ARCHITECTURE AND URBANISM 1948-1968
A Comparative Analysis of Selected Contemporary Theories

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ARCHITECTURE AND URBANISM 1948-1968

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ABSTRACT

This thesis demonstrates that:

Louis Kahn
Aldo van Eyck
Alison and Peter Smithson
Kenzo Tange
Robert Venturi
Shadrach Woods
David Crane
Noriaki Kurokawa
Denise Scott-Brown
Fumihiko Maki

are evolving theories of architecture and urbanism based upon the accommodation of growth and change, and a response to man's need for identity and association; and that the elements of movement and urban tissue and their corresponding linkage are ordered within this conceptual framework.

The Determinants of Form - Formal Expression

Fundamental to the development of this thesis is the distinction between the determinants of form and formal expression. Determinants of form are the forces which influence the formal expression of our environment. Interpretations of the nature of these determinants range from the points of view that they are either harmonious or conflicting natural systems. The degree to which these interpretations are formally expressed is a product of the
design process which facilitates unique formal expression.

Systems for Growth

The demands upon the world's urban centers brought about by the phenomenon of growth can no longer facilitate architectural and urban structures based on static concepts. Systems for growth are organized in terms of linear systems of movement to which the element of tissue is additive or in terms of spatial systems of tissue which are linked by the element of movement. Louis Kahn's concept of servant and servant spaces has universal application in the organization of systems of growth. Both systems consist of servant and served spaces. The conceptual organization of these spaces is a product of the individual's design emphasis. An awareness of their reciprocal nature provides the capacity to creatively direct the growth of architectural and urban form through design and investment.

Structuring for Change

In addition to the phenomenon of growth, the architectural and urban forms of today must respond to the phenomenon of change as a primary determinant of form. It has become necessary to recognize the varying life spans of building components and their relative cycles of change. The degree to which the linkage between these components is formally expressed is a product of each individual's design emphasis. The concept of linkage as a physical connector forms the basis for understanding urban structuring as an indeterminate process which depends upon feedback from the existing built environment, thus - an aesthetic of change.

Identity - Psychological Dimensions of Form

The impact of the phenomena of growth and change has altered the physical and social patterns of today's urban environment. These phenomena have generated
conflicting trends between man's need for identity and his capacity to adapt to a rapidly changing environment. The symbolic meaning of man's institutions must be accurately expressed if his perception of his environment is to be confirmed and given meaning through his experience. At all scales, from the individual dwelling to the collective institutions of society, man's identity must be accommodated not in terms of departure and arrival but as a continuous experience.

Patterns of Human Association

The phenomena of growth and change have greatly altered the physical and social patterns of today's urban environment. These phenomena have generated conflicting trends in man's constant need for association and his changing patterns of activity. There is the need to provide for meaningful, spontaneous human association. However, they are also responsive to patterns of disassociation. These new patterns of disassociation are equally significant in the search for an understanding of man's need for association.
# Architecture and Urbanism 1948 - 1968

A Comparative Analysis of Selected Contemporary Theories

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Introduction
Introduction

Each human settlement throughout history has had its distinct physical or formal expression. Man's architecture and his urbanism have reflected the nature and evolution of the forces which prompted and sustained their existence. These forces, or determinants of architectural and urban form, can be broadly classified as physical and cultural.

Physical determinants include geographic, climatic, and topographic conditions. These define man's need for shelter as well as the type and availability of construction materials to meet his needs. Cultural determinants include the social, economic, and political conditions within a particular society. These determinants define the priorities of a society with respect to the formal expression of its values and objectives. Every settlement is a response to some activity or combination of activities of man—defense, commerce, administration, or religious convocation.

Given the limitations of the physical determinants and the self-imposed limitation of choice of cultural expression, man's ability to control the formal expression of his environment is limited by his artistic and technological ability. Both art and technology are products of the society's level of cultural development. However, it is through art and technology that man has the capacity to direct the formal expression of his environment.

Traditionally man has conceived and formally expressed his architecture and urbanism as finite physical structures. These structures have reflected both the physical and cultural determinants which gave them form. Today the physical and cultural limits of the determinants of form have been greatly expanded. These expanding limits have created additional, more dynamic determinants which are generating a need for new concepts of architecture and urbanism.
During the past half century, the phenomenal increase in population and subsequent urbanization has combined with a rapidly advancing technology to disrupt the normal equilibrium of our urban centers, their physical and social patterns. At present rates of growth, the world's population will at least double during the next fifty years—with the major portion located in urban centers.

In addition to the predicted growth of the global population, new patterns of life are being generated through technological advancement and modern systems of communications. In an age of such unprecedented development and change, it is impossible to seek answers based on formal and static concepts. What is required is an open system for urban structuring; a concept or organization so positive that additions, removals, permutations, and rebirth may be regenerative. Such an approach leads to an understanding of the city as an organic process which is constantly flowing and changing; one which can never arrive at an end or ideal destination.

While accommodating growth and change, these structuring systems must also respond to the needs and activities of man as reflected in his patterns of daily life. Man interacts with his environment both as an individual and as a member of a collective society. The city as an expression of man's physical and social activities must provide for his identification; for identity remains a constant need of man.

The need for human association is also a constant; however, the patterns of association are changing. The accommodation of these human needs, identity and association, are essential to counterbalance the anonymity of the individual in today's complex and rapidly changing society.

The accommodation of growth and change and the need to respond to the constant and changing needs of man, identity and association, have become
FIGURE 1 - EUROPEAN URBAN HOUSING, 
Urban Structuring, p. 18

FIGURE 2 - LA VILLE RADIEUSE-LE 
CORBUSIER, Le Corbusier: The 
Machine and the Grand Design, 
p. 49

1 Smithson, Alison, "C.I.A.M. 
Team 10", Architectural Design 
May 1960, p. 176

2 ibid., p. 176
primary determinants of architectural and urban form. The individuals con-
sidered in this comparative investigation have responded to these new deter-
minants of form. Their theoretical positions can largely be identified as
specific reactions to the static master plan approach to city design and the
emphasis of a technologically dominated environment.

This position formed the basis for Alison and Peter Smithson's confron-
tation with established C.I.A.M. thought at Dubrovnik in 1956. The philos-
ophy of the Congress of International Architecture Modern was based upon the
town planning theories of Le Corbusier as exemplified by his Utopian schemes
for Ville Radieuse. The organization of the city as defined by C.I.A.M. was
a clear articulation of residential, commercial, industrial, and recreational
land uses linked by arteries of circulation. The Smithsons opposed the
functionalist tenets of C.I.A.M. and sought a more humane and pragmatic basis
for town planning.

The Smithsons' concerns were echoed by the Dutch architect Aldo van Eyck
as early as 1948 at C.I.A.M. 6 in Bridgwater. Van Eyck posed the question,
"Does C.I.A.M. intend to 'guide' a rational and mechanical conception of
progress towards an improvement of human environment, or does it intend to
replace or transform this conception?"¹ Le Corbusier himself was well aware
of the younger generation's accurate assessment of the state of town planning
theory. In a letter to C.I.A.M. 10, 1956, he wrote, "They are in the know.
Their predecessors no longer are, they are out, they are no longer subject
to the direct impact of the situation."²

The confrontation which came at C.I.A.M. 10 in Dubrovnik in 1956 led to
the dissolution of C.I.A.M. at Otterlo in 1959. The modern movement split
into several subgroups. One group which had been in the formative stages
since 1952 was Team 10 headed by the English architects Alison and Peter
Smithson. They were joined by several European and a few American architects. Notably, Aldo van Eyck was one of the original participants of Team 10.

Shadrach Woods, an American architect practicing in Paris, was another member of Team 10. Like the Smithsons and Van Eyck, he had been active in C.I.A.M. and greatly respected the work of Le Corbusier. Woods himself spent several years with Le Corbusier in Paris. In addition to his writings and conference participation, Woods has contributed significantly to the number of actual building and town planning projects executed by members of Team 10.

Kenzo Tange of Japan was also active in C.I.A.M. and has sustained contact with Team 10. Although he is not a member, he has participated in several of their conferences. Tange emerged as a significant figure in Japanese contemporary architecture as early as 1947 with his work for the Hiroshima Memorial and has since assumed the virtually unchallenged role of leadership in modern Japanese architecture.

Tange is also familiar with American architecture having served as visiting Professor of Architecture at M.I.T. in 1959-60. He is currently Professor of Architecture and Urban Design at Tokyo University. Through his association with the University and his practice in Tokyo, he has been most influential upon Japan's younger architects. Two of these, Noriaki Kurokawa and Fumihiko Maki, are considered here.

Noriaki Kurokawa entered Tokyo University under Kenzo Tange's tutelage in 1957 and for a considerable time he was a member of the Kenzo Tange Design Team. The World Design Conference in Tokyo in 1960 witnessed the birth of the Metabolist Group which places its emphasis upon the biological aspects of growth and change as well as upon human needs. Although not a major founder of this movement, Kurokawa is recognized by many as the group's most outspoken member. Kurokawa's emphasis on human needs is strengthened by his
association with Team 10. Although not a member, he has participated in several of the European conferences.

Like Kurokawa, Fumihiko Maki is one of the founders of the Metabolist Group of Japan and he has also worked with the European Team 10 group. Maki is perhaps as familiar with American thought as he is with Japanese or European. He completed his undergraduate work at Tokyo University, received his Master's at Cranbrook, and then attended Harvard University. While in the United States he worked in the offices of S.O.M. and Jose Louis Sert. He returned to Japan and helped pioneer modern town planning under the tutelage of Kenzo Tange. In addition to these experiences, Maki served as Professor of Architecture at Washington University in St. Louis in 1961-62 where he pursued investigations in group and collective form.

The American scene is somewhat different from that of Europe or Japan as there is no visible organized body of urban thought. Perhaps the closest identification can be made with what has been labeled the "Philadelphia School". This identification does not represent a formal school of thought but a collection of individuals with similar concerns who are associated with the same institution, the University of Pennsylvania.

David Crane has been an Assistant Professor of City Planning in the Department of City Planning, University of Pennsylvania, since 1957. Prior to his association with Pennsylvania, he was engaged in urban design research and teaching at M.I.T. and at Harvard University. During this time he was a close associate of Kevin Lynch who was engaged in studies on the Image of the City. Crane has also served as Director of the Boston Redevelopment Authority. Like the Smithsons, he is searching for a more pragmatic and realistic approach to city design. David Crane is an urbanist who is trying to bring together the disciplines of architecture and urban design.
Denise Scott-Brown, a former student of city planning under David Crane, is a consistent contributor to professional planning journals. Her concern is for understanding the American urban phenomena. Many of her early writings echoed Crane's concerns for the imageability, perception, and meaning of the city. She has also published several articles on the relevance of Team 10 and a more pragmatic approach to planning. More recently her attention has been devoted to probes into the nature of the American commercial landscape. Denise Scott-Brown has taught as an Associate Professor at the School of Architecture and Urban Planning, University of California at Los Angeles, and is now a partner in the Philadelphia firm of Venturi and Rauch and is also Mrs. Robert Venturi.

Robert Venturi taught eight years at the University of Pennsylvania, and in 1967 was named Davenport Professor at Yale. In 1966 he published a controversial book, "Complexity and Contradiction in Architecture", which has significant implications for understanding the complex and apparently chaotic urban environment. Together, Denise Scott-Brown and Robert Venturi have begun important investigations into the phenomena of the American commercial strip and its underlying determinants of form.

Also at the University of Pennsylvania is Louis I. Kahn, one of America's foremost architects and creative thinkers with respect to architecture and city development. His ability was recognized first by the Europeans and he has long been a confre're of Team 10. The Richards Medical Laboratories in 1960 brought Kahn international fame.

Consequently, Louis Kahn through his writings and architecture has played a significant role in the development of the architectural philosophies of not only American groups but of European and Japanese groups as well. At the same time, Kahn is not a part of any group or team, but follows his own direction.
Kahn's emphasis is upon discovering the essence of the institutions of man in order that their formal expression be meaningful. His search is particularly relevant today as our society is involved in a period of change and re-evaluation of its social, political, and economic institutions. He takes nothing for granted and offers no easy alternatives. He believes that there are no easy alternatives in human life but only possibilities for action if it can be determined where the critical fields of action lie. It is this obligation toward the discovery of the reality of the present which gives his work greater meaning and significance.

For each of the individuals considered here, the forces of growth and change and the need to respond to the needs of man—his identity and association—have become primary determinants of architectural and urban form. Furthermore, they recognize the interdependent nature of these determinants. Each has shown ability in comprehending the complex relationships and in responding to them in a creative fashion.

In order to facilitate a comparative analysis, the investigations have been structured according to the determinants of growth, change, identity, and association. Each of the four sections is concerned with developing specific comparisons between the individuals. As a prerequisite to these investigations, the first section deals with each individual's understanding of the forces or determinants which order our environment and their interdependent nature. In addition, this section investigates the individual's formal expression through the process of design, and establishes the validity of a comparative framework based upon conceptual and organizational principles rather than upon similarity of formal expression.
The Determinants of Form - Formal Expression
FIGURE 1 - BRYN MAWR DORMITORIES -
LOUIS KAHN, Architects on Architecture, p. 398

FIGURE 2 - YAMAGATA HAWAII DREAMLAND - NORIAKI KUROKAWA, New Directions in Japanese Architecture, p. 46
The Determinants of Form - Formal Expression

The primary objective of this comparative analysis is to establish a conceptual framework for investigating each individual's theoretical position with respect to the primary determinants of architectural and urban form. For the individuals considered, the forces of growth and change and the need to respond to the human needs of identity and association have become primary determinants. These concerns provide a common conceptual framework from which each individual begins the process of design. It is the process of design--unique to the individual--which facilitates unique formal expression.

