and value differences can be bridged.

(3) Committed to achieving an overall integrative planning-design-implementation process and not just to the elegant study, planning, and design

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results that are the usual focus of engineering effort.

(4) Able to creatively use their broad engineering problem-solving concepts as a framework for the development of an integrative process without imposing prespecified engineering structures and language on others to whom it is foreign.

(5) Able to join in an interorganizational and inter-disciplinary task group to build some initial solutions to major urban problems.

SUMMARY

Problem areas, people, and organizations with relevant skills, knowledge, money, and power, plus problem-solving steps must be linked effectively in order to build solutions to our major urban problems. In this paper, we have analyzed the usual linking mechanism for planning, design, and implementation—the fragmentive process—and have described its limitations. We have used those limitations as a background for proposing an idealized approach—the integrative planning-design-implementation process. The characteristics of the integrative process and some notions about how to develop it have been outlined. In conclusion, we have listed some of the conditions and orientations that will enable engineers and other professionals to participate effectively in the development of integrative processes.

REFERENCES

1. Catanese, A. J. and A. W. Steiss, "Systematic Planning—The Challenge of the New Generation of Planners," *Ekistics*, August 1968.

2. Project DATA-HUD Final Report, May 1969 (OHIO MTD-2, to be made available by the System Research and Development Division, Office of Utilities Technology, Department of Housing and Urban Development in late 1969 - Vol. I, Summary Report, 60 pp; Vol. II, Development of Project DATA Model, 350 pp; Vol. III, Computer Printouts).

3. Mayor's Commission for Urban Transportation Report, March 1969, Cleveland, Ohio.

4. Grinnell, S. K., "The Development of Creative Inter-professional Collaboration: A Social-Psychological Theory," Engineering Design Center Report No. 4-67-18, Case Institute of Technology, 1968.

5. Spiegel, H. B. C. (editor), *Citizen Participation in Urban Development, Vol. I - Concepts and Issues* and *Vol. II - Cases and Programs*, Washington, D. C., NTL Institute for Applied Behavioral Science, 1968.

6. Goss, D. N. and D. J. Rinehart, "An Approach for Evaluating the Suitability of Transportation Design Concepts to Meet the Needs of Major Activity Centers," Society of Automotive Engineers, New York, 1969.

7. Goss, D. N., "Reexamination of the Urban Transportation Problem," Battelle Urban Studies Center, Cleveland, Ohio.

APPENDIX A:
PROJECT DATA—SUMMARY DESCRIPTION

Project DATA was a collaborative approach for developing a continuous process for improving the high-density movement of people and goods within downtown Cleveland. The project was conceived as a three phase study. The following relates to Phase I, which was accomplished during 1967-1968.

A computer modeling approach for simultaneously simulating various user decisions related to selection of mode, route of travel, and destination to satisfy specific trip purposes within downtown areas was formulated during Project DATA. The model can be used to assist in identifying realistic downtown transportation system design concepts that are compatible with the environment of a downtown area and that serve the transportation needs of the users of the area.

As part of the model development process, four major data collection activities were undertaken to obtain better understanding of the transportation environment in downtown Cleveland:

(1) Downtown Origin-and-destination Survey. First large-scale effort in the United States to provide the detailed data required for describing who, how many, how, where, when, and why people move to, from, and within a major activity center (downtown Cleveland).

(2) Pedestrian-movement Survey. Provided data describing the types and numbers of pedestrians moving along arterial streets in downtown Cleveland as well as identifying major pedestrian attractors along the streets.

(3) Loop Bus Survey. Identified user-perceived attributes of an existing downtown distribution system plus relevant socioeconomic and trip-making characteristics of the loop bus system users.

(4) Visual Place Survey. Provided data describing the environmental as well as the physical character-istics of downtown Cleveland.

A conceptual framework for achieving improved collaboration among the various agencies and people in a community that must work together to develop effective solutions to complex sociotechnical urban problems, such as downtown transportation, was developed and tested as

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part of the project—the integrative planning-design-implementation process. This process was used as the basis for developing a client (owner) for the Phase II and Phase III concepts of Project DATA plus a continuous transportation action program for the City of Cleveland as part of the Mayor's Commission for Urban Transportation. In effect, this Commission provided a mechanism for making a transition from a locus of action in Project DATA to a locus of action in the community.

An immediate action program—Action '70—for improving the transportation system in downtown Cleveland was also formulated. The action program is presently being implemented as part of the comprehensive transportation action program developed by the Mayor's Commission.[3]

A comprehensive description of Project DATA may be found in the Project DATA Final Report.[2]

Further details on the model building process may be found in references 6 and 7.

DISCUSSION

QUESTION: One of the areas that was not discussed but only mentioned was evaluation. How do you evaluate and how do you set up your criteria? Have you gone through any of that exercise yet?

ANSWER: In the new CTAP program, there is a "sensing evaluation." It is important to get some money, and it is important to try to get money to pay people to do it. It is not enough to show that the loop bus attracted twice as many riders after we put the information signs up. It is a much more subtle business about the effect on other lanes, the effect on people patterns, and so on.

All I can say in reply is that you try a number of approaches, the best ones that people can come up with, fill them in in the beginning, and establish criteria by which the system will be evaluated. Priority is important, and it must be understood by the federal government and the people who are doing the work.

QUESTION: You didn't mention the Cleveland rapid transit program in connection with the buses. Is this a part of it?

ANSWER: The Cleveland Transit System operates a rapid transit line, which I understand is still the fastest such line in the country. It innovated the airport extension, which not only has been an exciting thing, but has turned out to be at least twice as effective as originally predicted. It operates all the buses, and the management and the board of the Cleveland Transit System have been deeply involved in Project DATA. This has been a long time in

building, because the transit system for years has had to operate out of the fare box. This in turn means that it has been sorely limited in its ability to meet what might be called social needs as distinct from being able to make every route pay for itself. They have been under constant criticism, and it has been difficult for them to dare to reach out into innovative areas.

QUESTION: Obviously, all of us are primarily interested in anticipating new problems, in finding a process to avoid future problems instead of just solving the ones we have at the moment. How could you use the model to anticipate similar problems or to characterize your results so that they can be used that way?

ANSWER: The model is not yet operationally complete as a tool for planners. When it is (and it is going to take a lot more data collection before it can be), I think it will be a tool that will anticipate problems. In other words, a new system proposed at a certain place and in a certain concept can be tested, and this will create dislocations or changes elsewhere in the system, which then can be observed.

Most of the present activities, except for building a planning process for the future, havy been concerned with quite obvious needs, such as getting people from the inner city to jobs or servicing a hospital. Until some of these things are done in the context of a broad framework, we cannot get much interest and support from the merchants and businessmen and the power sources to support long-range planning and the like.

DETROIT'S METROPOLITAN WATER POLLUTION
CONTROL PROGRAM—IN ACTION

Gerald J. Remus

Today, man is living in the city of tomorrow with the government of yesterday. It has ever been so, that the average man changes before the institutions that govern him change. This government-gap puts another dimension on those engineers who deal with establishing proper basic patterns of service for humanity ahead of the institutions that govern.

It is to this premise that I am basing my address, and on two basic services—water supply and the protection thereof, or pollution control. My principal emphasis in this discussion is on pollution control, but the two services are so economically and politically entwined that it is impossible to talk about the administration and development of one without dwelling on both services.

Today the Detroit water systems, supply and pollution control, serve Detroit and 71 adjacent communities—more than 40 percent of the State of Michigan's population. Political leaders are not ready to organize metropolitan government; and before they will become ready, considerable development will have taken place. To serve this development, there must be constructed (if priorities for construction mean anything at all) basic water transmission mains and sewage interceptors that can be gradually augmented, and they must be orderly and soundly engineered so that the ever-expanding demand for the service can be satisfied.

For years Detroit has provided service to those communities directly on its political border. In the last fifteen years we have embarked on programs of water supply and pollution control on a utility basis. Water mains have been built to provide water to communities more than 50 miles from Detroit; and we are today, in counties in the surrounding watershed, constructing sewage interceptors that are more than 12 ft in diameter and 33 miles in length.

The work is performed by the Detroit Water Board (or Detroit Metropolitan Water Services) on a contract basis and with revenue bond financing. Service for other than Detroiters is on a wholesale basis; that is, each community does its own water distribution and sewage collection, takes care of its own business operations, and pays the central city Water Board on a master meter basis. The formal contracts have minimum-bill guarantees to the Water Board that are large enough to cover the debt service on the facility constructed for the area. This guaranteed revenue is added to the already existent revenue base and is used as collateral for the issuance of revenue bonds for the system. The community served may pledge revenues, taxes, or any income to satisfy the guarantee. Local tax money is not available to the Water Board. Federal and state grant money is available.

GAINING ACCEPTANCE

The adoption of a metropolitan area program requires a great deal of educational work. Obviously, just presenting a program by the central city will not gain approval. Any plan, even though it may not be perfect, is preferable if it can get construction underway. The shelves are full of plans that approach the ideal but cannot be put into action, be it for financial or administrative reasons.

Acceptance of the Detroit Metropolitan Programs was gained by involving the interest of the Board of Supervisors of the six counties of the Detroit metropolitan area. In 1957 the Detroit Metropolitan Water Services presented a master plan for water supply and for sewage treatment, but these programs did not gain acceptance. To create interest, an organization identified as the National Sanitation Foundation agreed to underwrite a review of all aspects of the two programs.

In 1959, after many meetings and reviews, the area Master Water Program was consolidated under the Board of Water Commissioners of Detroit. This gave impetus to the sewage problem.