The architects and urbanists considered here establish a wide range of formal expressions. These range from the geometric forms of Louis Kahn to the amorphous biological forms of Noriaki Kurokawa. The actual comparisons of these formal expressions and their conceptual and organizational principles will follow in subsequent chapters. It is the objective of this chapter to establish the validity of a common conceptual framework which does not depend upon similar formal expressions in order to establish compatible relationships between conceptual and organizational principles.

In order to establish the validity of such a conceptual framework, it is essential to distinguish between the determinants of form, the design process, and formal expression. The writings of Louis Kahn make this distinction explicit. By utilizing Kahn's explanation, it is possible to investigate the theoretical position of each individual with respect to the depth and nature of his understanding of the determinants of form. From these investigations, it is then possible to explore the individual's design process and its potential for creating


4 Baily, James, "Louis Kahn in India", *Architectural Forum*, July-August 1966
unique formal expression from common determinants of form.

Louis I. Kahn - Order and Design

Each of the individuals considered have in common the ability to distinguish between the determinants of form and the design process which facilitates their formal expression. The explanation of their ability to make this distinction is not always explicitly stated. However, this distinction is the subject of much of the writing of Louis Kahn. For Kahn, an understanding of the complex and interrelated forces which determine architectural and urban form is a realization of order. The final formal expression is shaped through the process of design.

Kahn's statement "Order is" forms the base upon which he structures his entire creative philosophy. He contends the realization of order is the ultimate objective of the architect. Design is simply the process of putting into being that which is realized. "Design is a circumstantial thing. I believe that a man must realize something before he has the stimulation within himself to design."

By the realization of order, Kahn does not mean the simplicity of orderliness. He is seeking the building's character by willing the process of design to be "one of growth, of becoming....in order to permit the building to have a unique kind of progressive self-fulfillment, one revealed to the architect only with increasing awareness of the problem of the moment". Kahn's perception goes much deeper than simply an understanding of the programmatic requirements of a building. "A sense of order is a sense of the harmony of natural systems." It is this deeper meaning to which Kahn refers when he says "the creative task of the designer is to sense an initial order, which will guide

6 Scully, op. cit.

7 Baily, op. cit.

Kahn's concept of order and design has remained constant since his early writings in the mid-1950's. His terminology, however, has not. The concept of order and design has been similarly described as the immeasurable and measurable, form and design, and law and rule. The objective here is to establish the conceptual relationship between these descriptions.

Each of Kahn's concepts is directly related to an understanding of the determinants of form, the process of design, and formal expression. Consider first, his description of order and design.

"Order is:
Design is form-making in order
Through the nature why
Through the order what
Through design how." 

Kahn has also used the term law and rule to explain this concept. Law here refers to the natural laws of nature and rule to the laws and principles established by man. In architecture the natural laws cannot be violated. However, the design principles of man are subject to manipulation.

In Kahn's explanation of his concepts of the immeasurable and measurable as well as form and design, he clearly states his objectives for formal expression. Kahn contends that, "All works of architecture must start with the immeasurable, become measurable in the transition period of design for the making and after it is built again to reflect the immeasurable". Now consider his explanation of form and design.

"Form is the realization of inseparable characteristics
"form"

"design"

FORMAL EXPRESSION OF THE BEGINNING OR "FORM" MUST BE FELT....

LOUIS KAHN

immeasurable concepts

"...ORDER... LAW...

..... FORM ...."

measurable concepts

"... DESIGN .... RULE...

..... DESIGN ..."
Form has no existence in material shape or dimension
To begin is the time of belief in form
When the work is complete the beginning must be felt
A design is but a single spark out of form
It is of material and has shape and dimension". 9

These quotations provide a clear explanation of Kahn's thought process. The first segment states that all architecture must begin with an understanding of the determinants of form—in his words; order, law, and form. All are immeasurable concepts. The second segment recognizes a design process which employs organizational principles stated respectively as; design, rule, and design. All are measurable concepts. The third segment clarifies the intentions of Kahn's formal expressions. They are to reflect the immeasurable so that when the work is complete the beginning must be felt."

Abstruse though the language may be, Kahn's creative insight into the distinction between Order and Design and his search for the realization of order have led to an integration of form, technique, and content that has eluded most of the architects of his day.

A Search for the Determinants of Form

A conceptual understanding of the forces and processes which structure or order man's environment is not easily grasped. The significance of each of the individuals considered here is his ability to go beyond the functional and programmatic requirements of a building or planning situation in the search for the determinants of form. By utilizing the framework established in Kahn's distinction between order and design, it is possible to investigate the theoretical position of each individual with respect to the depth and nature of his understanding of the deter-
ALISON & PETER SMITHSON

"inner mechanisms.... A search for concepts that are "necessary in a metaphysical sense to some particular building."


11 Jacobus, op. cit., p. 126

minants of form. The objective here is to identify each individual's terminology and establish the relative theoretical positions.

Kahn's distinction between order and design finds a definite echo in the writings of Aldo van Eyck. "Man is both the subject and object of architecture....The city proper is the counterform of society's reciprocally individual and collective reality....it is because we have lost touch with this reality....the form....that we cannot build its true counterform."¹⁰ For van Eyck, the determinant of form here is society's reciprocally individual and collective reality. Its formal expression or counterform is the city itself. His contention that architecture has lost touch with the reality or form of society is a criticism of its failure to go beyond functional programmatic requirements in the search for form. Van Eyck's reality or form is identical to Kahn's concept of order. Both are searching for a deeper metaphysical understanding of the determinants of form.

Alison and Peter Smithson, Shadrach Woods, and Kenzo Tange are also searching for the deeper meaning of the determinants of form. Their probes into this area are not quite so explicitly stated, nor are they of the profound poetic quality of either van Eyck or Kahn. The concepts, however, are parallel.

The Smithsons' early concern for the "inner mechanisms" of a building program was the essence of their Brutalist Theory. It was, however, limited to a materialistic nature.¹¹ "The fundamental aim of Brutalism at all times has been to find a structural, spatial, organizational, and material concept that is necessary in a metaphysical sense to some particular building."¹² This search for inner mechanisms has taken on greater meaning through their efforts with Team 10 to understand the
SHADRACH WOODS

The ordering determinants of form lie in the "hidden relationships" between the physical and social orders.

KENZO TANGE

The true validity of a building situation comes from a... "confrontation with reality".

NORIAKI KUROKAWA & FUMIHIKO MAKI

An understanding of the determinants of form embodies the concept of the "phomenonality of all existence".

13 "Aesthetics and Technology of Preassembly", Progressive Architecture, October 1964, p. 180

14 Baily, op. cit.

15 Joedicke, op. cit., p. 170

16 ibid., p. 205

17 Nitschke, Gunther, "The Metabolist of Japan", Architectural Design, October 1964
true nature of the interrelated needs and activities of man. Their search here is identical to van Eyck's search for the reality or form of society through an understanding of these inner mechanisms.

Shadrach Woods contends that the ordering determinants of architectural and urban form do not lie in geometry or formal composition but in the "hidden relationships" which exist between the physical and social orders. Woods' attitude is reflected in Kahn's understanding of order not as orderliness but as a sense of the "harmony of natural systems." It is also evident that Woods' concept of hidden relationships is consistent with the Smithsons' concept of inner mechanisms.

Kenzo Tange is similarly concerned with discovering these inner or hidden relationships as he searches for the realities of a building situation. Tange contends, "The true vitality in any creative activity must derive from the confrontation with reality." Implied in the term confrontation is a direct relationship to Kahn's belief that "A man must realize something before he has the stimulation within himself to design."

Tange's perception into these realities is reinforced by the traditional oriental philosophies of Zen and Shintoism. Although Tange makes no reference to the concepts embodied in these philosophies he has been associated with members of the Metabolist group of Japan who have been attributed the utilization of these concepts in their architectural theory. Closely identified with the Metabolists are Noriaki Kurokawa and Fumihiko Maki. Again, the extent to which they rely upon these philosophies has not been explicitly stated by either. Nevertheless, it is clear that there is some reliance upon Zen and Shintoism which embody the concept of the "phenomenontality of all existence", and each
DENISE SCOTT-BROWN, ROBERT VENTURI, & DAVID CRANE

ARE CONCERNED WITH THE UNDERLYING DETERMINANTS OF FORM WHICH HAVE CREATED THE "PHENOMENA OF THE URBAN WORLD"

18 Gunther Nitschke, "Cities Stasis or Process", Pedestrian in the City, (Princeton, New Jersey, 1966), p. 179

19 Scott-Brown, Denise, "Mapping the City: Symbols and Systems", Landscape, Spring 1968, p. 22

FIGURE 4-GRAPHIC CHAOS OF URBAN ENVIRONMENT, Architectural Forum, March 1968, cover

postulate "the principle of relativity of all existential phenomena.... seeing all phenomena in their conditionality, their interrelation and interdependence". Such an understanding of the determinants of form and their interrelationships is indeed as profound as Kahn's understanding that "order is". However, without explicit documentation, the extent to which these philosophies have been probed by Kurokawa and Maki is somewhat suspect as a subjective literary expression.

Within the context of the American urban world, Denise Scott-Brown, Robert Venturi, and David Crane have sought to understand the order of the existing environment as a point of departure for deciding what ought to be. Their investigations have gone beyond the obvious visual chaos in search for the determinants of form.

Denise Scott-Brown contends, "The phenomena of the urban world are not chaotic but ordered,...what we see as chaos is an order which we have not yet understood". This concern for the underlying order of the urban world is reflected by Robert Venturi, who suggests that order and chaos are evident simultaneously. The chaos, here, is primarily visual while the order is of a communicative and economic nature. It is exactly this understanding of the other orders behind the physical and visual which David Crane refers when he explains that the "Chaotic City is not the product of anyone's overall design, but a confusing overlay of individual creativity, building interests, governmental rigamarole, and a very anonymous and imperfect market". Should the anonymous or mass market have perfect competitive economic information, there would be little need for the graphic chaos of the urban environment. This, however, is not the nature of a free, competitive society. It is from this realization of the underlying order that Venturi suggests,
REALIZATIONS OF ORDER

kahn
"ORDER IS"
"LAW"
"IMMEASURABLE"
"FORM"

van eyck
"REALITY OR FORM"

smithsons
"INNER MECHANISMS"

woods
"HIDDEN RELATIONSHIPS"

tange
"CONFRONTATION WITH REALITY"

kurokawa
"PHENOMENALITY OF ALL EXISTENCE"

maki

scott-brown
"PHENOMENA OF THE URBAN WORLD"

venturi

crane

A COMMON OBJECTIVE-TO OBTAIN A GREATER UNDERSTANDING OF THE DETERMINANTS OF FORM.
"It is perhaps from the everyday language, vulgar and disdained, that we can draw the complex and contradictory order that is valid and vital for our architecture as an urbanistic whole." These individuals have realized, as only a few members of a visually-oriented profession have, the underlying orders of the chaotic urban environment.

These investigations are directly related to Aldo van Eyck's concern for expressing the counterform of a society's individual and collective reality. There are no easy solutions amid the diversity and complexity of our society. Certainly, such a theoretical position is supported by Kahn's statement "the higher the order, the more diversity in design".

The specific concerns or areas of interest of each of the individuals considered here are not identical, but these observations clearly support the fact that each individual has gone beyond the functional programmatic requirements of a building situation in search for the determinants of architectural and urban form. The terminology attributed to each individual's understanding of these determinants is unique and personal. The conceptual relationship between their ideas is parallel, and their objective, to obtain a greater understanding of the determinants of form, is identical. Thus, the significance of the individuals considered here is their ability to grasp a conceptual understanding of the forces and processes which determine the expression of man's environment.

The Nature of the Determinants of Form

The previous section established that each individual has gone beyond the immediate building program in the search for a method of determining significant form. Indeed, each individual has expressed an obligation toward an understanding of the difficult whole. An understanding of the determinants of form is much more meaningful than purely
THE NATURE OF THE DETERMINANTS OF FORM

harmonious

conflicting

reciprocal

LOUIS KAHN

"... a sense of harmony of systems..."

"... relativity of all existence... their interrelation and interdependence..."

NORIAKI KUROKAWA & FUMIHIKO MAKI

23 Kahn, op. cit., p. 47


25 Jacobus, op. cit., p. 126

26 Baily, op. cit.
subjective literary expressions. It is Kahn's conviction that order lies at the root of architecture and that its realization goes deeper than "emotional whims that produce works of art". The process of realizing order is not totally intuitive as it depends upon rational logic as well. This is the real significance of the individuals considered here, that each is searching for a method of determining significant form in which creativity operates simultaneously on a subjective as well as on a consciously rational process of deductive logic. Kahn made this distinction quite clear when he wrote, "From what I have said I do not mean to imply a system of thought and work leading to realization from form to design. Design could just as well lead to realizations in form. This is the constant excitement of architecture".