In 1964, the National Sanitation Foundation reported on the sewage disposal problems of the six-county metropolitan area of southeastern Michigan. Members of the board of consultants were Abel Wolman of Baltimore,

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Louis Howson of Chicago, and George E. Hubbell of Bloomfield Hills, Michigan—all nationally known and respected. The board established what the sewage interceptor construction and the treatment standards for the area should be, estimated costs, and recommended administrative procedures. The conclusions were reached after reviewing all factors and after many meetings with regulatory agencies, business organizations, and county officials. The cost of this study, underwritten jointly by government of the area and business organizations, was $256,000.

During the time the board of consultants was preparing the final recommendations, in 1964, the federal government embarked on a study of pollution of the Detroit River and Lake Erie, and in 1965 made recommendations on quality standards of receiving water. These were evaluated, and on May 19, 1966, the City of Detroit signed a formal contract with the Michigan Water Resources Commission, in cooperation with the federal government. The contract stipulated that further improved treatment would be provided. Activated sludge was being touted as the "patent medicine" answer, but we had already established that this method of treatment alone would not remove phosphates consistently. We also had reservations about its ability to remove inorganic chemical wastes, although we really did not know what was coming into our sewage plant. Service is a prime requisite, if prompt and proper service is given to all. No political leader can or should be able to interfere with the normal development and expansion of a program.

PILOT PLANT—TEST FACILITY

In order to get the most results for the dollar on the hundreds of millions of dollars we knew it would take to protect the receiving waters of the Detroit River and Lake Erie, in accordance with the accepted water quality standards, it was necessary for us to do much research. A pilot station, with equivalent capacity of a community of 2,700 people, was built in one year's time, costing $484,000. Construction on the test facility was started in October of 1966, and it went into service in September 1967. After more than 50,000 laboratory determinations, and operating expenses of $320,000, it was concluded that our treatment process would be a combination of the activated sludge process, step feed modifications, supplemented with chemical precipitation of the phosphate using steel pickle liquor (ferrous chloride), and pretreatment with polymer for improved suspended solids removal. Post-chlorination will also continue to be used for bacterial kill.

The final design of the aeration tanks will incorporate the flexibility of the pilot plant so that efficiency and economy can be obtained through the full range of quality and quantity variations that will occur in the area's system.

STORMFLOW-SANITARY SEWAGE SYSTEM

The operation of the combined stormflow-sanitary sewage system has been improved considerably by the use of remote controls, automatic alarms, data loggers, and computer recording of all troubles, including the records of how a storm crosses a metropolitan area. This improvement, though just started, has reduced the stormflow dirt deposit to the Detroit River by at least 15 percent, and better protection will be provided against the flooding of our activated sludge process at the plant.

INDUSTRIAL POLLUTION PREVENTION

The pollution prevention aspect of this problem has been worked out with all industry on a person-to-person basis. In the Detroit regional service area all wastes—industrial (where compatible) and residential—are discharged into the public sewerage system for treatment at the central plant. By this method, uniformity occurs on all treatment practices of an area, and benefits occur to all, because there are not enough technicians for each industry to have its own. Even if there were enough technicians, confusion would exist in the multiple interpretations of the rules.

TRAINING

All technical effort goes for naught unless an organization is trained with the will to do this job better, and with the knowledge of how to do the job. This requires that approximately 300 of our 1,800 employes take part in some type of instructional development at all times.

WHAT ARE THE COSTS OF DOING THIS JOB?

System expansion and improved treatment will cost $159 million in the next two years, with $208 million additional by 1975. A breakdown on contracts is shown in Table 1.

WHAT MOTIVATED THE CENTRAL CITY TO UNDERTAKE THIS PROJECT

The central city was motivated by the lower unit costs of a large-scale operation, the elimination of sewage plant effluent above our water intakes, and acceptance of the fact that no other practical method existed to get uniform results. Particular emphasis is being placed on the clean-up of the Clinton River, a tributary of the Detroit River discharging above Detroit's two large water intake tunnels.

WHERE ARE WE NOW

$17 million worth of work has been completed since

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1966. Twenty-seven acres of land have been cleared adjacent to our sewage treatment plant for plant expansion. Three hundred families were moved. Total cost was $3,000,000. We have $12 million worth of work under contract, and $68 million more must be contracted for construction in 1969, in order to be able to get 55 percent financing from state and federal grants. Designs are completed and bids are now being taken. In the next calendar year, 1970, $79 million worth of work will be constructed. Plans are 75 percent completed. Design work has cost $1,540,000. We estimate that $208 million additional will have been spent by 1975 for improved treatment and for expansion and improvement of the regional interceptor system.

HOW IS IT PAID FOR

The $159 million will be paid for as follows—by the Detroit System:

Cash	$ 12,000,000
Revenue bonds	60,000,000
State grant, 25 percent of total	40,000,000
Federal grant, prefinanced by the state	40,000,000
Federal grant, direct (estimated)	7,000,000
Total	$159,000,000

A rate increase for treating sewage of 32 1/2 cents per thousand cubic feet was formally approved on October 16, 1969, to pay for the extra operating costs and the revenue bond financing. This increase applies to all on the sewage disposal system, Detroiters and suburbanites alike. This increases the total cost of treatment to 65 cents per thousand cubic feet.

The $208 million expenditure for the years 1971 to 1975 is not yet financed.

RECOMMENDATIONS

1. Determine the ecology of the receiving waters, in our case Lake Erie. Today there does not exist a clear-cut definition on what our goals are for Lake Erie.

2. Train technicians in our pilot and processing plants so that better operating efficiencies will occur.

3. Do more constructive reporting to the public, lest this eternal sermon on "how bad and dirty things are" will create a no-progress image and thereby lose the support of the public; then, of course, progress will cease.

4. Find use for waste products, for example, utilizing pickling acids in our treatment process or cinderizing of sludge cake from the sewage plant filters in conjunction with power plant fly ash to create a desirable concrete aggregate.

5. Emphasize pollution prevention. Look at the treatment savings that could be made if the phosphate content of detergents could be reduced by one-half.

6. Work more effectively with industry, so as waste products are known, they can be provided for as new plants and processes develop, rather than wait until messes occur and then try to clean them up.

7. Develop and gain acceptance of better methods for organizing the administration and financing of an areawide sewage system.

8. Develop better and more efficient treatment methods, such as using oxygen instead of air for aeration purposes. Better treatment, settling basins, aeration tanks, and improved sludge handling are desirable for large-scale processing.

9. Build ahead of development in such a way that uneconomical paralleling will not have to occur after initial build-up is reached; and thereafter gradually expand capacity in step with development.

10. Do more in all professional organizations to effectuate the proposition that water supply and the protection thereof (pollution control) is one economic problem.

11. Establish in the minds of the public the premise that water supply and sewage treatment are a utility to be efficiently operated with ever-expanding programs as the service dictates, and that these services are not political playthings.

A strong recommendation is made against trying to adopt a master program in its entirety, totally financed (an impossibility) and constructed, before the demand for service develops. It is with equal emphasis that I recommend that a program be adopted in principle, and then systematically developed as demand dictates. Thus financing can be accomplished with lower rates and better acceptance. It would have been impossible to get either formal approval of Detroit's program in the financing, administration, and construction, or formal contracts with the suburban communities that we serve if all commitments would have had to have been made at one time.

The character of the organization responsible for executing these master programs is of prime and basic importance. If the organization is trusted and provides proper service, then the program gets good public support.

IN CONCLUSION

This outline of the Detroit programs is not presented as a cure-all for a metropolitan service in other areas, but these things that we do may help others. It is the best we could develop for our area, taking cognizance of all the conditions that control.

There is ample evidence that the existence of the basic services (or the probability thereof) when they are needed

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will control metropolitan developments more than any other force. If properly done with the other essential humanity services, such as solid waste disposal, control of storm waters, air pollution abatement, and metropolitan administrative improvements, then it can only follow as the day follows the night that the engineer then fulfills his proper destiny of being the principal technician that molds our society.

DISCUSSION

QUESTION: Please comment on the relationship of your pollution-control program to the metropolitan urban growth policy and, specifically, whether the system is supporting and extending the normal and undesirable urban sprawl that is occurring in that area now. Does this system feed that type of growth, or does it try to control it?

ANSWER: We have completed a study costing $4,500,000. We have had many discussions, and were asked (and refused) to run our system to expand to take care of urban development. But through the requirements that exist on grants that the regional planning commission approve what we are doing in order to get federal grants and state grants, some order is being brought to the process.

I would like to point out, however, that we have had so many studies in Detroit that there are enough studies on the shelves to prove anybody wrong or right. It doesn't make any difference anymore if you have another study.

The answer is that if there is a reasonable amount of intent on the part of the country or city that may be involved (townships are usually very ineffective) to follow some type of zoning laws, then they come out in fairly orderly development.

We have now developed several semi-central-city complexes of factories, with the accompanying shopping centers, and the end product of this is that you take the work to the people rather than the people coming to the work. There is decentralization in this effort.

QUESTION: First, do you think the boundaries of states and counties have become obsolete and should we start thinking in terms of urban centers? (Particularly in the Detroit area, you might think of Detroit and Flint or Detroit and Toledo). Second, what do you think of a water-filtering and recycling system installed in the homes?

ANSWER: Regarding the first question, I think I have already answered it in part, But, if you will, examine what is happening at Port Huron and Flint; I will use as an example a city that is there now but was a piece of naked ground five years ago—Woodhaven. It is 26 miles removed from our central city. Ford Motor Company said, "If you will provide the water and make arrangements for sewage treatments, we will put a plant in that township that will employ 3,000 people." That has been done, and the area is all built up.