The objective of this section is to establish each individual's interpretation of the nature of the determinants of form. The explanation of these individual interpretations can be developed from three points of view. The first point of view is that of harmonious, interrelated natural systems. The second point of view is that these systems are in conflict and are contradictory. The third point of view seeks to establish the validity of both the first and second as reciprocal systems.

Louis Kahn states that "order supports integration" and that the psychological understanding of a sense of order is a "sense of harmony of systems". These statements leave little doubt as to Kahn's understanding of the nature of the determinants of form. A similar understanding of the harmony of natural systems is echoed in the philosophies of Zen and Shintoism, which have been ascribed to Noriaki Kurokawa and Fumihiko Maki. Both philosophies favor a harmony of systems through their recognition of the "relativity of all existence....their condition-
KENZO TANGE

... INCOMPATIBILITIES...

... CONFLICTING TRENDS...

ALISON &
PETER SMITHSON, &
SHADRACH WOODS

27 Nitschke, op. cit., p. 179

28 Tange, Kenzo, "Technology and Humanity", Architectural Design February 1961, p. 60

DAVID CRANE

"THE INEVITABLE CONFORMITY OF CHAOTIC INDIVIDUALISM..."

29 Crane, David, "The Meaningful Content of Physical Forms in Development", unpublished paper delivered to planning seminar, University of Pennsylvania, 1958, p. 5

30 Crane, "Symbolic City Order", op. cit., p. 2

31 Joedicke, op. cit., p. 170

32 ibid., p. 170
ality, their interrelation and interdependence".  

Kenzo Tange, on the other hand, supports an order of conflicts or contradiction. Tange calls these contradictions incompatibilities and suggests that today in our society there are "conflicting trends toward universality and individualism, toward anonymity and identification". Similar concerns are shared by Alison and Peter Smithson and Shadrach Woods in their efforts to retain the identity of the individual within the greater number. Although their concerns are primarily focused on mass housing, they recognize these conflicting trends in the greater context of an urban society.

David Crane's understanding of the order of urban society is also one of contradiction. This point of view is implicit in his statement that the idea of the free individual operating in an undifferentiated city with all the inevitable conformity of chaotic individualism reflects the undisciplined genius of a productive society in which everybody and yet nobody is to blame. Tange echoes Crane's concern when he says, "our existing society cannot deal with its own ever-increasing productivity any longer. It makes only for vicious cycles." Tange expands his position to the classification of these contradictions as a dilemma. He explains that the realization of this dilemma is the source of creativity. "This kind of society cannot revitalize its own order. Therefore, our reality itself is a dilemma. We should not be afraid of facing reality. The true vitality in any creative activity must derive from the confrontation of reality - the reality which is a dilemma....There is no vitality where no dilemma exists or where no one sees the reality as a dilemma."

Tange's understanding of these incompatibilities is strangely
KENZO TANGE

"There is no vitality where no dilemma exists or where no one sees the reality as a dilemma."

"From...false consistency real cities can never grow. Cities, like architecture, are complex and contradictory."

ROBERT VENTURI

ALDO VAN EYCK

"false alternatives"

"twin phenomena"

Van Eyck, Aldo, "Kaleidoscope of the Mind", Via 1, Ecology in Design, Student publication of the Graduate School of Fine Arts, University of Pennsylvania, 1968, p. 90

Van Eyck, "The Medicine of Reciprocity Tentatively Illustrated", op. cit., p. 174

ibid., p. 174
enough the essence of Robert Venturi's philosophy of "complexity and contradiction" and reflects Venturi's conviction that the complexity of life precludes simple solution. "Not everything will work in a building or a city...(architects) cannot ignore inconsistencies of program and structure within the order."33 "From....false consistency real cities can never grow. Cities, like architecture, are complex and contradictory."34

For Aldo van Eyck the processes which structure man's environment are reciprocal. His theory of reciprocity is explained in terms of false alternatives and twin phenomena.

False alternatives are generated by the mind and hinder man's understanding of the processes which shape his environment. Van Eyck sees the separate disciplines of architecture and urbanism as an example of false alternatives. "We must stop splitting the making of habitat into two disciplines--architecture and urbanism. The thought process in planning can't be divided on the basis of part-whole, small-large, few-many, i.e., into architecture and planning."35 False alternatives do not account for the richness and mixture of reality; instead they limit the number of choices of the individual: "splitting what is virtually unsplittable into empty absolutes."36

The concept of "twin phenomena"37 accepts the ambivalent means and intentions which false alternatives cannot incorporate. Again architecture and urbanism can be cited as an example, this time within the context of twin phenomena. "The time has come to conceive of architecture urbanistically and urbanism architecturally. Man is both subject and object of architecture....the city proper is the counterform of society's reciprocally individual and collective reality."38

Van Eyck's concept of twin phenomena provides a unique middle
VAN EYCK - VENTURI

"FALSE ALTERNATIVES" / "EITHER-OR"

"TWIN PHENOMENA" / "BOTH-AND"

VAN EYCK

"THE IDENTITY OF THE WHOLE..."

VENTURI

"SPECIAL OBLIGATION TOWARD THE WHOLE..."

VAN EYCK - VENTURI

bruges town hall

39 Venturi, op. cit., p. 31

40 Venturi, op. cit., p. 37

41 Nitschke, op. cit., p. 169

42 Venturi, op. cit., p. 14
ground which can accept the nature of the determinants of form as reciprocal, harmonious, and conflicting. Here Robert Venturi's "either-or" relationships are identical to Aldo van Eyck's false alternatives and the relationship between his concept of the phenomenon of "both-and" and van Eyck's twin phenomena are unquestionably direct.

The idea that architecture must include multimeaning and often contradictory programmatic requirements is embodied in the concept of the phenomenon of "both-and". Complexity and contradiction is inclusive of "both-and" rather than exclusive of "either-or" relationships. Venturi contends, the "apparent irrationality of a part will be justified by the resultant rationality of the whole".39 "The double-functioning element" is an integral part of this concept. Venturi states that the validity of the tower of the Bruges Town Hall in Belgium rests upon this concept. The scale of the tower is violently disproportionate to the building; however, "the scale of the building relates to the immediate square, while—the tower above relates to the whole town".40

The city which van Eyck proposes is one which has the capacity to embody the complexities and contradictions of human reality in its built counterform. "The identity of the whole should be latent in the components, whilst the identity of the components would remain present in the whole."41 The words of Venturi and van Eyck are interchangeable. For Venturi contradiction is fundamental to the nature of life itself and "values before all else the actions of human beings (van Eyck's "human reality") and the effect of physical forms (van Eyck's "counterform") upon their spirit".42 His philosophy of complexity and contradiction has a "special obligation toward the whole; its truth must be in its totality or its implications of totality. It must embody the
ORDER IS

/ RECIPROCALLY

HARMONIOUS

CONFLICTING

INCOMPATIBLE

COMPLEX/INCONSISTENT

ORDERED

CHAOTIC

43 ibid., p. 23

44 ibid., p. 102

45 Joedicke, op. cit., p. 206
difficult unity of inclusion rather than the easy unity of exclusion". This greater whole is the context of the city; therefore, like van Eyck, a building for Venturi, "is a whole at one level and a fragment of a greater whole at another level". Both men are obviously obligated to an understanding of the difficult whole.

Although discussion can be developed from harmonious or conflicting points of view, it is clear that these positions are simply each individual's personal explanation or interpretation. The essence of this investigation is perhaps best summarized in van Eyck's all inclusive theory of reciprocity or Kahn's deceptively simple statement, "order is". These concepts suggest that the nature of the determinants of form is really inclusive of all interpretations.

The Design Process and Formal Expression

The previous investigation has established each individual's interpretation of the nature of the determinants of architectural and urban form. Through the process of design, these interpretations may materialize in a variety of unique formal expressions. The objective here is to explore the degree to which each designer expresses his interpretation through formal expression. The question is primarily one of the process of design.

Louis Kahn suggests that "Nature is not concerned with form, only man is concerned with form". Kahn's use of the word form in this context means formal expression. Nature would simply express the determinants of form where man would seek their alteration. In making this distinction, Kahn has paved the way for an open aesthetic in design. Such an aesthetic seeks its substance in the determinants of form, yet permits through the process of design their formal expression in a
AN OPEN AESTHETIC

common realization
design process
range of formal expressions

venturi, op. cit., p. 25

VENTURI - TANGE

venturi, op. cit., p. 86
variety of unique ways.

This concept of an open aesthetic is meaningful when considering many individuals with common theoretical positions. Kahn believes, "A man who discovers things that belong to the nature of things does not own these things. The designs belong to him, but the realizations do not." Therefore, the fact that many individuals share identical conceptual concerns is no indication that their formal expression of those concerns will be identical. In order to demonstrate this idea, it is perhaps best to begin with polar opposites.

The direct relationship between Kenzo Tange's understanding of the conflicting nature of the determinants of form and that of Robert Venturi has already been established. Tange contends, "The true vitality in any creative activity must derive from the confrontation of reality—the reality which is a dilemma. There is no vitality where no dilemma exists or where no one sees the reality as a dilemma." This attitude is the essence of an architecture of complexity and contradiction. However, their design philosophies and formal expressions are opposite.

Robert Venturi contends that, since life is complex there is no reason for modern architecture to ignore this reality. Tange, on the other hand, chooses to work within the basic traditions of architecture. Unlike Venturi, Tange's intellectual understanding of the underlying ordering forces still does not allow him to tolerate the chaotic urban environment, much less express this understanding in his architecture. For Tange "order is not something we are given, it is something we must create".

For Venturi "contradiction....is an essential characteristic of urban architecture". This realization implies the design process must
ROBERT VENTURI

"Each fragment expressed as a complex and contradictory whole"

KAHN - VAN EYCK

KAUROKAWA- SMITHSONS

51 ibid., p. 19

52 Joedicke, op. cit., p. 210

53 ibid.
consider all forces simultaneously. Each element is singularly awkward, yet Venturi contends that each is a "fragment appropriately accommodating to a complex and contradictory whole". It is this complex and contradictory whole which Venturi seeks to express through the diversity of the parts. As part of his design process, Venturi consciously seeks to resolve the complex function of the whole into the simple functions of the parts. He then expresses the complexity of the whole through the violent juxtaposition of the assembled parts.

Louis Kahn and Aldo van Eyck's understanding of the nature of the determinants of form includes both harmonious and conflicting points of view. However, their formal expressions are within an ordered architectural context which advocates the expression of the parts but within certain architectural constraints. Kahn writes, "I think an architectural space is one in which it is evident how it is made; you will see the columns, you must see the beams, or you must see the walls, the doors, or the domes in the very space which is called a space." The formal expression of these elements is integrated into architectural systems, as opposed to their being in violent juxtaposition. Similarly, the Metabolist architecture of Noriaki Kurokawa depends upon integrated architectural systems.

Kahn's contention that "Space is architectural when the evidence of how it is made is seen and comprehended" is the essence of the Smithsons' Brutalist theory. The distinction here is again the degree to which their understanding of the determinants of form is carried into formal expression. Characteristic of the Smithsons' work has been a search for structural, spatial, organizational and material concepts that are necessary to a particular building and then to express them
54 Hatje, op. cit., p. 63
55 ibid., p. 64
56 Venturi, op. cit., p. 53

FIGURE 5-HUNSTANTON SCHOOL-WASHBASINS-ALISON AND PETER SMITHSON, The New Brutalism, p. 40

FIGURE 6-DRAWING BY PAUL KLEE-Design of Cities, p. 241

57 ibid., p. 25

FIGURE 7-DRAWING BY PAUL KLEE-Design of Cities, p. 241

58 ibid., p. 60
with "complete honesty in a form that will be a unique and memorable image". While the Smithsons abandoned fictitious surface for the reality of steel and concrete and expressed mechanical services and conduits, they have still practiced and theorized within the basic traditions of architecture. The Smithsons' position here would be more closely related to Venturi's "contradiction adapted". Contraction adapted is viewed by Venturi as a method of making violent contrast tolerant and pliable.

The advocacy of minimum structuring frameworks for the urban architecture of David Crane, Fumihiko Maki, and Denise Scott-Brown would also indicate the acceptance of some contradictions but within an ordered framework. David Crane's position is somewhat closer to traditional architectural formal expression than Fumihiko Maki's or Denise Scott-Brown's which advocate a freer expression of the various elements of an urban architecture.

Robert Venturi's architecture is based upon the completely honest expression of these elements without the restraints of traditional architectural expression. Unlike the others considered here, Venturi's search is a deliberate effort to find and express the contradictions and complexities of life. Venturi contends that complexity does not deny the valid simplification which is part of the process of analysis and is even a method of achieving complex architecture itself. This idea is basic to his own design process where he analyzes complex functions to understand their form implications and then expresses their complex and contradictory nature through uncompromised "super adjacencies".

From these observations, it is clear that each individual's formal expressions are a product of his design process as well as his under-
standing of the determinants of form. It is the process of design, unique to the individual, which facilitates unique formal expression. The significant point here has been to establish the validity of a framework for analysis which does not depend upon similar formal expressions in order to establish compatible relationships between conceptual and organizational principles.

Summary

The present is a time of stylistic expression. It is also a time of groping, a time of discovery, and a time of realization. Our urban problems are new and our spatial demands are new. It is a time, therefore, more concerned with trying to understand the nature of the new determinants of architectural and urban form.

In the course of this chapter, an effort has been made to demonstrate that the individuals considered search beyond the immediate programmatic requirements of a building situation in order to obtain a better understanding of the determinants of form. It has been noted that this search is not purely intuitive but based upon rational, deductive logic as well.

Each individual has a unique interpretation as to the nature of the determinants of form. These interpretations range from the point of view that these determinants are either harmonious natural systems or they are conflicting. Either interpretation is valid. The degree to which they formally express their interpretations of the determinants is a product of the design process. It is the design process which facilitates unique formal expression.

The specific determinants of form: growth, change, identity, and association can now be explored in terms of their conceptual and organizational principles.
circulation diagram

relationship diagram


2 ibid., p. 153
Systems for Growth

The pressure and demands upon the world's urban centers are increasing. They have been brought about by the phenomenal increases in population and subsequent urbanization. The majority of today's major urban centers are basically 19th century cities faced with the demands of a 20th century technological society. Our cities can no longer facilitate architectural and urban structures based on static concepts. Today the problem is fundamentally one of urban structuring and its capacity to evolve new and creative forms. Therefore, the accommodation of growth has become a primary determinant of architectural and urban form.

Before attempting any comparative analysis, it is necessary to develop some basic organizational principles which will assist in clarifying the basic components of growth systems and the kinds of growth.

Organizational Principles - Servant and Served Spaces

It has long been academic procedure to organize the complex functions of large building programs by either one of two organizational principles; the circulation diagram or the relationship diagram. The circulation diagram was "utilized well into the twentieth century by Beaux Arts planners for the composition of huge and often quite unfunctional spaces which nonetheless dramatized corridors, foyers, and other connecting spaces".¹ This, according to Reyner Banham is "a long-discredited academic procedure".² The relationship or bubble diagram which is currently accepted in design offices and academic circles seeks to establish affinities between the functional areas. Although the latter procedure recognizes circulation patterns, the dominant emphasis is upon the areas--just as the Beaux Arts planners placed
SERVANT and SERVED SPACES....KAHN

architectural

and urban systems


4 Jacobus, op. cit., p. 153

5 ibid., p. 153
dominant emphasis upon circulation. In either case there is little concern for dealing with these organizational systems in a reciprocal fashion.

Banham, in a review of Louis Kahn's Richards Medical Laboratories, recognized a new concern "to render visible the movements of people and things within buildings, using patterns of movement as suggestions for the shaping and relating of distinct architectural volumes". He described it as a visual concern, "the buttery hatch aesthetic", and simply stated that it "seems to be a machine-age restatement of a long-discredited academic procedure, the circulation diagram". The significance of the structure, however, is not in its visual expression but in its organizational implications. Although its formal aesthetic has been copied (often superficially) by architects throughout the world, the concern here is for the reciprocal relationship between the two components of Kahn's concept of servant and served spaces.

Although it can be so considered, the idea of servant and served spaces is not primarily a formal concept. It is an organizing system which serves to order the design process at any scale. For example, at the architectural scale the servant spaces might be mechanical services and circulation spaces; and the served, containers of human activities. At the city scale this might correspond to public roadways and systems of movement which serve both the public and private institutions of man. The universal application of this concept is obvious, as every architectural and urban system can be resolved into servant and served spaces. Implicit here is the dual or reciprocal relationship between servant and served spaces and the basic components of architectural and urban systems, movement and tissue.

Systems for growth are conceived either in terms of linear systems
MOVEMENT-servant emphasis

"...TO WHICH THE ELEMENTS OF TISSUE ARE ADDITIVE."

SPATIAL-served emphasis

"...LINKED BY THE ELEMENT OF MOVEMENT."
of movement to which the element of tissue is additive, or in terms of spatial systems of tissue which are linked by the element of movement. As organizational principles these systems are reciprocal. The only distinction between them is the conceptual emphasis of the designer. The ability to perceive the relationship between linear systems of movement (servant emphasis) and spatial systems of tissue (served emphasis) is fundamental to a clear understanding of the reciprocal relationship between architecture and urbanism. Therefore, there is the need to consider both servant and served spaces simultaneously as they are inseparable. The conceptual emphasis of one or the other is a false understanding of these organizational principles.

The Kinds of Growth - Two Systems

Only two individuals, Noriaki Kurokawa and Shadrach Woods, have made explicit distinctions between the kinds of growth systems. However, their explanations are sufficiently clear to define and distinguish between the concepts. They contend that within the context of architectural and urban systems there are but two kinds of growth. The first, linear systems, will eventually reach a point where growth can no longer occur. The second, spatial systems, can reach a higher degree of development.

The Metabolists of Japan have extended their understanding of the growth phenomenon of the urban world through analogies which relate the processes of the city to the metabolic processes of plant and animal growth systems. It is significant to note here the distinction between the concept of change and the concept of growth which is inclusive of change.

The general connotation of the word metabolism defined as "physical
6 Webster's New Collegiate Dictionary, 1966, p. 528

7 Kurokawa, Noriaki, "Two Systems of Metabolism", Japan Architect, December 1967, p. 81

8 ibid., p. 83

9 ibid., p. 83
processes continuously going on in living organisms includes the concepts of both growth and change. Noriaki Kurokawa, however, contends that in terms of specific classification, growth is distinct from metabolic change. "Growth refers to the quantitative increase of the volume of the living system, particularly an increase in the volumes of its elemental forms." Therefore, growth systems are inclusive of metabolic change and their order is more complex. The phenomenon of change will be discussed separately in the following chapter.

Using his personal terminology Noriaki Kurokawa distinguishes the two kinds of growth systems as "infrastructuring and master spacing". These two systems are actually of the same organizational order; meaning, they are both comprised of servant and served elements. Although both are of the same organizational order, master spacing can reach a higher degree of development.

Kurokawa argues that the infrastructuring method corresponds to the external growth pattern of plants where the growth is additive upon the basic framework. Eventually the system will reach a point where it cannot grow to the next succeeding stage. In contrast the master spacing method is analogous to internal metamorphosis which is a "change in the entire form of the system".

Kurokawa has more recently emphasized the use of the terms "fiber form" for infrastructuring and "porous form" for master spacing. The concepts are identical. Similarly, the concepts of Shadrach Woods are identical to those of Kurokawa, the only distinction being in the terminology. According to Woods, his "web" theory is a higher degree of development than his theory of the "stem".

"A point is static, fixed

11 Shadrach Woods, Georges Candilis, and Alexis Josić, "Recent Thoughts in Town Planning and Urban Design", Pedestrian in the City (Princeton, New Jersey 1966), p. 185

12 ibid., p. 189
A line is a measure of liberty
A non-centric web is a fuller measure.\textsuperscript{10}

Woods contends, (like Kurokawa in his concepts of infrastructuring and master spacing), that "the web, as a structuring device, has a higher degree of order than the stem".\textsuperscript{11} There is no beginning or end to the web system. Openness is guaranteed by an even intensity so that it can "be plugged into at any point and can itself plug into greater systems at any point".\textsuperscript{12}

Linear and spatial systems operate at two conceptual levels simultaneously—as organizational principles related to servant and served spaces and as kinds of growth. It is extremely important to distinguish between these two conceptual ideas. As organizational principles linear and spatial systems have no formal implications; as kinds of growth they have definite implications for formal expression.

Both growth systems employ the use of the organizational principles of servant and served spaces. In either case the designer's conscious level of conceptual organization places a dominant concern on either the servant or the served space. In linear systems the dominant concern is usually upon movement or servant spaces. The elements of tissue are additive and are of a secondary nature. In spatial systems, the dominant concern is usually for the elements of tissue or served spaces. The element of movement is considered as a secondary system of linkage.

These classifications of dominant concern for each growth system are only theoretical. In fact, it is entirely possible to reverse the conscious level of conceptual organization. Linear systems could be conceived in terms of the elements of tissue as dominant and movement as secondary. This is rarely the case. Spatial systems, however, are
more subject to reversals of the dominant concerns in their conceptual organization.

The point is that the organizational principles of servant and served spaces are reciprocal components of both linear and spatial growth systems. The distinction between these concepts as conceptual organizers is simply a product of each individual's particular conscious level of emphasis.

**Growth Systems**

It is the objective of the following sections to establish with respect to each growth system, the presence of the concept of servant and served spaces and the conscious level of emphasis of each individual with respect to his conceptual organization of these spaces. The discussion, therefore, is organized in terms of the conceptual emphasis which the individuals utilize in explaining their work. These structuring systems are conceived as: linear systems of movement to which the element of tissue is additive (servant emphasis); spatial systems of tissue which are linked by the element of movement (served emphasis); or as reciprocal systems (equivalent emphasis). Note that servant and served elements are present in all three conditions.

**I. Linear Growth Systems.** The formal implications of linear growth systems have already been established as additive upon a basic framework. Such a linear system within the realistic context of architectural and urban structures will eventually reach a point where it cannot grow to the next succeeding stage. Should it do so, the linear system would become spatial.

For Alison and Peter Smithson, the utilization of systems of movement is basic to their philosophy of urban structuring. They contend
13 Alison and Peter Smithson, "Building Toward the Community Structure", *Structure in Art and in Science* (New York, 1965), p. 111

14 *ibid.*, p. 111

FIGURE 2-GOLDEN LANE—ALISON AND PETER SMITHSON, *The New Brutalism*, p. 50


FIGURE 3-HAUPTSTADT BERLIN PLAN—ALISON AND PETER SMITHSON, *New Directions in British Architecture*, p. 33

that it is a failure of architecture not to recognize the potential of movement as a basic organizational structure. The result of this failure is evidenced by building complexes which are "big lumps unrelated even in the most obvious and literal sense to one another: roads and emptiness in between". Therefore, the movement systems which serve these spaces must be recognized as an organizational framework which the Smithsons call "infrastructuring".

The Smithsons first employed their concepts for establishing an infrastructure as an ordering system for growth in their Golden Lane Housing Proposal for London. The emphasis was upon people and their patterns of movement. The public circulation ways were dominant. The elements of tissue, the served spaces or living units were additive to the movement system. The proposal expressed the potential to grow and to extend itself into the existing urban fabric by its capacity to "lace inbetween existing buildings and mesh over existing road and service networks". Golden Lane represents a significant step in the Smithsons' development of an approach to architecture which does not depend upon formalistic geometric concepts.

The ideas generated by the Smithsons' approach to movement as an organizing infrastructure are reflected in Shadrach Woods' concept of the stem. For Woods the stem is a means of achieving a meaningful organization in the absence of other criteria. It provides for "The organization of vast numbers of strictly repetitive and additive elements when there is no clear sociological or philosophical hierarchy".

Toulouse LeMirail, France, is an excellent example of Woods' concept of stem. The buildings which constitute the stem itself consist of two functional domains, the dwellings and the ancillaries. Woods specifically
17 ibid., p. 9

FIGURE 4-TOULOUSE LE MIRAIL-SHADRACH WOODS, Building for People, p. 188

18 Woods, "Recent Thoughts in Town Planning and Urban Design., op. cit., p. 185


FIGURE 5-STEM DIAGRAM-SHADRACH WOODS, Building for People, p. 194

20 Gunther Nitschke, "Cities Stasis or Process", Pedestrian in the City (Princeton, New Jersey, 1966), p. 167

FIGURE 6-DWELLINGS AND ANCILLARIES-SHADRACH WOODS, Building for People, p. 178
describes them in Kahn's terms of servant and served. The dwellings are understood as served spaces and the ancillaries like roads, paths, service installations, and the provision for educational, cultural, social, and commercial activities as servant spaces. The servant "ancillaries" provide the dominant organizational structure. The served "dwellings" are additive elements of tissue.

One of the stated objectives of the stem system is to return the city to the "domain of man on foot and seeks to respect his scale". There is complete separation of pedestrian and motor traffic except at their point of interaction. In order to accomplish this objective, the buildings actually serve as the pedestrian movement system and provide both a physical and social linkage between the community and the individual.

Woods contends that by its nature the stem is open-ended. Subject only to the natural limitations of a linear growth system, the stem provides maximum possibilities for growth while remaining complete at every stage of development. The stem, therefore, evolves an urban structure based on mobility by deliberately forming a planning language within which future development is generated. This concept suggests that the system allows for alternative directions of growth without reliance upon formal geometric composition.

Woods' concerns are obviously directly related to those of the Smithsons. Another individual who shares these same concerns for people and objects in motion is Noriaki Kurokawa. Like the Smithsons he identifies his concerns with the term infrastructuring. For Kurokawa, "infrastructuring is the method that attempts to see architecture and cities as information patterns and to compose their structures in keeping with
21 Kurokawa, op. cit., p. 81

FIGURE 7-TELAVIV-JAFFA PROPOSAL-
NORIAKI KUROKAWA, Architectural Design, December 1964, p. 604

22 ibid., p. 82

Unlike Woods or the Smithsons Kurokawa's terminology here becomes complex and esoteric. Kurokawa explains, "The infrastructure, the determining factor in the basic spatial composition, has some connection with the spatial scale. In cases where we attempt to grasp the growth form in terms of the information-flow growth pattern, the infrastructuring process can evolve a clear, effective growth system". The first sentence implies that the served spaces are somewhat a resultant of the infrastructure. The second sentence reinforces that idea as Kurokawa suggests that the servant infrastructure should be clearly expressed.