Another area where there is a project of a similar nature is the City of Flat Rock. Flat Rock officials were told by the Ford Motor Company: "We will build a plant adjacent to your community," a type of foundry, "providing you get Detroit water." Flat Rock had its own water plant and its own sewage plant, but factory officials, building on the scale that they do, are wise to the fact that when they get the factories in there, they then can get nailed for the cost of the development of the township. These people don't bite on that anymore.

There is no doubt from the utility standpoint of water supply and pollution control that political borders must be ignored when looking for the lowest common denominator as far as costs are concerned.

As to your question about the local recycling process, that is technically possible but financially impractical. It is very expensive.

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Table 1
Sewage Disposal System
Estimated Cost - Program Phase I
Construction Starting 1968 Through 1970

Tabulated below is the estimated total cost of work under the first phase of the construction program. The items are listed by priority. Also tabulated are the cumulative total costs of Phase I. The costs include the estimated construction, engineering, contingencies, legal, and fiscal costs. Based on current cost index projections, the costs are estimated to be valid only until January 1970.

Item	Facility	Cost (Total)	Total Cost (Cumulative)
1.	Outfall diffuser and sampling station (PC-212)	$ 480,000	$ 480,000
2.	Railroad improvements (PC-213)	100,000	580,000
3.	15 Mile Road interceptor (PCI-15 & 15A)	4,030,000	4,610,000
4.	Pickle liquor facilities (PC-228)	450,000	5,060,000
5.	Steam generating units (PC-225)	280,000	5,340,000
6.	Steam generating unit auxiliary (PC-226)	160,000	5,500,000
7.	Northeast Sewage Pumping Station (PC-216)	5,500,000	11,000,000
8.	N.E.S.P.S.—pumping units (PC-227)	540,000	11,540,000
9.	Oakland Arm—section I (PCI-8)	5,600,000	17,140,000
10.	Corridor Interceptor—section I (PCI-5)	8,180,000	25,320,000
11.	Corridor Interceptor—section II (PCI-6)	7,590,000	32,910,000
12.	Corridor Interceptor—section III (PCI-7)	8,110,000	41,020,000
13.	Oakland Arm—section II (PCI-9)	5,770,000	46,790,000
14.	Plant tunnels (PC-215)	5,450,000	52,240,000
15.	Primary tanks (PC-219)	7,500,000	59,740,000
16.	Primary effluent conduit (PC-220)	3,030,000	62,770,000
17.	N.E.S.P.S.—outlet (PCI-4)	3,830,000	66,600,000
18.	Railroad relocation—phase I (PC-238)	400,000	67,000,000
19.	Metering installation—I	730,000	67,730,000
20.	Oakland Arm—section III (PCI-10)	5,250,000	72,980,000
21.	Polymer system	1,210,000	74,190,000
22.	Blower units (PC-235)	1,820,000	76,010,000
23.	Four vacuum sludge filters (PC-223)	1,200,000	77,210,000
24.	Incinerator improvements (PC-224)	2,780,000	79,990,000
25.	Chlorine contact chamber (PC-221)	10,300,000	90,290,000
26.	Romeo Arm—section I (PCI-12)	5,860,000	96,150,000
27.	Romeo Arm—section II (PCI-16)	3,940,000	100,090,000
28.	Harper-15 Sewage Pumping Station (PC-218)	2,640,000	102,730,000
29.	Metering installations - II	300,000	103,030,000
30.	First aeration module, including blower and electrical building (PC-233)	24,100,000	127,130,000
31.	Intermediate pumping units (PC-234)	970,000	128,100,000
32.	Transformers (PC-236)	400,000	128,500,000
33.	Switchgear (PC-237)	650,000	129,150,000
34.	Four final tanks (PC-222)	12,100,000	141,250,000
35.	Existing electrical system improvements—Phase I	500,000	141,750,000

36.	Fairview Pumping Station (discharge modifications)	200,000	141,950,000
37.	Conner regulator improvements	200,000	142,150,000
38.	Primary sludge disposal facilities	12,900,000	155,050,000
39.	Scum disposal facilities	2,420,000	157,470,000
40.	Secondary sludge thickening facilities	3,630,000	161,100,000
41.	Secondary sludge disposal facilities	10,900,000	172,000,000
42.	Secondary sludge electrical facilities	1,810,000	173,810,000
43.	Process water	1,450,000	175,260,000
44.	Control building, laboratory, and sampling system	3,440,000	178,700,000
45.	Additions to system monitoring and remote control	500,000	179,200,000
	Subtotal	$179,200,000	
	Land acquisition	3,400,000	
	Total program phase I cost	$182,600,000	$182,600,000
	(Construction starting 1968 through 1970)		

Session IV
PROPOSALS FOR ACTION

Philip Sporn, Chairman

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REORDERING OUR PRIORITIES TO MEET THE URBAN CRISIS

Walter P. Reuther

I want to congratulate you for having chosen as your subject "The Engineer and the City," because I believe that the future of the American city is in grave doubt. I think we in America need to act in the realization that we cannot save America except as we act to save the American city. And we cannot save the American city unless we bring about a more rational and more responsible allocation of our national resources.

I share the view of other Americans that the future of our cities is inseparably tied to the central question that confronts the human family: To what purpose are we going to commit the power and the potential of the twentieth-century technological revolution? Will we continue to commit that power and that unlimited potential to the madness of the escalation of the nuclear-arms race and man's ultimate, total self-destruction? Or can we work to bring about a rational world community? Can we harness the rising stars of science and technology for man's peaceful purposes, so we can extend the frontiers of human progress and human betterment and open up new and exciting opportunities for human growth and human fulfillment?

For the first time in the history of man, we have the physical capability of mastering our environment. For the first time, the tools of economic production are adequate to solve mankind's basic economic and material needs. Therefore, this is the first opportunity to build a just social order. Having satisfied man's material needs, we can begin to devote our time and our energy and our resources to facilitate man's growth as a social and cultural and spiritual being. This is the true meaning of a civilized society.

We have not yet fully understood the dimensions of the technological revolution that is changing our world at an accelerated rate, changing our cities and creating new problems that, to date, we have not responded to adequately.

It is very difficult to comprehend the simple fact that 90 percent of all the scientists who have lived in the history of the world are alive today. Their creative and productive minds are unlocking the mysteries of the universe, and we will make more scientific and technological progress in the next 25 years than we made in the last 2,500.

To what purpose shall we commit this fantastic technological progress? How do we go about relating it to basic human needs? How do we begin to direct it more effectively to meeting the problems of the cities?

The trouble in the world is not caused by science, and it is not caused by technology. Science and technology are neutral in the affairs of man. They have no ideology, and they have no morality. We must give them a sense of purpose, and a sense of social direction. The basic dilemma of the human community is that science and technology have expanded man's wealth, but not his wisdom. Science and technology have multiplied man's power, but not his understanding, his compassion, not his sense of human solidarity and brotherhood: all essential ingredients around which the survival of cities and the survival of the human community must be built.

We continue to make progress in the physical sciences, but we lag farther and farther behind in the human and social sciences. It is this growing gap between technical know-how and human and social "know-why" that creates the dilemma of the American city today.

Some years ago I was asked by the State Department to meet with Mr. Khrushchev when he visited our country at the invitation of President Eisenhower. We had a rough evening together, a bare-knuckled discussion. When it was over, he said that I was the chief lackey of American capitalism. . . . I want to tell you that I haven't persuaded the General Motors Corporation of that as yet.

Mr. Khrushchev was cockey; and he said, "We will bury your system in time, because history is on our side." I have tried to understand why he and other doctrinaire, dogmatic Communists feel that way. I have come to the conclusion that they think our free society is composed of conflicting and competing, irreconcilable, economic pressure groups. In their judgment, we are incapable of achieving a sense of common national purpose in the absence of the threat of war.

I believe we can prove them wrong, because I believe the genius of a free society is its capability of achieving

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unity in diversity. We can build that unity around positive qualities—common hopes and common aspirations, a common faith and belief, and a common set of values. But we must begin to work now as though we realize that time is getting short, and the solution to the crisis we face in the American city cannot be postponed.

Like millions of other Americans and millions of people all over the world, I was thrilled when Neil Armstrong left man's footprints on the face of the moon. We in the UAW were doubly proud because UAW members built the major space vehicle and many of the major components for every aspect of the space program. But to me, the significance of that successful moon flight does not lie in America's great scientific and technological capability. The real significance lies in the fact that America has the capability of doing great and wonderful things when it makes a national commitment and is prepared to allocate the resources necessary to achieve that purpose.

We went to the moon because we made a commitment to go to the moon; and we will solve the problem of our cities *only* when we make a comparable commitment and are prepared to allocate sufficient resources to translate that commitment into programs of practical performance.

Our values have been out of focus. We have been more concerned with the quantity of our goods than the quality of our goals. We desperately need to reorder our national priorities and put first things first, so we can get on with the job. I should like to suggest some of the priorities that I would place high on America's agenda of unfinished business.

In almost every city in America, there is a deepening crisis in the school system. The local tax structure is wholly inadequate to deal with the new dimensions of educational need. A massive injection of federal resources is needed. This is the only level of our governmental structure where we have access to resources even remotely adequate to the task.

I asked myself, "Why is it that when our federal policy makers are called upon to appropriate billions to train young Americans to die in the negative pursuits of war, hardly anyone says we can't afford that?" Now I believe it is time for us to provide adequate federal resources for a system capable of educating our young people in the rewarding purposes of peace.