These principles are clearly expressed in Kurokawa's proposal for restructuring a slum area of the two existing conurbations, Tel Aviv and Jaffa. The proposal provided a new city infrastructure by reinforcing two existing routes which connected the two areas—a dominant infrastructure to which the new commercial elements could be added.

In the respect that the plan established a basic framework for private development, Kurokawa's proposal is directly related to David Crane's theory of the Capital Web. Both concepts include servant and served spaces. Like the concept of servant and served, the capital web can be one of formal expression. However, the capital web theory is an ordering system, not a statement of form. Its organizational principles have valid implications at all scales of design from the individual dwelling unit to the urban-region. The capital web theory facilitates, as does Kurokawa's explanation of infrastructuring, the organization of people and objects in motion.

The fact that the capital web is an organizational principle but can become a formal building system is evident in a studio project com-
FIGURE 8-CHANDIGARH RECONSIDERED-

24 Crane, David, "Chandigarh Re¬
considered", *American Institute of Architects Journal*, May 1960, p. 34

FIGURE 9-CHANDIGARH RECONSIDERED-
MAXIMUM DEVELOPMENT ENVELOPE COMPLETED-STUDIO PROBLEM UNDER DAVID CRANE, *Architectural Design*, April 1960, p. 159

25 ibid., p. 35
pleted under Crane's direction. The project was a reconsideration of Chandigarh. The reason for reconsidering the city was its faltering development for lack of an adequate industrial base. The proposal was founded upon the rerouting of a major rail line. The new city was considered as a major point within a lineal regional city. The organization establishes two major intersecting axes of communication, the public belt and the industrial belt. These elements, in addition to utility systems and a network of public open space, form the organizational framework for the capital web.

The scheme is largely designed for pedestrian movement and mass transportation along the two axes. It was suggested that "growth would hold rigidly to the transport services of the public belt." This established a maximum development envelope which reflects a maximum time-distance, pedestrian-to-transit relationship. In this respect the proposal is limited by transport technology as to future growth except for linear expansion along the railroad. Clearly the servant movement systems were a major organizational force in the reconsideration of Chandigarh.

Linear systems of growth are certainly inclusive of the organizational principles of servant and served spaces which correspond to the elements of movement and tissue. The conceptual emphasis of these organizational principles was clearly upon the servant element of movement. The elements of tissue, or served spaces, were additive and of a secondary nature.

II. Spatial Growth Systems. The formal implications of spatial growth systems have been established as systems of tissue which are linked by systems of movement. Spatial growth systems represent a higher degree of development than linear growth systems and have the capacity to incor-
CONCEPTUAL EMPHASIS

maki-group form


27 ibid., p. 57
porate linear systems into their structure.

In spatial systems the dominant emphasis is usually for the elements of tissue or served spaces, the element of movement being considered as a secondary system of linkage. It is entirely possible to reverse the conscious level of conceptual organization. As the following comparisons demonstrate, spatial systems are more subject to these reversals of emphasis. The first comparative analogy is between Fumihiko Maki's theory of "group form" and David Crane's theory of the "capital web" as organizational concepts.

Maki attempts to structure his understanding of the complexity of the urban world through the theory of group form; Crane through the theory of the capital web. Both theories rely upon the idea "that a system with the smallest organizational structure permits the greatest efficiency and flexibility". Maki's statement here could just as well have been made by Crane.

For Maki, the formlessness of Japanese cities is "almost historic". He sees his task as reorganizing the city by contributing structures and enhancing the diversified elements. In a similar fashion Crane is seeking to provide an organizational structure which will bring unity to the extremely diversified elements of the American city. The objective of both approaches is to make unity from diversity within an ordered system. The distinction is simply one of conceptual emphasis. At the same time each man recognizes the secondary component; Crane responds to the tissue or areas of the city, and Maki expresses his concern for movement systems through the concept of linkage.

The Shinjuku District of Tokyo is one of the city's largest sub-centers and serves as a commercial and amusement center. Maki's proposal
Maki: "master program"
...elastic and more enduring in the face of societal change."

Crane: "dynamic city"
"...capable of successive adaptations based on the change possibilities created."

FIGURE 10-SHINJUKU DISTRICT PLAN-FUMIHIKO MAKI, Investigations in Collective Form, p. 55


29 "Group Form Approach to Urban Design", Progressive Architecture, October 1964, p. 178

30 ibid., p. 178

FIGURE 11-SHINJUKU DISTRICT-FUMIHIKO MAKI, Investigations in Collective Form, p. 56

31 Crane, op. cit., p. 34


for the district is a clear statement of group form in terms of growth. It is an expression of a method which accommodates the addition of single dynamic elements to space. "The nature of such growth is cumulative, and the resulting form is a collective open structure". The linkage here is generated by the strength of the collective form. "The image remains a total one, even though individual parts may be designed by different architects". The overall looseness of the organization is called master form, "elastic and more enduring in the face of societal change, than the master plan". Maki is seeking a "dynamic totality" of urban form where through group form "city growth is more akin to patterns of crystal formations or biological divisions, not the mere addition or assemblage of units within the static rigidity of a structural grid".

Maki's reference to master form means the physical expression of what he calls a master program. This concept is the equivalent of Crane's theory of the capital web which is also an enduring generative spatial framework. Similarly Maki's search for a dynamic totality within a minimum organizational framework is identical to Crane's explanation of his concept for the "dynamic city" which is capable of "successive adaptations based on the change possibilities created". Clearly David Crane and Fumihiko Maki's concerns are parallel. Direct relationships, however have been obscured because of their unrelated formal expressions.

A second comparative analogy is presented here between Noriaki Kurokawa and Shadrach Woods. The formal expressions of their concepts are identical. Emphasis upon the organizational principles which shaped them are reversed.

Noriaki Kurokawa expresses a concern for the element of tissue in
34 Kurokawa, op. cit., p. 82

FIGURE 12 - AGRICULTURAL CITY - NORI - AKI KUROKAWA, Investigations in Collective Form, p. 14

35 Nitschke, "The Metabolist of Japan", op. cit., p. 510

FIGURE 13 - FREE UNIVERSITY OF BERLIN - SHADRACH WOODS, Building For People, p. 212

36 Woods, "Recent Thoughts in Town Planning and Urban Design" op. cit., p. 189
his concept of "master spacing" and the emphasis is clearly related to the served spaces. In contrast to "infrastructuring", it is an attempt to develop the organizational structure of either a building or a city by areas or spatial units. Shadrach Woods emphasizes the servant elements of movement within his web theory of growth.

Kurokawa first expressed his concept for master spacing in his proposal for Agricultural City, which was an effort to structure a small farming village in Japan. Here Kurokawa acknowledges the project is an extension of the Smithsons' ideas of "clustering" which were intended to distinguish new forms of human association from traditional concepts such as dwelling, community, and neighborhood. He has taken the traditional Japanese agricultural unit and organized it into twenty-five master spaces. The interconnecting infrastructure was conceived as a secondary system in service of the spatial units. The proposal accommodates each spatial unit as a self-developing and self-regenerating metabolic structure.

Shadrach Woods' design for the recently completed Free University of Berlin emphasized the web as a system of movement to which the served elements were additive. The major concern was the employment of the web concept to facilitate growth. Woods suggests that the future is compromised in an environment where some places are central and others are not. The success of the web system depends on the even distribution of activities over the web. Instructional areas have been dispersed in order to facilitate the non or poly-centric requirements of the web concept. Woods contends that the web "can be plugged into greater systems at any point".

Spatial systems of growth include the organizational principles of servant and served spaces. All the individuals share parallel concepts
FIGURE 14 - HELIX PLAN FOR TOKYO-
NORIAKI KUROKAWA, World
Architecture 2, p. 25

FIGURE 15 - HELIX PLAN - SECTION OF
MASTER SPACES AND URBAN CON-
NECTORS - NORIAKI KUROKAWA,
World Architecture 2, p. 25

37 Nitschke, "The Metabolist of
Japan", op. cit., p. 496

FIGURE 16 - TOKYO BAY PLAN - KENZO
TANGE, World Architecture 2,
p. 20

38 "Aesthetics and Technology--
Kenzo Tange", Progressive
Architecture, October 1964,
p. 164
and organizational principles, the only significant distinction being placement of emphasis. Crane and Woods place their emphasis upon the servant element of movement and Kurokawa and Maki upon the served spatial elements.

III. Combined-Linear and Spatial Growth Systems. Closer to the reality of the urban world is the combination of both linear and spatial growth systems. Noriaki Kurokawa's proposal for Helix City and Kenzo Tange's proposal for Tokyo Bay are expressions of the combined systems.

In Kurokawa's proposal for Helix City, he employed the concept of "infrastructuring" in combination with "master spacing". This project takes as its starting point the fact that a city is a series of concentrated areas. These are established as master spaces. From this understanding, Kurokawa has developed a series of loop highways which interconnect all the various master spaces of the city. These "urban connectors" are intended to serve as an infrastructure along which future development can occur. Although Kurokawa does not stipulate the necessity for even intensity as does Woods in his poly-centric web, this condition is implicit in the proposal. Tange's proposal was based upon developing a shift away from the existing radial transportation structure of the city. When improved, Tange contends, the existing structure simply increases the demand and therefore congestion.

One of the stated objectives of the Tokyo Plan was to resolve the existing radial transportation system. The proposal advocates a series of transportation loops extending across the bay to form a "civic axis". Within these loops are the commercial, business, and governmental activities of the city. The housing units are attached to a system of linear infra-
FIGURE 17 - CIVIC AXIS, TOKYO BAY -
KENZO TANGE, World Architecture
2, p. 23

39 Personal Conversation,
22 March 1969,
Houston, Texas

FIGURE 18 - HOUSING UNITS, TOKYO BAY-
KENZO TANGE, Architectural
Forum, October 1966, p. 47

FIGURE 19 - EXPLANATION OF METABOLIST
ROLE IN TOKYO BAY PROPOSAL-
ORIGINAL DRAWING BY ARATA
ISOZAKI
structures extending into the bay from the civic axis.

It is significant to note that at the regional scale this civic axis serves as a major linear system of movement to which the housing areas are additive. At a lesser scale it becomes clear that the axis is a series of spatial systems of tissue linked by the systems of movement. It is also evident that the housing areas are structured by linear systems of movement to which the housing canopies are additive. The two organizational systems correspond to Kurokawa's concepts of master spacing and infrastructuring.

The Tokyo Bay Plan has been recognized by many as perhaps the clearest expression of Metabolist thought to date although Tange is not a member of the group. The Tokyo Bay Plan is a product of the Kenzo Tange Design Team which at that time contained several Metabolists including Noriaki Kurokawa. Arata Isozaki, who was also a member of the design team, described the influence of Metabolist thought upon the proposal.

Mr. Isozaki explains that proposals for extending the city into Tokyo Bay had been made many times in the past. However, Tange's was the first to link with the opposite shore. Tange's original proposal did not indicate the transportation loops of the civic axis, but rather a single straight line. The spatial system was later developed by Kurokawa. The organic nature of the network system in the existing city is also the work of Kurokawa as a response to the existing urban pattern. Tange's proposal for that section was an extension of the linear infrastructure which he had developed in the bay. The significant point here is that the proposal recognized the existing urban pattern.

The objective of this section has been to establish the presence of the concept of servant and served spaces in both linear and spatial
FIGURE 20 - AN ARCHITECTURE OF MOVEMENT, PHILADELPHIA PLAN - LOUIS KAHN, Team 10 Primer, p. 49

40 Joedicke, op. cit., p. 210

FIGURE 21 - PHILADELPHIA PLAN - LOUIS KAHN, Louis I. Kahn, p. 109

41 Kahn, Louis, "Visionary Cities" Arts and Architecture, January 1961
growth systems. These investigations make it clear that as organizational principles they are reciprocal. The distinction between these concepts as conceptual organizers is simply a product of each individual's particular emphasis.

_Growth-Control Through Design and Investment_

The ability to perceive the reciprocal nature of linear systems of movement and spatial systems of tissue is fundamental to a clear understanding of the relationship between architecture and urbanism. Once the organizational and formal implications of these concepts are understood, it is possible to creatively direct and control architectural and urban form through a rational process of design. This possibility is founded in the concept of servant and served spaces. In addition to its design implications, the concept of servant and served spaces is essential to the balanced control of growth through public and private investment.

Louis Kahn and Alison and Peter Smithson have realized the reciprocal relationship between architecture and urbanism in the automobile age of the twentieth century. Kahn writes, "It is inconceivable today for a city not to have an order of movement; to define every element of movement for what it does, so that one can make form around it. It is a form-making thing....if you zone streets—then you are giving automatically the use of environments and buildings."^40

In the Philadelphia Plan Kahn found a way to give form to this new order of movement. It is significant that he did so within the existing urban pattern. It is equally ironic that this investigation, because of its formal expression in Kahn's drawings, has been misunderstood as a visionary scheme.^41 The fact that Kahn responded to an existing situation and clearly defined the relationship between the elements of movement and
FIGURE 22 - PHILADELPHIA PLAN, EXISTING MOVEMENT PATTERNS - LOUIS KAHN, Louis I. Kahn, p. 108

42 Nitschke, "Cities Stasis or Process", op. cit., p. 165

FIGURE 23 - PHILADELPHIA PLAN, PROPOSED MOVEMENT PATTERNS - LOUIS KAHN, Louis I. Kahn, p. 108


44 "Kahn and the Living City", Architectural Forum, March 1958, p. 116

45 Kahn, "Visionary Cities", op. cit., p. 10

FIGURE 24 - PHILADELPHIA PLAN, DRAWING - LOUIS KAHN, Team 10 Primer, p. 60
urban tissue demonstrates the pragmatic reality of his proposal.

The essence of Kahn's Philadelphia Study was to discover the existing order of the city. Kahn feels the automobile has completely upset the form or order of the city—"The problem of chaos in the contemporary city is not in its design but in its order." Kahn contends that the streets which expressed the "order" of pedestrian and equestrian movement systems of the past century are still being used. The automobile demands a new order—one which has previously been given no consideration—hence, disorder and chaos.

To Kahn the problem was to realize the order of movement and its implications for an urban architecture which seeks, "To make a distinction between the viaduct architecture of the car and the architecture of man's activities." At present there is no distinction...."Today's city streets carry half a dozen different, contradictory types of traffic." Kahn contends that a natural zoning or order exists between the movement system and the functions of a particular street. The design of the street is also architecture—"A street wants to be a building." To express this understanding at the urban scale, Kahn developed the concept of stop-and-go streets arranged hierarchically to accommodate the various modes of movement. His thoughts are expressed in an analogy between the movement characteristics of highways and waterways.

"Expressways are like RIVERS
these RIVERS frame the area to be served
RIVERS have HARBORS
HARBORS are the municipal parking towers
From the HARBORS branch a system of CANALS that serve the interior
The CANALS are the go streets

FIGURE 25-LONDON ROADS-REGIONAL STUDY-ALISON AND PETER SMITHSON Urban Structuring, p. 72

47 Smithson, Alison and Peter, "London Roads Study", Architectural Design, May 1960

48 ibid., p. 186

49 Smithson, "Urban Structuring", op. cit., p. 30

FIGURE 26-LONDON ROADS-SOH0 STUDY-ALISON AND PETER SMITHSON, Urban Structuring, p. 70
From the CANALS branch cul-de-sac DOCKS

The DOCKS serve as entrance halls to the building."46

The Smithsons' London Roads Study reflects many of Kahn's ideas which appeared in his Philadelphia Plan—movement systems, stop-and-go streets, and terminal parking structures are related to the existing city pattern. The study is a realistic effort, both in content and in formal expression, to deal with structuring systems for the urban environment. The sincerity of their effort is emphasized by the fact that their ideal concepts were compromised by existing conditions.

Ideally the Smithsons would propose a network of urban motorways which would be equally spaced and be of even intensity. This idea is compromised somewhat because "the pattern of the net is adjusted to the existing structure of the city".47 The objective is to maintain an even flow of traffic over the net to provide maximum efficiency. There is no "hierarchy of importance, only a hierarchy of density. That is, where the use is greatest the road net is most dense."48

At every level of design the movement systems provide the ordering framework. Patterns of pedestrian movement are the key to architectural organization. At the city scale roads are used to form an urban infrastructure or network which can direct the pattern of growth.49 The automobile has set new standards of comfort and convenience which have created a new scale to which architecture has to respond.

Urban motorways are the primary fixed elements for forming the community structure. Any increase in the network within any area has the potential to produce a change in the existing pattern. This idea was proposed in an effort to generate growth in South and West London where such roadways do not presently exist. Urban motorways are, therefore, tools
50 ibid., p. 60

FIGURE 27-LONDON ROADS-SOHO STUDY
ROUTE BUILDINGS-ALISON AND
PETER SMITHSON, Urban Structure, p. 71


52 Alison Smithson, Team 10 Primer, (Cambridge, Massachusetts, 1968), p. 47

53 Crane, David, "Public Art of City Building", Annals of the American Academy of Political and Social Sciences, March 1964, p. 87


55 ibid., p. 30
to produce growth and direct change, "to break down the 'density pyramid' into a looser cluster of 'density points'".50

The direct influence of Kahn's Philadelphia Plan is acknowledged by the Smithsons. "In the London Roads Study much of the thinking was dominated by Louis Kahn's Philadelphia Plan, the most important single contribution to changing our idea of the nature of the relationship between architecture and urban planning." The Smithsons believe it is the architect's obligation to work toward a more comprehensible community structure by interpreting the needs of the individual building program in terms of the total community.52

Like Kahn and the Smithsons, David Crane considers the urban freeway to be a powerful constructive device for city building.53 Inherent in the structure of the freeway is its capacity to control access and therefore to determine either positively or negatively land uses and values. As a city builder it has the capacity to direct the form and pattern of the city. Crane's concern at this scale is balanced between the servant linear systems of movement and its served elements of urban tissue.

Denise Scott-Brown, like Kahn, contends that the impact of the automobile and the communication systems which have responded to it have been superimposed on the form of the nineteenth century city order. "A very different relation of traffic volume to land value and building intensity must emerge with the automobile, and has not yet emerged in a comprehensible form."54 Any meaningful organization of the city will be dependent upon these "new relationships which are forming between parts of the city as a result of the social and technological changes of the twentieth century".55

In more recent investigations into the relationship between movement
FIGURE 28-VISUAL CHAOS-Architectural Forum, March 1968, p. 41

FIGURE 29-A BUILD-DING-BOARD PROPOSAL-ROBERT VENTURI, Architectural Forum, April 1968, p. 77

56 Scott-Brown, Denise and Robert Venturi, "On Ducks and Decoration", Architecture Canada, October 1968, p. 48


58 ibid., p. 91

FIGURE 30-A BUILD-DING-BOARD PROPOSAL-ROBERT VENTURI, Architectural Forum, April 1968, p. 77
systems and urban tissue, Denise Scott-Brown and Robert Venturi have provided valuable insight into what these new relationships really are. Ironically as Kahn's Philadelphia Plan has been misunderstood as a visionary scheme, the studies of Denise Scott-Brown and Robert Venturi have been misunderstood because of their apparent advocacy of what is otherwise considered a formal expression of chaos. Their significance, however, lies in the fact that they are in search of creative and realistic means for ordering the environment, and contend that a re-evaluation of current purist thought will be forced by "the architecture of communication involving symbolism and mixed media. The graphic sign in space has become the architecture of the landscape."  

The order which exists is based not on visual principles but on economic principles of merchandising and movement of people through space. The distortion of visual order is the product of competitive economic speculation which has had little or no concern for visual principles. Robert Venturi believes that these honky-tonk elements are here to stay. He further suggests that the problem is not their "banality or vulgarity as elements which make for the banality or vulgarity of the whole scene, but rather their contextual relationships of space and scale".  

Therefore, creative control through perceptual relationships of space to scale of movement should order graphic communications. "Contained intricacy might be one of the viable methods for dealing with urban chaos and the endlessness of road town."  

The Venturis' investigation into the Las Vegas commercial strip provides valuable insight into structuring controls through design. An initial analogy describes the phenomenon as a disengagement of the false fronts of main street and the old west. These disengaged fronts are the
FIGURE 31 - LAS VEGAS COMMERCIAL STRIP - DENISE SCOTT-BROWN AND ROBERT VENTURI, Architectural Forum, March 1968, p. 36


ibid., p. 91

ibid., p. 41
big billboards and signs which are now perpendicular to the highway. The buildings have been disengaged from the street to accommodate the automobile. The graphic sign is the link between the motorist and building. It also defines the channel of movement. This order is not an easy one to perceive because "The image of the commercial strip is chaos". The Venturis thus quote Henri Bergson, who said, "Disorder is an order we cannot see."

The problems of high speed, big scale, and open space are analyzed in terms of the more obvious visual order of the street elements and the difficult visual order of the commercial buildings and signs. The street elements are different at the two scales of movement, main street and the strip. Main street is basically a bazaarlike organization based on pedestrian movement. People flow easily from building to building without any strong definition between public street and private club. The strip is ordered to accommodate this same type of movement of people between buildings but at the scale of the automobile.

Here there is a definite transitional sequence from public to private space. The turning systems of the strip are entirely consistent with the location of the buildings to facilitate access and exit. In Las Vegas as in most other commercial strips, this order is primarily a responsive one. Without adequate control it can also become chaotic, although inherent in the relationship is the capacity to generate, control, and direct the growth of private enterprises.

The buildings and signs constitute the difficult visual order. "The scales of movement and space of the highway determine distances between buildings: they must be far apart to be comprehended at high speeds." The locational pattern is a response to the changes in the patterns of
FIGURE 33-LAS VEGAS COMMERCIAL STRIP—DENISE SCOTT-BROWN AND ROBERT VENTURI, Architectural Forum, March 1968, p. 41

62 ibid., p. 41

63 Venturi, Complexity and Contradiction in Architecture, op. cit., p. 103
movement brought by the automobile. The large-scale graphic sign is also a response to the demands of high-speed movement. It has become a heraldic symbol of communication which links the individual in motion to the building.

The highway is a public order. The buildings and signs are an individual order. "In combination they embrace continuity and discontinuity, going and stopping, clarity and ambiguity, cooperation and competition, the community and rugged individualism," Order and chaos are evident simultaneously. Robert Venturi suggests, "It is perhaps from the everyday landscape, vulgar and disdained, that we can draw the complex and contradictory order that is valid and vital for our architecture as an urbanistic whole."

The organizational principles of servant and served spaces as they correspond to the elements of movement and tissue have universal application. A conscious awareness of their reciprocal relationship provides the capacity to creatively direct and control the growth of architectural and urban form through design. However, as Peter Smithson has pointed out, planning in the absence of the executive capacity to build has little meaning. It is significant that the concept of servant and served spaces forms the basis for a theory of public design leadership complemented by private investment.

At the urban scale, public ownership of the appropriate balance of servant spaces (public roads, utilities, and services) to served spaces (private homes, institutions, and business concerns) is essential to the control of growth.

The idea of public leadership is the first criterion of David Crane's capital web theory. Crane is more concerned with the process and methods
64 Crane, "Alternative to Futility", op. cit., p. 94

65 Crane, David, "Symbolic City Order", unpublished paper presented to the American Institute of Planners Conference, Seattle, Washington, July 1959, p. 4


67 Crane, "Chandigarh Reconsidered", op. cit., p. 36

68 Crane, "Public Art of City Building", op. cit., p. 91

69 Crane, "Alternative to Futility", op. cit., p. 94

70 Crane, "Architecture and the Urban Revolution", op. cit., p. 31

71 Crane, "Public Art of City Building", op. cit., p. 91
for obtaining end goals and qualitative ideas for urban life and environment than formal expression. The capital web theory is therefore a dynamic philosophy of city form and design which emphasizes "movement, time, and process". It is capable of "successive adaptations based on the change possibilities created".

The capital web provides a "generative spatial framework" for accomplishing the objectives of urban planning. The physical elements of the web are a hierarchical system of roads, public structures and open spaces, and utility systems. Crane would build all these elements of public structure as the primary ordering system allowing for the remaining elements to be filled in later by private enterprise. Thus "local government is asked to design and build its own facilities in an ordered time-space sequence as a basic control and creator of growth and changeability".

The idea that public design is "to leave and make creative opportunities for the private sphere" is the second criterion of the "capital web" theory. The capital web serves to guide the "individual acts which by accretion become the connective tissue of the city". Crane advocates at the city scale a capital theory—a concept of public design leadership within the "City of a Thousand Designers".

It is clear that such a relationship cannot exist without some controlling devices. Crane points out that present capital improvement programs which might have a direct value in directing city form are often nullified by land speculation. Therefore, "local-government—and its federal and state helpers—must choose its design tools for maximum effect and minimum fiat". Admittedly the realities of present capital improvement programs and private ownership concepts do constitute capital webs. However, they function in a corrective rather than a creative capacity.
The validity of the capital web theory lies in the awareness of its creative potential by its users.

Summary

In the course of this chapter an effort has been made to demonstrate that the individuals considered have recognized the pressures and demands upon the world's urban centers created by the force of growth. Consequently they have recognized the accommodation of growth as a primary determinant of architectural and urban form.

Louis Kahn's concept of servant and served spaces has a profoundly universal application in the organization of systems of growth. Both linear systems and spatial systems of growth are composed of these two kinds of space which correspond to the elements of movement (servant spaces) and tissue (served spaces).

Investigations into linear systems of movement to which the element of tissue is additive and spatial systems of tissue which are linked by the element of movement demonstrate that their conceptual organization is a product of the individual's emphasis. An understanding of the reciprocal nature of the concept of servant and served spaces is necessary for an understanding of the relationship between architecture and urbanism. A conscious awareness of this relationship provides the capacity to creatively direct and control the growth of architectural and urban form through design and investment.
Structuring For Change
TIME & CHANGE

Urban form must be conceived... "As events, not as isolated static substances."