We have a crisis in health care. We are the richest nation in the world—yet we have second-rate health care. We are spending $60 billion a year, an expenditure second only to military expenditures, and yet we rate eighteenth among the nations of the world in life expectancy for the male, twelfth for the female, and fourteenth in infant mortality. Last year, Sweden had the lowest infant mortality rate. If our rate had been the same, 40,000 fewer babies would have died in America.

Obviously, we must reorganize our health care system. We are the only industrial nation in the world that relies upon the marketplace to provide health care. The marketplace has demonstrated a tremendous capability of providing gadgets, but it lacks the capability to provide essential human services, such as education and health care.

We face a dangerous crisis on the housing front. I would put this high on the agenda, because we cannot save America's cities unless we can afford to rebuild them, unless we can afford to wipe out the slums and the social cesspools that breed crime and delinquency, and unless we can build communities in which the living environment will be worthy of people in a free society.

The Congress has set a goal of 26 million new housing units in the next ten years; but we will not achieve that goal unless we being to deal with the new realisms—unless we begin to apply the most advanced technology and design capability and use new materials and marketing techniques.

I am privileged to serve as the chief executive officer of what is called the Metropolitan Detroit Citizens Development Authority. It is a six-county, nonprofit, nongovernmental housing authority fortunate in having as leader a cross section of the top people in the greater Detroit community. Henry Ford is a vice chairman. Jim Roche, Chairman of the Board of the General Motors Corporation, is a vice chairman. We have taken upon ourselves the task of providing leadership and resources to deal with the housing crisis in the greater-Detroit area. We are told that we are the third largest builder of housing in America. But we don't pretend to be doing a good job; we are only piddling on the outer fringe. We look good only because other people are doing worse.

We have orders for 1,000 industrialized housing units with some significant reductions in cost; but the technology used was still very primitive. We will not solve our problem until we apply the most advanced technology through mass production of housing units.

Many people think that only low-income families are being priced out of the housing market; but more and more moderate- and middle-income families are finding that they, too, are feeling the squeeze. We are the only democratic country in the world where housing needs are subjected to the fluctuation of the money market. When the economy is going in high gear, we are told we can't allocate federal money for housing because it will heat up the economy; and when the economy is in low gear, we are told that we can't afford it. So housing gets victimized in both directions.

We need a new approach that breaks completely with the past—one that can bring to bear upon the housing crisis the full leverage of our highest technological capability. We

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must change old methods and old habits and old attitudes, and come to grips with the housing problem, or the American city will not survive. The choice is simple and clear. We must build, or the cities will burn, because the human frustration that builds up in the center-cities will explode and destroy them.

As one privileged to have been identified with the American labor movement for 30 years, I feel that labor cannot meet its historic responsibilities unless it rises above the status of a narrow, economic pressure group, and acts instead as an effective instrument for creative and constructive social change.

Now, I am aware that the building-trades unions have been conditioned by their bad experiences of the past—unemployment, seasonal work, and all of that. But I believe we must have a massive rebuilding of our cities by the application of the most advanced technology—the only way we can afford to rebuild America. And from that total rebuilding and the economics of abundance, the building trades would get more work and more job security than they could get from the economics of scarcity.

Consider the Apollo-11 main space vehicle that lifted three astronauts off the pad at Cape Kennedy and put them into orbit. UAW members built it in the North American Rockwell plant in Los Angeles. What was the labor mix that went into the most sophisticated thing ever assembled by man? It was 85 percent nonskilled labor and 15 percent skilled.

Next, take a primitive little box called a house; and we find a mix that is 90 percent skilled labor and 10 percent unskilled. Nothing could be more irrational from a productive point of view.

Consider materials. We are still using some materials handed down from the pyramids for housing; but not for the Apollo vehicle. Its heat-shielded underbelly, laminated 5-in. thick with new materials, develops temperatures up to 5000 degrees as it comes through the atmosphere to land. Yet the temperature inside the capsule goes up only a couple of degrees. These are the new materials. Until we use them and the new technology and design capability for housing, we are only pretending to deal with the problem.

The housing industry is a cottage industry in the space age. Last year the largest single producer had less than 1 percent of the total market. The industry is fragmented by a system of antiquated, obsolete, local building codes. We need to assemble a national housing market.

The Urban Coalition Task Force on Housing, of which I am privileged to serve as co-chairman with David Rockefeller and Joseph Kienan, is working toward such a market built around a set of national performance standards. And if we can establish one, it will facilitate the application of advanced technology to satisfying national housing needs.

We also have a land problem. We must build regional land banks and end the scandalous speculation and profiteering in land. We need to provide adequate long-term resources at a reasonable rate.

We have to deal with the problems of traffic in our great cities; because unless we do, we are going to be paralyzed. The automotive industry should make a constructive and creative contribution to helping America develop a modern mass-transportation system with private cars being used to supplement that system. We must realize that we cannot have one without the other.

We need a massive effort to deal with the deterioration of our living environment: air and water pollution, and other related problems. We need a total massive effort to create an environment in which we can begin to reassert the sovereignty of man over things.

And these are only some of the most urgent priorities that we need to be working on if we are going to deal with our problems.

One will ask, "Where do we get the money? How are we going to pay for these things?" This is where the allocation of resources comes in.

We are spending $80 billion a year in the arms race. The nations of the world are spending more than $200 billion each year searching for security, and yet every new generation of nuclear weapons makes us all more insecure. Somehow, because we are the strongest of the free nations of the world, we have got to provide new initiative and new leadership in trying to deescalate this insanity.

Unfortunately, you can't get a moratorium on the world power struggle; but we can try to shift it from the negative contest of the nuclear arms race, which no one can win, to a positive contest between our two competing social systems. Let us see which system can best harness man's creative genius and relate it to the basic needs of the human community. In that contest, I am confident that our system of freedom will prove equal to the challenge.

But we must get rid of some of the economic myths of the past. We ought to recognize that both Karl Marx and Adam Smith are museum pieces; and we ought to put them in the museums. A free society that relies primarily upon the marketplace for motivation is not incompatible with public planning for people.

In 1946 the Congress enacted what is called the Employment Act of that year. It committed us to goals of full employment, maximum production, and maximum purchasing power. We have never achieved those purposes. In the 22 years since the act was passed, we have wasted 53 million man-years of potential economic production.

I have said many times to the members of my union that an hour of human labor is the most perishable

economic value. You can produce a ton of steel in the Gary steel mills; and if you don't use it this year, you can store it properly and use it next year. You can raise a bushel of corn in Iowa; and if you don't consume it, you can store it properly and use it next year. But you can't store even one hour of human labor. If you don't use it, it is a total, irretrievable economic loss. And we have wasted 53 million man-years of labor that are irretrievable because we simply did not use them.

When the economists translate that loss into potential gross national product, they tell us that it could have equaled $1,815 billion. In those 22 years, we could have expanded our GNP $42,000 for every family of four in the country.

The answer then to the question of resources to meet our needs will be found in reducing the level of armaments and through full mobilization of our economy. We must have these resources to let us deal with our problems.

But we also have a problem that is not economic in character: how do we go about trying to make America whole—one nation, one people? Each of us, I believe, must work with greater courage and greater compassion to hasten that day when every American will be judged by the quality of his character and not by the color of his skin.

We must reject the voices of extremism, whether they are white or black, because there are no separate answers in America. There are no white answers, and there are no black answers. There are only common answers that we must find together. But if we are to find those answers together, then we must facilitate the process of peaceful social change. As John F. Kennedy warned, "Those who make peaceful change impossible, make violent change inevitable."

We must act in the knowledge that it will take new ideas and new concepts and new methods and new social investion to solve the new problems in the American cities. The tools of yesterday will not solve the problems of tomorrow.

Abraham Lincoln, whom I consider one of the great political philosophers of America, said at another time of testing in the history of our nation, "The quiet dogmas of the past are not adequate to the problems of the stormy present." He said, "Our task is new. We must think anew. We must act anew."

In the stormy present in which we search for answers to the problems of the city, we, too, must recognize that our cause is new; and we, too, must think anew and act anew. We have to develop the intellectual integrity and honesty to evaluate every new idea by its substance, and not by its source.

I have unlimited faith in the capability of free men in a free society. I believe America is equal to the call to greatness. I believe we can find answers to the urgent problems of our cities. But to do so we must get our values in sharper focus. We must reorder our national priorities and put first things first. We must allocate our resources more responsibly. We need a clearer sense of national direction. We need a stronger sense of national unity. And we need a deeper sense of national purpose.

As one American, I believe that we *can* save the cities. I believe that we *can* build a just social order. And I believe that we *can* transform the twentieth-century technological revolution into the twentieth-century revolution of human fulfillment.

DISCUSSION

QUESTION: We have made great strides in working toward a model building code. We also have new materials and new methods of production of materials that will lead to better and lower-cost housing. But we obviously have a problem with local building codes, with labor unions, with the design and the acceptance of these. I wonder if you have any specific suggestion that you might make for getting these various forces together to actually move ahead in this area.

ANSWER: As I indicated, I am working with the task force committee on the National Urban Coalition and we are trying to assemble a national housing market. One of the ideas we have been working around is the concept of federal legislation providing for a set of national performance standards. All federal financing would be based upon those performance standards, the standards being accepted by any community in lieu of their local building codes as a condition for federal financing. If there was a local community that wanted to continue to be wedded to antiquated local building codes, that would be a matter of local self-determination, but then they would be denied access to federal financing. We believe that is the only realistic way to break through, because if you try to change every local building code, it will take another hundred years, and we haven't got that much time.

Now, about the general problem. If I were the leader of a building-trade union, I would be out in front fighting to bring about the basic reorganization of that industry so that we could begin to make high-quality housing available to millions of American people who could afford that

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housing. I think that in the long run this is the way the building-trades workers will get greater security and greater protection, because only if we can afford to rebuild America will we have that opportunity. But if they drag their feet, if the industry drags its feet, then I think America has to move ahead, because no economic group in our society has a right to veto our capability of solving this kind of urgent problem.

QUESTION: I think a majority of the people in the nation agree with you that our national priorities should be reordered. The question is, how? How can the public get a better understanding of the mechanisms through which national priorities are being determined today? How can we explore effectively how these could be changed?

ANSWER: The point you raise is a very serious central problem. In a very complex society in which the average person is so busy living his own life that he doesn't really feel that he can influence the democratic process in a meaningful way at the decision-making level, how do you get people actively involved in that process?

I know of no other way than multiple meetings of this kind at every level of our society, in every community, to constantly raise the level of understanding of the average citizen. If they have the ultimate power of selection of leadership, and the leadership ultimately determines the priorities and the allocation of resources, then the only hope in a democratic society resides in raising the level of public understanding so that millions of Americans can translate that greater understanding into political action, into legislative action, influencing the whole democratic process as it goes about allocating resources.

QUESTION: I am a general contractor. I know you are well aware of the problems with the Building Trades Council when it refuses to permit contractors to utilize factory-fabricated units in order to cut costs. Do you think that attitude of unions will change to permit the most economic production of such units?

ANSWER: Well, I think that unless it changes, the American labor movement is going to be in very deep trouble, as it ought to be.

I have said on other occasions that only an economic moron thinks you can get more out of producing less, that the only way you can raise your living standards is to have access to more productive tools so that one hour of human labor applied to more productive tools can create more economic wealth. This is why in our contracts in the automotive industry we have spelled out very clearly that we join with the company. We want the best tools that science and technology can provide. We want to use those tools, and using them, we want to create more economic wealth. Then we want to share in that greater economic wealth.

It seems to me that a labor movement that thinks it can get more out of the economics of scarcity is a labor movement that is looking backward and not forward.

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URBAN PROGRESS: THE FORCES OF GOVERNMENT AND INDUSTRY

Bernard A. Schriever

We have arrived at the threshold of an era where, for the first time since man's existence on earth, it can rationally be envisioned that not only is it man's destiny to explore his universe, it is also mankind's responsibility to control and exploit the resources that exist for the benefit of the present generation as well as generations yet to come. We live in an age where within a span of a decade, a national commitment was made to release man from the shackles of the earth, and as a consequence, man's footprint is on the moon. We have penetrated millions of miles of space to send unmanned satellites to the vicinity of Mars and Venus and, on a basis of a radio-command request initiated at Pasadena, our knowledge of the environment and origin or our sister planets is suddenly increased many hundredfold. Television and communications relay satellites enable us to scan the globe on a real-time basis from the comfort of our living room. We have augmented our memory and problem-solving capability by the development of extremely powerful computers. Within one generation, mankind has spanned the gap from an earthbound existence to the era of supersonic and space flight. We have achieved so much in such a short time span and, yet, there are still slums in our cities. Poverty exists in our nation, and we see violence and unrest in an age of affluence. We have conquered distance, time, and speed, but have not yet provided minimal living standards for all our people. We must ask: "Why cannot our technological and management capabilities be oriented to solve our very pressing urban problems?" Indeed, in some cases, technological advancement has proved to be a detriment to living standards by an increase in the level of pollution. This apparent inconsistency in observing sophisticated technological developments on the one hand, and viewing a degradation in the quality of life in our urban centers on the other, has resulted in the concerted attempt to apply modern technology and management towards the solution of key urban problems. A number of industrial firms have made commitments to enter the urban and regional sciences area with the intent of using aerospace technology, planning, and management techniques to improve the quality of urban life. As of now, this has resulted in little success when looking at the big picture. Of course, we have begun to look to industry and modern technology for solving specific problems—pollution, air and water, waste disposal, transportation, education, health, etc. This is good and progress is being made. Project breakthrough is a breakthrough in one sense already—HUD is becoming a customer of industry, with more than 500 proposals. I am not saying that industry should build houses for HUD but if industry is ever to become effective in urban matters—as in defense and space—the federal government must be a considerably more vigorous customer. It may be that we are doing all our system will allow. An assessment as to the reasons for this apparent lack of success in the overall is vital if we desire to improve our environment to the point where life standards are compatible with our technological capability and our ability to plan and manage.

What is wrong? Why can't we solve our urban problems if at the same time we can put a man on the moon? The oversimplified answer is always more dollars. The truth is that more dollars is not the answer. The engineer too often finds all the answers in technology and the systems approach. This too will help but alone won't do it. In fact, I've heard it said that the city and technology are in conflict and the city got in the first punch. I'm inclined to agree. Then, of course, the social scientist tends to look down his nose at any outside help to his socially oriented solutions.

We are a long way from solving our problems and many, including me, believe that we are not making very much real progress. In fact, I doubt if we are even holding our own. Certainly we need a national urban policy—the subject of Dr. Moynihan's paper. We will also need more dollars. We will need technology and the systems approach. We will need the social scientists and we will need the politicians. The $64 question is how can all of these elements be harnessed to permit meaningful planning—particularly long term, disassociated from political tenure—and a management system that will allow reasonably efficient execution. NASA and DOD have learned how to

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do this in their areas of responsibility. They have brought together the elements of government—industry and science—to accomplish their goals in carrying out their responsibilities to the nation. Military-industrial complex has become a sinister term. But what is the alternative in achieving national security or our national space goals—to joint participation of government—industry and science? This we have not yet achieved in any organized way in grappling with our urban problems. Barbara Wood stated it perhaps as well as anyone in the July 8, 1967 *Economist:*

> There are new insights into urban planning. There are new technologies available to give the plans a solid base in fact and extrapolation. There are myriad inventions—in power, in traffic control, in automation—waiting to be applied to urban problems. And there are the resources which will in any case be spent. What is lacking so far is the unifying vision of the whole urban order as a proper field of coordinated inquiry and action.

Since retiring in 1966, I have explored this area with a number of industrial firms, individual scientists, and the government at all levels, with no tangible success.

Though the need for a systematic approach to urban development exists, unfortunately, its application today is extremely difficult. The key problem is that social and psychological phenomena cannot be rigorously posed in mathematical terms as can physical phenomena. It is not feasible to define on an analytic basis the consequence of urban development strategies. It is also unfortunate that empirical approaches cannot be used due to the lack of a meaningful data base. However, since urban systems are orders of magnitude more complex than weapon and space systems, the ultimate approach toward urban development must be a systematic one, wherein the interactions of the physical, economic, social, and psychological are completely assessed and understood. Our urban posture to date has been to meet crisis conditions as they arise with emergency and patchwork solutions, rather than to consider urban development as an integrated entity. We must begin to develop the necessary data base and we must develop urban laboratories to understand the interacting effects if we are to intelligently and efficiently use our technological capacity for urban development. In this the federal government must take the lead—the Urban Institute is a step in that direction.

Now let me tell you briefly of my experience with Urban Systems Associates, Inc.—USAI—ten or twelve companies participated at one time or another in this two-year-plus effort, now on the shelf. Lockheed, Northrop, Raytheon, Emerson Electric, Control Data, Ralph M. Parsons, American Cement, to name some.

The types of programs encompassed by USAI's charter involved systems management, systems analysis, and long-range development planning as the first steps. USAI's experience in summary was that the establishment of a customer was more difficult than the derivation of specific programs.

The nature of the programs involved local, state, and regional development, which would be conducted in a cost-efficient manner using systems management and engineering techniques previously developed by the private sector. The first phase in programs of this type included the conduct of cost analysis and trade-off studies leading to the definition of an implementation program plan.

USAI proposed in several instances to conduct this phase jointly with appropriate government organizations. It was determined in the course of several of these efforts that government was not structured nor motivated to accept a program of this type. The reasons for this were generally due to:

(1) The nature of government itself, its organizational structure, and its implementation approach.

(2) The traditional procedures used by civil servant-implementator and politician-decision maker.

(3) The general policy of government to respond to crises as opposed to the establishment of a leadership position and recommending innovative or new concepts for preventing problem solving.

The experience of USAI in its attempt to develop meaningful systems management programs with government indicates that at the present time the government is not constituted to effectively participate in these programs.

In summary, the reasons for this are as follows:

(1) The absence of an authoritive governmental body (client) with jurisdictional responsiblity coinciding with problem areas. Government is fragmented—at all levels.

(2) The lack of a responsive management structure within government. Mayors do not control many city departments or special-purpose districts. Governors do not control mayors.

(3) Most local governments have not defined their needs. There is no common agreement on what has to be done to improve conditions.

(4) Many implementors in government either do not agree with or do not understand a systematic approach to problem solution. Governments traditionally respond to crisis; planned efforts to prevent crises are rare. The present call is to provide jobs, housing, and education and, more important, to provide them now.

(5) The lack of money. Central cities are broke; they want unattached block grants from the federal government to spend as they see fit.

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(6) The characteristic of the governmental employee. To generalize, the employee does not have the concern and interest in involving the private sector in his affairs.

(7) The participation of elected governmental officials. Often these officials do not in fact support many urban programs because of possible repercussions from critical opposition, from antagonizing self-interest groups, and lack of perceiving problems beyond tenure of office.

The client with money, authority, defined needs, and proper scope, and agreement with a systematic or otherwise changed approach to improvement of urban conditions is seemingly nonexistent at this time.

However, it is the belief of much of the private sector that government needs additional assistance in planning, designing, implementing, and managing the growth of the city. Greater utilization of systems management techniques would contribute to better future growth rather than an excess of the unsatisfactory growth that we have experienced in most of the cities in the past.