1 Nitschke, Gunther, "The Metabolist of Japan", Architectural Design, October 1964, p. 509
Structuring for Change

In addition to the phenomenon of growth the urban world today is confronted by constant and more rapid change. Our technological society is creating, developing, and outdating its artifacts at an unprecedented rate; often disrupting existing physical patterns. It has become necessary to recognize these cycles of change in the organization of architectural and urban structures in order to facilitate change with minimum disruption of the entire system. The phenomenon of change as it relates to the fourth dimension of time has become a primary determinant of architectural and urban form.

It is the objective of this chapter to demonstrate that the individuals considered have responded to change as a determinant of form and have developed organizational principles of structuring for change. The structuring process becomes indeterminate and depends upon feedback from the existing built environment. The recognition of this indeterminate process has led to a new aesthetic of change which visually encompasses an understanding of the phenomenon of change as a determinant of form.

Observations on the Nature of Change

The traditional Japanese philosophies of Zen and Shintoism serve as an excellent point of departure for developing a conceptual understanding of the dynamic nature of twentieth century urban form. By providing a basis for conceiving objects or forms "as events, not as isolated, static substances," these philosophies recognize the significance of the fourth dimension of time and subsequently of change.

Noriaki Kurokawa and his fellow Metabolists are extremely conscious of the time dimension. They reinforce their architectural theories by seeking the creation of an environment that responds to the growth and
2 Fumihiko Maki, Investigation in Collective Form, Special Publication No. 2 (St. Louis, 1964), p. 59

3 Kawazoe, Noborn, "Topological Spaces", Japan Architect, December, 1967, p. 77

4 Shadrach Woods, Georges Candilis and Alexis Josic, "Free University Berlin", World Architecture 2 (New York, 1965), p. 113


6 Kahn, Louis, "Statements in Architecture", Zodiac 17, p. 57
decay cycles of human life. Fumihiko Maki contends that the city must first be a "reflection of growth and decay in our life process—a metabolic process. This is to conceive a form in relationship to an ever-changing whole and its parts."2 Much of Kurokawa and Maki's thought about the dynamic nature of cities has been generated as a reaction to "living in an environment built on the basis of Euclidian geometry".3

Shadrach Woods expresses exactly the Metabolist point of view with only slightly different terminology. He contends that since change is the basic and organic principle of life, change should become one of the basic conditions of design. To deal with our environment in terms of perfect Euclidean space "would conceal an imperfect, unstable state of becoming".4 Woods believes that our civilization today is set apart from any other by our consciousness of the fourth dimension of time and therefore change.

Woods' statement which recognizes the "unstable state of becoming" is parallel to the philosophic position of Louis Kahn. Drawing on his understanding of the order of man's institutions Kahn suggests that he cannot predict the architecture of the future. "We can only work within the laws we comprehend now. The architecture will be based on new rules as the system of laws becomes more and more part of a new comprehension of physical order and the nature of man."5 Kahn further contends "That everything you see is under scrutiny; there is nothing finished; and the door is open, very open, to the realization of wonderful new institutions".6

Kahn's recognition that the door is open to the realization of new institutions is a major concern for Kenzo Tange. However, Tange fears that the forces of change will overrun man's capacity to adapt. The rapidly advancing technology of our age has greatly increased the speed at which
KENZO TANGE

"THE PACE OF CHANGE...

EXISTING

CHANGE

OBJECTIVE

ADAPTATION | FAILURE

..... MUST BE WITHIN
MAN'S ABILITY TO ADAPT

SCOTT-BROWN &
VENTURI

ALTERNATIVES
CREATED BY
NEW......

....INDETERMINATE
FORCES

DAVID CRANE

"THE UNKNOWN BECOMES
A CRITERION
OF FORM..."

PRESENT

FUTURE


10 Crane, David A., "A New City for India", Notebook of Programs and Student Reports, University of Pennsylvania, 1959, p. 7


12 ibid., p. 36
our social life is expanding and changing. Tange says that man can no longer be considered simply as a measurable, biological abstract. Today man must be considered a dynamic and complex being who is seeking identity within a rapidly changing environment. This is an age in which the design ideals of the first half of the century are no longer appropriate for the complexity of today's environmental problems. Tange's position here is shared by van Eyck and the Smithsons as expressed in their investigations of the constant needs of man for identity and association within a rapidly changing urban environment.

From a pragmatic point of view the phenomenon of change is also recognized by Denise Scott-Brown. She supports the idea that "If there is to be architecture at all, it must be indeterminate architecture—its physical form will be undifferentiated, impermanent, able to grow, metamorphose, and be destroyed". This attitude is inherent in Robert Venturi's advocacy of complexity and contradiction. "A play of order and compromise—supports the idea of renovation—and evolution in city planning. Indeed change in the program of existing buildings is a valid phenomenon."

David Crane places particular emphasis upon change. He suggests growth may or may not be inevitable, "But in all cities change is an inherent fact of life". The concept of change is only one of several disciplines of form required for "city making instead of city planning". According to Crane, "The unknown becomes a criterion of form".

These observations demonstrate that each individual is keenly aware of the significance of the phenomenon of change and its ever increasing importance in the design and structuring of the urban environment.

Cycles of Change

Having recognized that architectural and urban forms are not static
FIGURE 1 - RICHARDS MEDICAL LABORATORIES - LOUIS KAHN, Louis I. Kahn, p. 84

13 Crane, David A., "A New City for India", op. cit., p. 18

FIGURE 2 - RICHARDS MEDICAL LABORATORIES PLAN - LOUIS KAHN, Architects on Architecture, p. 391

14 ibid.

FIGURE 3 - CAPITAL WEB/PUBLIC FACILITIES AND LAND CONTROL, STUDIO PROBLEM UNDER DAVID CRANE, Architectural Design, April 1960, p. 162

15 Crane, "Chandigarh Reconsidered", op. cit., p. 39
substances but events which occur at points in time, there is a need to establish organizational principles which can facilitate change with minimum disruption of the building system. It has become necessary to conceive of the various building components in terms of cycles of change and consider their interconnection with respect to their life span. Louis Kahn's concept of servant and served spaces again has universal application.

Kahn is searching for a differentiation of internal building space, structure, and services. This is accomplished through his organizational concept of servant and served spaces. This feature "seems to recognize the time element and probability that the uses of these two orders of space will not always change together".\(^{13}\) As applied here it serves as an organizational device for determining the long life span (servant) and short life span (served) components of a building system; and in the Richards Medical Laboratories Kahn has provided a strong framework which allows for frequent tenant modification.

David Crane contends that the inherent organization in Kahn's system would also accommodate change at the city scale. "Kahn's service spaces can become certain parts of our circulation system and public service facilities; his structure can become our main roads and community facilities; and his activity spaces our private land uses."\(^{14}\) Crane incorporates this idea into his concept for the Dynamic City.

The Dynamic City, a conceptual component of Crane's Capital Web Theory, seeks to establish a hierarchy of change and permanence. This concept depends upon a generality and flexibility of parts. Crane seeks to identify "strong and permanent locational rhythms, and less permanent superimpositions".\(^{15}\) Simply stated he identifies roads, public structures, and utility systems as the longer term, more permanent elements of the city.
Above: one family house plan. Knockout panels in party walls allow for later expansion into the adjacent unit.

FIGURE 4—CHANGE AT THE INDIVIDUAL UNIT SCALE, STUDIO PROBLEM UNDER DAVID CRANE, Architectural Design, April 1960, p. 160

16 Crane, David, "The Dynamic City" Architectural Design, April 1960, p. 162

17 Crane, "Chandigarh Reconsidered", op. cit., p. 33

FIGURE 5—CHANGE AND RENEWAL AT THE CITY SCALE, STUDIO PROBLEM UNDER DAVID CRANE, Architectural Design, April 1960, p. 158

FIGURE 6—HAUPTSTADT BERLIN CENTRAL PLAN—ALISON AND PETER SMITHSON, New Directions in British Architecture, p. 33

while individual houses and buildings are considered as less permanent superimpositions. The classification of components is based "on an organization of parts related to life spans". The most emphatic objective of the Chandigarh studio project, completed under Crane's direction, was to "provide for dramatic internal change to reflect future standards and economic capabilities". The proposal attempts to provide this flexibility so that destruction is not a prerequisite for change. The notion that future change is a determinant in designing the present urban form is evident throughout the scheme. From knocked-out panels within the individual units to diagrammatic studies of renewal at the city scale, the dominant theme is change.

Like Kahn and Crane the Smithsons are keenly aware of the fact that the life span of each building component varies. This implies that such specialized elements as elevators, mechanical services, and stairways are the more "fixed" elements. The more generalized elements such as wall partitions are considered "transient".

These concepts can be extended. At the city scale this implies fixing "an 'infrastructure' along which development can take place; a structure based on our new patterns of society—and on an awareness of the different life cycles of the fairly transient and more permanent objects". In their plan for Haupstadt Berlin, this organization of components is evident. By utilizing fixed, vertical elements to provide a unifying three-dimensional framework, the Smithsons have established an elevated pedestrian net which works its way into the urban fabric by connecting into existing as well as new structures. This net is linked vertically with the automobile network below. Together the two networks, according to the Smithsons, express a dynamic theme "which is not static,
FIGURE 7-HAUPTSTADT BERLIN PEDESTRIAN AND AUTOMOBILE NETWORKS, ALISON AND PETER SMITHSON, *Team 10 Primer*, p. 70
19 ibid., p. 172


FIGURE 9-STEM CONCEPT, TOULOUSE LE MIRAL-SHADRACH WOODS, *Building for People*, p. 188

20 Kurokawa, Noriaki, "Two Systems of Metabolism", *Japan Architect*, December 1967, p. 81
but is extendable, uncompleted, enabling variation and growth, decay and regeneration - without destroying the basic concept".\textsuperscript{19} Whatever the scale the Smithsons seek to express this idea in terms of "transient and fixed" elements determined by their relative life cycle.

The recognition of cycles of change is also fundamental to Shadrach Woods' concepts of the stem and web. Both systems are generative frameworks which are organized in terms of the life spans of the various building components. Implicit in the formal expression of these concepts is that the movement or servant elements are considered as the more permanent components.

The ideas of Kahn, Crane, the Smithsons, and Woods are clearly interchangeable, the only distinction being terminology and perhaps emphasis. There is also a direct parallel between their ideas and those of Noriaki Kurokawa, but the relationship is obscured in the writings of Kurokawa.

The emphasis of the Metabolists is to create an environment which expresses the Metabolic process of human life. Kurokawa explains his theory in terms of "biological metabolism", the theoretical equivalent of Crane's "Dynamic City". Kurokawa utilizes biological metabolism to analyze the fundamental components of cities as well as of buildings. The objective is to discover the "temporal metabolic rhythm" which exists within each building component and its relationship to the entire system. "Temporal metabolic rhythm" is simply Kurokawa's esoteric way of saying "life cycle".

In order to demonstrate his theory, he has formulated a four-point method of analysis of biological metabolism.\textsuperscript{20}

1. Divide the spaces into basic units
NORIAKI KUROKAWA

1. THE BUILDING PROGRAM
   "IDENTIFY UNITS"

2. "EQUIPMENT UNITS" (SERVANT)
   "LIVING UNITS" (SERVED)

3. "TEMPORAL METABOLIC...
   "RHYTHMS"
   SHORT TERM
   LONG TERM

4. CLARIFY THE CONNECTORS TO PERMIT CHANGE

"LINKAGE" AS A CONCEPT OF...

RIGID

FLEXIBILITY

A PHYSICAL CONNECTOR WITHIN ARCHITECTURAL AND URBAN STRUCTURES
(This is equivalent to identifying the functional programmatic requirements of a building program.)

2. Divide the units into equipment units and living units.
   (This concept is parallel to Kahn's servant and served spaces which are also fundamental to the Smithsons', Woods', and Crane's organization of building and city components.)

3. Clarify the temporal metabolic rhythms among the unit spaces.
   (This is equivalent to assigning the approximate life span in terms of time to each space. Specifically, this is identical to the Smithsons' identification of "transient and fixed" elements, Crane's "permanence in change", and the implications of Kahn's servant and served spaces in terms of long span—short span building components.)

4. Clarify the connectors and joints among spaces with differing metabolic rhythms. (The effort here is to establish a compatible linkage between elements of the building which have different life spans.)

   Implied in this last step is the potential for the individual designer to formally express the strength of the linkage between the components. Kahn simply chooses to accommodate change where Crane, the Smithsons, Woods, and Kurokawa are advocates of change.

   The concept of linkage and its degree of formal expression is fundamental to an architecture which seeks to respond to the cycles of change. The degree of formal expression of this concept can range from one which makes no distinction between building components to one of extreme flexibility and interchangeability of components.

   The concept of linkage is a major concern for Fumihiko Maki. He
21 Maki, Fumihiko, op. cit., p. 35
 contends that the greatest efficiency and flexibility exist when the smallest organizational structure is employed. This is in direct contrast with the Smithsons', Kahn's, Woods', or Kurokawa's contentions that the emphasis be placed on the organizational framework. The point is that there is a full range of formal expression for the concept of linkage.