Possible future courses of action for industry in making a contribution to the improvement of the urban environment include the following:

1. Continue previous civil-related activities that are most compatible with current products, business operations, or minimum capital risk and investment, such as:
- Supporting the independent sector efforts in the local communities.
- Conducting job training for hard-core unemployed under the manpower act programs.
- Providing consulting services to government agencies, at no charge, as deemed appropriate for each request received.

2. Continue to diversify company business into consumer breakthrough areas in need of attention. One example is to invest in the development of lower cost housing, which could be achieved through application of current technology and factory production techniques. The risk here is high and the possible return is long term.

3. Establish a formal, separate, nonprofit activity to achieve improvements in the local community. In this case a percentage of profits would be expended yearly, with no expected dollar return.

4. Express the industry viewpoint to government at all levels with respect to government inefficiencies, and with respect to the need for minimizing "political expediency" in government management of urban development and redevelopment.

5. Maintain an in-depth knowledge of urban activities by nominal market analysis expenditures over the years, and prepare to become committed to this market as government becomes more receptive to joint programs and when investment risk can be better defined and controlled.

ORGANIZATION

Urban affairs activities must be made a full-time corporate activity if the corporation is to generate an image of significance in the civil sector. Functional and/or product orientation must be subordinant to a more pervasive overview of the role the corporation seeks to assume. Once the corporate role is defined, it can then be implemented along functional and product lines. Since urban affairs is a people-oriented activity, it is imperative that the most current information concerning the environment and prevailing views of all individuals involved in a given situation be acquired. It is, therefore, quite likely that political consulting services will be required.

APPLICATION OF NEW SKILLS

A new science and technology is emerging that is an interdisciplinary integration of the social, physical, and management sciences. It is directed toward a comprehensive understanding of man and his institutions in light of his total environment. If new markets created by public edict in the civil sector are to be serviced, considerable attention must be given to this new science and technology. Many believe that to develop an effective, profitable, "urban-oriented" business, capable in this new science and technology, will require considerable time and a sizable investment.

That constitutes quite a list of suggestions for industry. However, to really succeed, the government must find ways to interact much more effectively with industry than it does today; let us say, as a government-industry complex in its most constructive sense for urban programs. And, of course, I include in this, participation by the scientific community. Project breakthrough could well be a step in creating an effective communication link.

I have the following rather obvious suggestions as to what might be done at the federal level. They all have precedent in either defense or space-oriented activities.

1. Improved coordination

There is a need to provide a structure for coordinating the responsibility for housing and urban activities that is splintered throughout government. At minimum, it seems to me, the secretary needs a commission composed of not lower than undersecretary-level persons (no alternates!) from all the agencies involved in the urban problem (HEW, DOT, DOD, Commerce, etc.). This group would convene under the chairmanship of the Secretary of HUD at intervals deemed necessary to work out interagency coordination.

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I also believe there would be value if the Secretary established an advisory council composed of leading persons from those sectors of the society who are involved in urban affairs (labor, industry, universities, the Congress, etc.). Properly tasked and led, such a group could go far to provide the entrepreneurial, innovative approach so difficult to achieve in government but so vital to adequate solutions for the problem.

2. Planning

HUD'S task is so complex that it can never really get a leg up on the solution without an adequate advanced planning and systems analysis group. Starting from scratch to create such an in-house capability is difficult. It appears to me that the most effective way to achieve this capability would be by creating a contractual obligation with a nonprofit group (see DOD's Institute for Defense Analyses).

3. Formulate a 5- to 10-year get-well action program

This is not intended to eliminate the immediate programs. Everyone admits the instant solutions are not possible; then why not add action items that take longer but that have promise to eventually get us on the right side of the power curve? I suggest that HUD initiate an in-depth survey for the purpose of identifying all inhibitions and obstructions—including sacred cows that stand in the way of more efficient planning—to management and implementation of sensible urban programs. The objective of the survey should be a specific action program to be carried out over a number of years: involving policy—legislation—organization—funds—management. This would provide an excellent platform for the planning and analysis group that was my previous suggestion.

DISCUSSION

QUESTION: I would like to commend the first speech that I have heard that says in fact that we are not committed to a policy in this country of helping the cities. I think we have heard too much of a feeling of consensus, but no one has really said we are willing to spend additional money to help the cities.

In connection with this, have you thought of how industry and the universities as well as governmental agencies could produce what amounts to a consensus for the real goal? And the real goal must be, I think, increasing the tax base for the purpose of helping the cities.

ANSWER: I think this is true, but I think my last comment inhibits me from saying that all we need is more money. There is no question that more monies will have to be provided through the governmental structure. But I think the highest priority should be in creating the management capabilities within government and then that interacting with private enterprise to enable us to efficiently carry out programs so that we can utilize those monies effectively.

Today the organizational structure and management structure simply don't exist. Even when we offered to provide our services free, we weren't welcome in some communities because a lot of the local bureaucrats do not want high-quality people looking over their shoulders. In every community, there is the usual, "Scratch my back and I will scratch yours."

How are we going to get rid of that?

We know what the problems are. Everybody has a whole set of problems that exist, and they say, "Well, just another study."

I am speaking about a survey in depth that comes up with a program directed into the Housing and Urban Development Secretary's level and the President's level. This will require legislation. It will require identification of programs. And I certainly agree with what Mr. Reuther said; you have got to have leverage with money.

And if you come up with programs that are rational and logical, then, if you can't get local levels to go along, just shut off the purse. It is the only solution. It is the only leverage. I don't think the federal government should go down to the local level and try to do the job that has to be done at the local level. But it has to get some leverage.

QUESTION: About two years ago a symposium was sponsored by the Civil Service Commission. One of the speakers in that symposium was former Governor Terry Sanford of North Carolina. He mentioned that he thought it was of assistance to the states and the governors to have federal programs with strings attached to the money. He thought the programs were good, and politically the states didn't have a chance of carrying out many of these program without strings.

I am inclined to feel a little pessimistic myself about the New Federalism. Would you care to comment about that?

ANSWER: It all depends on what definition you give "strings attached to federal support."

Having had experience in the Defense Department, from the Pentagon level down to the working level, I would say that I don't mind having strings attached to monies provided me at the working level when I ran programs at the working level, as long as I didn't get help from the

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bureaucrats in the Pentagon in actually conducting the program. So I think it depends entirely on the level of detail that is involved.

I certainly would agree with you. I don't think that we are really ready at the local levels for the federal government to turn over large sums of money without some monitoring—or at least providing guidelines, possibly broad guidelines—on how the monies should be used, and then monitoring to see that it is used along those lines.

But to try to have people looking over your shoulder at every detail, I think, would be a mistake. There are levels of detail at which the federal government can supervise. And I think it should maintain at least some monitorship.

Get a good management information system and get the kind of information you need to see that those guidelines are being followed. That sort of thing has to be done, and I don't know how you could really hope to accomplish very much, right now at any rate, unless you did that.

QUESTION: Throughout your remarks seemed to be a theme of greater centralization of governmental at all levels. But at the same time you say, quite rightly, of course, that urban affairs is essentially a people-oriented concern. Isn't there a danger of centralization on the one hand and certainly our need and wish to keep diversity at the human level?

ANSWER: There is, and I think the answer lies in the procedures that are established to allow participation in the conduct of large programs. And you can have participation at various levels in major programs, particularly the kind of national programs that Mr. Reuther was talking about, which I think would avoid the very narrow interpretation of centralized control.

I have seen it happen within the Department of Defense, even though a lot of people think we are monolithic, now that we are not from where you sat, so I think this can be done also in the civil sector.

THE CHAOTIC SOCIETY: WHITHER?

Philip M. Hauser

In my judgment, certain perspectives are basic to understanding the "why" of the urban crisis that afflicts America. Let me start in a professorial way by pointing out that man, or a close kissing cousin, has been on this earth for 2 million or perhaps 4 million years. In the course of man's occupation of this planet, four developments have had the greatest impact on his attitudes, values, institutions, and behavior: the population explosion, the population implosion, the population displosion, and the accelerated tempo of technological change.

I regard all four of these developments as components of what might be thought of as the social morphological revolution, comparable in its far-reaching effects to the industrial revolution. There is a significant difference, however. The impact of the industrial revolution is reasonably well understood. The meaning of the social morphological revolution is not yet even known.

Let me briefly identify these developments.

Almost everybody today knows what we mean by the population explosion. It refers, of course, to the remarkable acceleration of the rate of world population growth, particularly during the three centuries of the modern era. Population implosion refers to the concentration of the world's people on a relatively small area of the earth's surface—a process better known as urbanization or metropolitanization. Population displosion refers to the increasing heterogeneity of peoples who share not only the same geographic locale, but also the same social, economic, and political activities. People sharing the same space today often represent many diverse cultures, languages, religions, value systems, ethnicities, and races. The accelerated tempo of technological change requires no further elaboration.

These four developments are interrelated. The population explosion has fed the population implosion, both have fed the population displosion, and all three have been preceded and followed by accelerated technological change. As it turns out, these four developments probably are exemplified more dramatically in the United States than anywhere else in the world.

First, the population explosion in the United States:

In 1790, we were a nation of fewer than 4 million souls. By 1960, the census showed our population to be approximately 180 million. When the nineteenth census is taken next April, it will record a U.S. population of approximately 205 million. Despite our decreasing birth rate since 1957, a second postwar baby boom is just around the corner, which almost certainly will increase the population of this nation to more than 300 million by the year 2000. That is, we stand to add another 100 million people to our population in the next 30 years.

Second, the population implosion in the United States: In 1790, when our first census was taken, 95 percent of the American people lived in rural areas, on farms, or in towns having fewer than 2,500 people. There were only 24 urban places in the whole country, and only two of them, New York and Philadelphia, had populations in excess of 25,000.

In order to understand the current urban crisis we must realize that the United States did not become an urban nation—in the sense that more than half of our people lived in urban places—until as recently as 1920. When the 1970 census is taken, we will have had half a century as an urban nation, and half a century is a short time in the life of a nation. Small wonder, from the temporal perspective alone, that we are afflicted with an urban crisis.

In 1960, the U.S. population was 70 percent urban and 63 percent metropolitan. Short of an unpredictable event—with thermonuclear war, all bets are off—it is likely that all of the 100 million people we are almost certain to add to our population by the end of the century will go into our urban areas. It is possible that 80 percent of them will go into our metropolitan areas—places with 50,000 or more inhabitants and the counties in which they are located, as defined by the federal government. I feel free to predict with considerable certainty that this additional 100 million will swamp us before we can even solve our present problems.

Third, the population displosion in the United States: We are one of the most polyglot nations on earth. We have

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drawn our people from every corner of the globe. As recently as 1900, only 51 percent of the American people were native whites of native parentage. The remaining 49 percent were either foreign born, the children of immigrant parents, or members of other races. By 1960, 30 percent of the American people still were either foreign born, the children of immigrant parents, or members of other races—notably of the black race.

The population displosion hit hard in the United States. We are in the midst of a black revolution, and certain basic facts help us to understand why. Although blacks have been here for three and a half centuries, they could not enter the mainstream of American civilization— that is, urbanism—until as recently as World War II.

As recently as 1910, 89 percent of the blacks in this nation lived in the South. That concentration had come down only two or three percentage points from the census taken before the Civil War in 1860. Only during World War I, when a manpower shortage caused a bottleneck in war production, did the internal migratory movements of blacks begin from the South to the North. This was greatly accelerated during World War II. By 1960, the concentration of blacks in the South had diminished to 60 percent. By now it is somewhere between 50 and 60 percent and certainly will drop to about 50 percent during the course of the coming decade.

Two other figures reveal why the black revolution is part of the urban crisis. In 1910, 73 percent of all blacks lived in rural places, on farms or in towns having fewer than 2,500 people. In the course of half a century, less than one lifetime, the blacks in the United States have been transformed from 73 percent rural to 73 percent urban and are now more highly urbanized than the white population.

To gain a quick insight into why we have the kinds of problems that confront this nation, consider that as recently as 1960, 23 percent of all black adults in the United States, those 25 years of age and over, were still functionally illiterate. They had not had the opportunity to achieve education beyond the fifth grade and were unable to read a newspaper with ease. This was their part of the American heritage. This was their preparation for life in metropolitan America.

This situation cannot be compared to that of white immigrants who came to this country possessing only a strong back and lacking education, skills, or an ability to speak the language. When the major waves of white immigrants arrived on our shores, this nation was in the beginning process of building its physical plant, its railroads, and its highways. At that time, with a strong back you could make a living. Blacks migrated to urban America where, with nothing but a strong back—and that was their heritage—you cannot even make a living.

Underlying all these developments has been rapid technological change, which also had precipitated the entire range of problems contributing to the urban crisis. These include air pollution and water pollution, inadequate supply of housing, traffic congestion, the profligate use of natural resources, and defective urban design.

These problems in turn have spawned a whole set of social problems, including delinquency, crime, drug addiction, alcoholism, and the revolt of youth. At one extreme of this revolt are the hippies, who have adopted a form of retreatism. At the other extreme are the activists, who beat their heads futilely against the walls of the Pentagon or, like mad dogs, seek to bring about a revolution in the United States with bicycle chains and clubs, as they attempted to do in the streets of Chicago this summer.

The developments I have outlined have also created a series of problems for our federal, state, and local governments. The founding fathers could not have anticipated and did not anticipate urbanism, which is evident in the nonfunctional character of the boundary lines of cities and counties, and even of states. Our form of local government was inherited directly from eighteenth-century England. The British have gotten rid of the worst elements of that particular structure. The United States still is stuck with it.

Let me state my fundamental thesis. Man is the only culture-building animal on this globe. He has built a new technological and physical world, a twentieth-century world manifested in the urban and metropolitan plant. Because of the unprecedented physical world he has created—characterized by rapid urbanization—he is experiencing unprecedented problems. And he has become paralyzed in his efforts to deal with these problems.

At the risk of incurring hostility in some quarters, I must say that I think engineers kid themselves and kid the American people when, in discussing possible remedies for urban ills, they talk about a systems approach and a management approach and the contribution of the engineer. They are merely trying to apply Band-Aids to cancerous growths. They fail to understand the national inclination to attempt to solve twentieth-century problems with nineteenth-, eighteenth-, and prior-century institutions and values; with nineteenth- and prior-century ideologies; and with nineteenth- and prior-century governmental structures and processes.

Let me try to document these assertions. One of my old professors, William F. Ogburn, wrote a book, *Social Change*. In it he said that our society changes at differential tempos. Technological change, for example, occurs more rapidly than social change. He introduced the concept of "cultural lag" to the literature. I contend that cultural lag in the United States prevents us from facing up to our twentieth-century problems and that engineers are among

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those prevented by cultural lag from making contributions.

Let me give an example of cultural lag. The Constitution of the United States was developed by an agrarian society, many aspects of which are as outmoded as the horse and buggy. The Constitution provided that every citizen had the right to bear arms. This made considerable sense in 1790. Guns were necessary for protecting families from the dangers of a frontier society and for getting a food supply. A gun also was a way to increase your realty holdings, if Indians were in the way. By and large it was a wise founding father who went along with providing the right to every American to bear arms in 1790.

But I submit that the right to bear arms in the last part of the twentieth century in urban America is a good example of a cultural survival—an atavism, the dead hand of the past imposing itself on contemporary society. It is why every year we kill people by the thousands with guns. People killed annually with guns by a comparable population of 200 million in Europe or in Asia can be counted in the tens and the low dozens.

Let me present another reasonably concrete example of cultural lag. As recently as 1960, there were 39 states in this Union in which the urban population constituted a majority of the people. There was not a single state in the Union in which the urban population controlled the state legislature. In my judgment, there was never an example of civil disobedience as injurious to the American people as the civil disobedience of the state legislatures when they deliberately defied federal and state constitutional mandates on reapportionment. This rural minority so callously ignored urban problems that they forced the urban population to turn to the federal government for the resolution of their problems.

It is rather naive of people to say that the federal government usurps states' rights. They do not know their history. What has happened is that the state legislatures have committed suicide by not joining the twentieth century. It matters little in these United States what the state legislatures do from now on.

As for the New Federalism of President Nixon, some aspects of it are fine. But if this Administration follows through on its proposals, it simply will be turning over funds to state governments that for 69 years in this century have demonstrated their complete and utter disregard for urban problems. The federal government will be turning funds over to state governments that, by any standards, are more inept, more corrupt, and more incompetent to do a job than any other branch of government in the United States. If this is the New Federalism, it is one reason the urban crisis will worsen, not diminish, during the rest of our lifetimes.

There are other forms of cultural lag reflected in some of the sacred tenets to which many Americans cling. Because engineers are educated in a manner calculated to remove them as far as possible from the humanities and social and economic studies—although this is more true of the past than of the present—I suppose they seldom reexamine these tenets. Among the most sacred is: "That government is best which governs least."

Another of these silly shibboleths from the agrarian past is: "Man in pursuing his own interest, as if guided by an invisible hand, automatically acts in the common interest."

These tenets had their place in 1790, when 95 percent of the American people lived on farms and in small towns, because what was there for government to do beyond what it was doing? In taking care of his own family in a small town or on a farm in 1790, man was acting in the interests of all. But can any of us envision the United States today without a Social Security Administration, without a Pure Food and Drug Administration, without Federal Communications Commission, and so on down the line? Whom are we trying to kid?

Or consider this interesting aspect of the same set of shibboleths, these cultural atavisms from the dead past: *Caveat emptor.* –"Let the buyer beware."

Recently, I entered into a debate with a conservative columnist who lives on top of one of the Blue Ridge Mountains (I suspect that is about as close as he has got to twentieth-century society) and he argued that caveat emptor must continue to be a guiding principle of American life. Consider the small bundle of products available to the American consumer in 1790 when this might have made some sense, and consider the complex products and services available to the American people today.

Caveat emptor? That means that every woman in America could have one, two, or three thalidomide children and, after discovering what caused the deformed children, could punish the producer only by not purchasing the product any more.

Caveat emptor is a dead shibboleth, inapplicable to contemporary life.

Let's take another one: "A tax is something government takes away from people, and taxes should be held to a minimum." That, too, is a shibboleth from the dead past, when there was nothing for government to do. I submit that the essential question that should be raised by the American people today is: "What basic public services are required to assure that the American society remains a viable society?" The second question is: "How do we raise the revenues to perform those essential public services?"

I submit that the chairman of the Ways and Means Committee has the cart before the horse. He may still know

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how to run a small-town bank in Arkansas—I hope—but when it comes to financing the needs of the American people, he seems not to have entered the twentieth century.

Then there is "rugged individualism." We are getting it in a new sense in the inner cities of America. We see evidence of addiction to this relic of the past in our present Administration. Although it is recommending some of the programs that Dr. Daniel P. Moynihan, Assistant to the President for Urban Affairs, is proposing, it is still verbally trying to avoid the "welfare state."

I submit that urban and metropolitan America is in large measure a welfare state, and will become more so. If you do not like big government and centralization and a welfare state, let me remind you that for the first time in the history of man we have now developed a way to reverse the population explosion and the population implosion and the population displosion. Up until now, these developments have been irreversible, but at present we have a hope that all of them can be reversed. That hope, of course, is the hydrogen bomb. The bomb can solve all our urban problems.

Where should we go from here? I have some suggestions. One is that we must first decide that we need an urban policy.

Second, we need to revamp the Constitution. I have said that the Constitution of the United States is an outmoded piece of paper in many respects. And it is. It was a wonderful document for eighteenth-century agrarian America and, among other things, it protected us from the despotism of King George III. But as a result of some of its provisions, no city in the United States has the competence to deal with organized crime, because our Constitution makes the rights of the individual more important than the rights of our society. During the past 50 years, all Americans have been affected by organized crime. Our outmoded Constitution—not the Warren Court, which interpreted the Constitution—makes that possible.

I offer ten new amendments to the Constitution of the United States—a Bill of Rights adapted to the needs of our metropolitan, urban society rather than to the agrarian United States of 1790:

1. The right to the kind of opportunity, freedom, and security that enables a person to achieve optimum development.

This concept does not exist in the Constitution of the United States, nor does it exist in the minds of many of our people and leaders. Those of us who have the privilege of reading the self-proclaimed "World's Greatest Newspaper" in Chicago (the editorial page is the best comic strip in the nation) remember that all during the Depression of the 1930's the word "unemployed" was usually not used. The word was "idle." Anyone unemployed was obviously a stupid bum who would not work. His red American blood was not rising to the occasion.

2. A physical, social, and political setting that fosters effective education to enable a person to acquire the basic skills, the salable skills, and the civic skills needed to assume the obligations and responsibilities, as well as the rights, of citizenship.

A large proportion of the American population today, particularly in our inner cities, is poor. About 42 percent of the blacks are poor and 11 percent of the whites. But because the proportion of whites in our population is greater than that of the blacks, there are two poor whites for every poor black. These people no longer are getting basic skills, salable skills, or citizenship skills to enable them to stand on their own feet in the United States of America.

Our system of education once was responsible for creating unity out of diversity and for promoting an open society. Today, public education is creating a caste society in America, a society stratified by race and by economic status.

3. Opportunity for maximum length of life and good health.

4. An environment—and here is where engineers enter the picture—controlled in the interests of society, free from pollution and from adverse population densities.

Nearly half of the freshwater supply of the whole world is in the Great Lakes. I do not have to remind you that Lake Erie is dead and that Lake Michigan is within ten years of being dead. Do you want to continue a value system that permits this kind of destruction?

5. Opportunity for employment commensurate with skill. That would constitute an extension of the Employment Act of 1946, which it was my privilege to help work out during my days as a bureaucrat in Washington.

6. Knowledge and means of limiting family size, in the context of community, national, and world welfare.

7. Impartiality in the administration of justice, in order to protect the interests of society, even while safeguarding those of the individual.

8. Government consistent with the realities of the metropolitan order and majority rule.

We do not have majority rule. The one-party system in the South, plus the seniority system in the Congress, has given the South a virtual death grip on natural legislation. Senators Claghorn Thurmond and Claghorn Eastland, and the rest of them, are trying to decide what to do about twentieth-century problems when they have never left the eighteenth century in most fundamental respects.

9. The benefits of the arts, technology, and the sciences for everybody.

10. Opportunity to live in a world where conflicts of

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interests are solved by adjudication, not by physical force including war.

If you want a more specific blueprint about how to solve America's urban problems, go back and dust off the Kerner Commission Report. It has not been looked at since it was written. It contains a blueprint for doing the things that must be done if we are going to resolve the urban crisis. Go back and support the Urban Coalition's recommendation that the government be the employer of last resort. That does not mean another WPA.

Finally, to deal with contemporary problems, both the conservative and liberal approaches must be abandoned in favor of a social engineering approach. The conservative turns to the past for an answer to twentieth-century problems. The liberal too often manifests emotion, zeal, and determination to deal with twentieth-century problems. Both approaches are hopelessly outmoded. What is needed is the social engineering approach—the application of knowledge based on research to the resolution of problems. Social engineering is needed to deal with social problems in the same sense that physical engineering is utilized to solve physical problems and biomedical engineering (medicine and surgery), to meet biomedical problems. Our society has come to recognize the role of the physical and biomedical engineer but has yet to recognize and accept the social engineer.

It is well to remember that it took roughly the century from 1750 to 1850 for the physical sciences to achieve the respectability and acceptance to enable physical engineers to apply physical knowledge to physical problems. It required approximately the century from 1850 to 1950 for the biomedical sciences to similarly acquire sufficient respectability and acceptance to enable biomedical engineers to apply knowledge to the solution of problems of health and life. It apparently may take the century from 1950 to 2050 for the social sciences to gain comparable respectability and acceptance so that the social engineer is permitted to apply knowledge to the solution of social problems.

But it is a moot question as to whether we shall survive as a viable society to 2050. It may well be that the chaos with which we are beset will engulf us and drag us down into the drain of history as a nation that achieved the miraculous in technology but could not adapt itself rapidly enough to survive the new world that man created. The United States, as Rome before it, may well collapse and bring down with her most if not all of human society. We have the means to destroy ourselves and perhaps all of mankind; and it is naive to assume that the employment of these means is beyond the realm of possibility.

I close, however, with a positive note. I am convinced that we also have the means to deal with our problems in an effective manner to create a world twentieth century in its social, economic, and political aspects as well as in its technological aspects. The means to this lies in man's potential for rational behavior—in man's ability through science to acquire knowledge and in his ability through engineering to apply knowledge for the solution of his problems.

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FORMULATING AN INITIAL URBAN PROGRAM
FOR THE NATIONAL ACADEMY OF ENGINEERING

Eric A. Walker

Summary of Remarks

Engineers must assume a major responsibility for improving the quality of urban life in this country. While it is a mistake to say that the engineer alone can solve all the problems of the cities, the engineer can play a significant role in arriving at many of the solutions.

The National Academy of Engineering is now making a significant contribution to the search for workable means to end some of the problems of the cities. It is clear, however, that the Academy has the resources to do much more. A greater effort is needed.

Part of the problems of the city are the result of misguided individuals who, without considering the full effects of their work, through a desire for "progress," abused the technology they had before them. It is a cliche to say that no man is an island, but no creature is independent of its habitat. Changes and decisions can no longer be made in one part of our civilization without effecting others elsewhere. It is this sort of ignoring and ignorance of the consequences of our activities that is at the root of our crisis in the cities.

Some of the ills of the cities, however, particularly in the economic, social, or political spheres, simply are not ammenable to solutions arrived at by traditional engineering analyses. An engineer, for example, can propose a system to alleviate urban transportation problems, but after the system is devised, there remains a fundamental question to be answered: Should we go ahead and do it?

This question involves several things. It involves the availability of money. It involves the priority of doing one thing instead of another. It involves the question of public support for the decision.

This calls for better and greater communication among the engineers and the politicians who usually have to find the money for the project; for better communication among engineers and sociologists who might be capable of measuring public acceptance. And of course, we have to involve those who ultimately benefit from the system and those who pay for it: the taxpayers.

It is not easy to surmount the communication barriers between these diverse elements of American society, but unless the gap is bridged, the problems cannot be readily resolved.

For its part, the Academy has an obligation to make certain that the issues of the city are clearly understood by all who are or should be deeply concerned. We can make a genuine contribution by placing these issues in their proper perspective and setting priorities for their solution.

Engineering deals with people—and people live in the cities. For this, the simplest of reasons, the Academy must make a strong commitment to the betterment of life in the United States through working to improve the cities in which her people live.

PARTICIPANTS

John A. Buggs
Director of Local Coalitions
The Urban Coalition
Washington, D.C.

Jay W. Forrester
Professor of Management
Massachusetts Institute of Technology
Cambridge, Massachusetts

T. Keith Glennan
President Emeritus
Case Institute of Technology
Cleveland, Ohio

Martin Goland
President
Southwest Research Institute
San Antonio, Texas

Sherman K. Grinnell
Associate Director, Engineering Design Center,
    and Associate Professor
Case Western Reserve University
Cleveland, Ohio

Philip M. Hauser
Director, Population Research Center,
    and Professor of Sociology
University of Chicago
Chicago, Illinois

J. Erik Jonsson
Mayor of Dallas
Dallas, Texas

Thomas C. Kavanagh
Partner
Praeger-Kavanagh-Waterbury,
    Engineers-Architects
New York, New York

Stephen F. Keating
President
Honeywell, Inc.
Minneapolis, Minnesota

W. Deming Lewis
President
Lehigh University
Bethlehem, Pennsylvania

Daniel P. Moynihan
Assistant to the President for Urban Affairs
Washington, D.C.

Joseph H. Newman
Vice President
Tishman Research Corporation
New York, New York

Milton Pikarsky
Commissioner of Public Works
Chicago, Illinois

Gerald J. Remus
Superintendent, General Manager,
    and Chief Engineer
Detroit Department of Water Supply
Detroit, Michigan

James B. Reswick
Leonard S. Case, Jr., Professor of Engineering,
    and Director, Engineering Design Center
Case Western Reserve University
Cleveland, Ohio

Walter P. Reuther
President
United Auto Workers
Detroit, Michigan

Bernard A. Schriever
Chairman of the Board
Schriever, McKee Associates, Inc.
Arlington, Virginia

Philip Sporn
Consultant
New York, New York

Peter L. Szanton
President
New York City—RAND Institute
New York, New York

Eric A. Walker
President, National Academy of Engineering
President, The Pennsylvania State University
University Park, Pennsylvania