Maki's concept of linkage at the city scale minimizes the idea that "linkage" must be a physical connector. Such an understanding is applied to his theory of group form in which Maki suggests an "open linkage" to indicate the ever changing nature of his system. By open linkage Maki means that he recognizes the relationship between his buildings and the movement systems which serve them—yet, he does not want to formally express that relationship in his architecture. In this sense group form is purely compositional. Unlike the traditional compositional approaches to design where these relationships are always present but often latent in the mind of the designer, Maki is fully aware of the relationships between each structure.

Maki's theory of group form with respect to linkage is directly related to Crane's theory of the capital web. It is a question of emphasis. For like Maki, Crane is fully aware of the relationship between the movement systems of the city and the areas which they serve; and like Maki he minimizes the formal expression of that relationship. The theoretical position of the two individuals with respect to linkage is identical. The only distinction here is their placement of emphasis upon different components of the organizational framework. Crane emphasizes movement and Maki places his emphasis upon the element of tissue. Both concepts recognize cycles of change.

23 Crane, David, "Public Art of City Building", Annals of the American Academy of Political and Social Sciences, March 1964, p. 91
The concept of linkage as a physical connector greatly affects the accommodation of cycles of change. It is this aspect, the question of linkage, which becomes the central issue when investigating the theoretical positions of David Crane and Kenzo Tange.

In terms of cycles of change, Tange's position is identical to Crane's. He believes the city's basic framework is a public infrastructure which is comparatively permanent and privately owned buildings are considered as short cycle elements. With each of these elements having a different cycle of change, they must be appropriately balanced if urban growth is to be orderly. Tange contends that the system has failed because modern capitalism has tremendously outstripped public investment.22 Both men advocate a public structure which can direct private investment.

For Crane public design is "to leave and make creative opportunities for the private sphere".23 Likewise Tange contends that the individual must have that opportunity; and in his plan for Tokyo Bay, one of his major concerns was to provide maximum flexibility for the individual. Tange's concept is based on the idea that the cycles of change are becoming both shorter and longer at the same time. This is the justification for the physically dominant megaform to which the private housing units are added. His contention is based on sound logic because greater accumulation of capital facilitates the long cycle public elements and at the same time this shift in the economy encourages the shorter cycle private elements. The physical form would be dictated by Tange's strong architectural framework. The proposal is not consistent with the idea that over a period of time the goals and aspirations of a society are subject to change, so Tange's flexibility is an implied technocratic one and does not permit any real flexibility for the individual. There is
URBAN STRUCTURING

"A CONTINUOUS INDETERMINANT SYSTEM WHICH....

....DEPENDS UPON FEEDBACK FROM THE EXISTING ENVIRONMENT..."
no question as to the validity of the organizational principles employed in this scheme. The significant point is to understand the implications of linkage in physical forms at the city scale. If change (and therefore the time dimension) is to truly become a determinant of form, then the implicit relationship to geographic and population scales must also be understood.

Each individual considered has recognized the phenomenon of change as a primary determinant of architectural and urban form. The conceptual organization of cycles of change is accommodated through the principles of servant and served spaces. These principles facilitate the organization of the various building components in terms of their relative life spans.

The degree of formal expression of the linkage between the components is a product of each individual's emphasis. If the phenomenon of change is to be truly accommodated, the expressed linkage must be a compatible response to time, geographic, and population scales. The distinction here is between a "real" as opposed to an "implied" accommodation of change; and the concept of linkage as a physical connector has significant implications for developing an understanding of urban structuring as an indeterminate process.

**Urban Structuring - An Indeterminate Process**

From the investigations of the phenomenon of cycles of change, it is obvious that the unknown must be recognized as a determinant of architectural and urban form. To acknowledge the unknown as a criterion of form is not to submit to a totally random process. The process of urban structuring must be understood as a continuous indeterminate system which depends upon feedback from the existing environment; and inherent in the

25 ibid.

26 Alison Smithson, *Team 10 Primer* (Cambridge, Massachusetts, 1968), p. 79

27 ibid., p. 71


30 Smithson, Alison, *Team 10 Primer*, op. cit., p. 85
structuring process is the involvement of the people of a society and an aesthetic of indeterminacy.

The process of planning is viewed by Alison and Peter Smithson as continuous and organic. The Smithsons have established a connection between their planning philosophy and that of the "action painters" in America, especially Jackson Pollock. The personal relationship is irrelevant to the development of this thesis, but the analogy is appropriate. Pollock was seeking "a complete image system for an order with a structure and a certain tension, where every piece was correspondingly new in a new system of relationships". For Pollock the paintings may have begun completely at random, ordered perhaps only by the laws of gravity and the limitations of the medium. From that point the indeterminacy of the process dictates new responses to the existing pattern. The final product cannot be preconceived. It is a result of the process.

Similarly for the Smithsons, "Form is generated in part by response to existing form....Every addition to a community, every change of circumstance, will generate a new response". Implicit in this concept is a change in the social order as well as in the environment. The objective is to build toward the community structure "so the sum of the individual acts—serve also the collective ends". It is the individual acts of townbuilding which the Smithsons support. Peter Smithson contends that no single person or design team can arbitrate over the entire design of a city; "centralized design control does not work". He accepts the fact that each generation is limited in the amount of work it can contribute as he suggests, "we have to select points at which our actions can have the most significant effect on the total city structure". A general intention or direction for city development can be established
FIGURE 15-TREE-LEAF/CITY-HOUSE ANALOGY-ALDO VAN EYCK, *World Architecture 3*, p. 120

31 Nitschke, Gunther, "Cities Stasis or Process", op. cit., p. 168

32 Smithson, Alison, *Team 10 Primer*, op. cit., p. 59

FIGURE 16-WEB CONCEPT, FREE UNIVERSITY OF BERLIN-SHADRACH WOODS, *Building for People*, p. 211

33 Maki, Fumihiko, *Investigation in Collective Form*, op. cit., p. 30

FIGURE 17-GEOMETRY OF STEM CONCEPT-SHADRACH WOODS, *Building for People*, p. 189
by placing emphasis on selected points. "The realization of the actual
town should be in the hands of the builders of the parts, who, under-
standing the general intention, must at every stage assess what has gone
before and by their activities mutate (and if necessary redirect) the
whole." 31

Aldo van Eyck, like the Smithsons, is also seeking an understanding
of the structuring process. He states that "the city should embrace a
hierarchy of superimposed configurative systems—all systems should be
familiarized one with another in such a way that their combined impact
and interaction can be appreciated as a single, complex system". 32 The
abstract reference to systems is understood to mean that an architectural
expression is sought which can govern creatively the evolution of the city
structure. Van Eyck finds a clue to this natural process in vernacular
buildings where "vernacular unit and link are evolved together and appear
at the end as a perfectly coordinated physical entity". 33 This vernacular
approach suggests that the people participate in fashioning their own
immediate surroundings within a conceived overall framework.

Shadrach Woods says that his formal concepts of stem and web provide
just such a framework and that even as the first portion of the web is
realized it modifies the conditions which govern the second and by contin-
uous feedback it modifies the whole plan. The stem forms a deliberate
planning language which accommodates all future growth and change within
its dynamic framework. These two systems are based on the concept that
architecture and town planning are part of continuous process through
time and are complete at every stage of development.

Woods believes, like the Smithsons, that each decision is based on
the present built environment and is a process of continuous feedback.
FIGURE 18-CENTRAL PLAN FOR SKOPE, YUGOSLAVIA-KENZO TANGE, Japan Architect, May 1967, p. 37


FIGURE 19-YAMANASHI COMMUNICATIONS CENTER-KENZO TANGE, New Directions in Japanese Architecture, p. 119

FIGURE 20-YAMANASHI COMMUNICATIONS CENTER, PLAN-KENZO TANGE, New Directions in Japanese Architecture, p. 118
He relates the position of the town planner to that of an interpreter. For him the "man in the street" is the real town builder and the source of ideas in the feedback process. Both the linear stem and the non-centric, open-ended web seek to respond to this process. Woods appears at this level of town planning to be advocating the use of the "stem and web" as organizing principles and that the formal connotations of the systems be dropped. The systems can be utilized as organizing principles much like Crane's "capital web".

There is the recurring question of degree of formal expression as opposed to organizational intent. This was the basic question involved in a similar relationship between the theories of Crane and Kenzo Tange's proposal for Tokyo Bay. Although Tange advocates participation of the individual in the physical environment, the formal expression of his city proposals for Tokyo Bay and Skopje, indicate formal centralized design control.

The Yamanashi Communications Center is a powerful architectural statement representative of Tange's search for visual order although implicit in the vertical service pylon approach of the communications center is the unlimited potential for a building organism to respond to the processes of generative feedback. This approach is also valid at the urban scale. The plan for Tokyo Bay, an earlier scheme, used a similar concept in the commercial sections of the civic axis of a superscale of 200 meters on center. There is little doubt that Tange advocates an architecture of generative feedback, but there is still some question as to the role of "the man in the street" in the process.

Like Tange there is little doubt that the Metabolist philosophy of Kurokawa incorporates the concept of planning as a continuous, generative


37 ibid.

38 Maki, Fumihiko, Investigations in Collective Form, op. cit., p. 19

39 Maki, Fumihiko, "Some Thoughts on Collective Form", op. cit., p. 116


41 Crane, David, "Chandigarh Re-considered", op. cit., p. 36
process. The first objective of this philosophy is to stimulate new
directions by the placement of new structures into existing situations.
The second objective is that although the unknown future is accommodated,
at each phase of growth a harmony must be achieved through balance.\textsuperscript{35}
The question is again one of formal design control and the role of the
individual.

The ideal system according to Fumihiko Maki is a kind of master
form (physical expression of a master program) that can "move into ever
new states of equilibrium and yet maintain visual consistency and a sense
of continuing order in the long run",\textsuperscript{36} He contends that Group Form is
such a system which operates within a minimum organizational structure.
This explanation sounds random and uncontrolled; however, Group Form is
"not a system in which the physical structure of the city is at the mercy
of unpredictable change".\textsuperscript{37}

Maki clearly establishes his position with respect to the role of
the individual; that Group Form is evolved from the people of a society
expressed as a "generative feedback process where the elements suggest
a manner of growth and that, in turn, demands further development of
the elements".\textsuperscript{38} Maki refers to this process as a master program instead
of master plan. Given a set of goals, "The master program suggests
several alternatives for achieving them, the use of one another of which
is decided by the passage of time and its effect on the ordering concept".\textsuperscript{39}
David Crane could not explain his "capital web theory" and the alternatives
which it provides any more clearly.

Crane's "generative spatial framework"\textsuperscript{40} for the Dynamic City begins
with a comprehensive understanding of the "time dimension--past, present,
and future--and relates it to space".\textsuperscript{41} Crane points out the validity
DAVID CRANE

"A GENERATIVE SPATIAL FRAMEWORK...

...RELATED TO THE TIME DIMENSION AND TO SPACE"

42 Crane, David, "The Dynamic City", p. 162

43 Crane, David, "A New City for India", op. cit., p. 7

DENISE SCOTT-BROWN

"THE FORM OF THE CITY WILL BE TO SOME EXTENT...

...A RESULT OF THE PROCESS THROUGH WHICH IT WAS BUILT"

44 Scott-Brown, Denise, "Little Magazines in Architecture and Urbanism", op. cit., p. 231

45 Venturi, Robert, op. cit., p. 102

ROBERT VENTURI

"...BUILDING...IN ITS OPEN FORM IS IN COMPLETE....

INDIVIDUAL BUILDINGS

THE CONTEXT OF THE CITY

...A FRAGMENT OF A GREATER WHOLE IN A GREATER CONTEXT"

46 ibid.

of the notion of change through an analogy between "Plant life ecology
and what might be a philosophy of form change. Over a long period change
is more than replacement; forms mutate to suite new purposes." This
understanding of the city as a living, cyclical organism provides a
framework for seeing areas of cancerous blight as part of an "inevitable
cycle with inherent opportunities for improvement".

The concept of an indeterminate structuring process is also voiced
by Denise Scott-Brown. "Some concept of process should be part of the
idea. The form of the city will be to some extent a result of the process
through which it is built".

This concern is implicit in Robert Venturi's concept of complexity
and contradiction when he suggests that process is essential at all levels
of design. At the scale of the individual building the program is growing
and changing continuously because of its inherent complexities; "yet at
each stage, (it is) at some level related to the whole". This idea
that the program is an incomplete but related process has obvious impli-
cations at the city scale. "The very complex building...in its open form
is incomplete...a fragment of a greater whole in a greater context: the
building...is a whole at one level and a fragment of a greater whole at
another level." This greater whole is the context of the city and if
its fragments are incomplete, open forms which are continuously changing
because of their programmatic complexities; by definition then, city
design is also a continuous process.

Louis Kahn believes the function of planning is not to dominate the
city but to initiate and direct. Although Kahn's forms imply formal sys-
tems he views the process of design as one of continuation and his struc-
tures simply as physical realizations at a point in time. Kahn further
LOUIS KAHN

"how to do it is infinitely less important than knowing what to do..."

...for it gives you the means to do it..."

AN AESTHETIC OF CHANGE

To recognize change you must acknowledge new orders...

Which coexist as natural phenomena.


FIGURE 23-SHEFFIELD UNIVERSITY PROJECT-ALISON AND PETER SMITHSON, Urban Structuring, p. 46

49 The Aesthetics of Change, Smithson, Alison, Team 10 Primer, op. cit., p. 71

expresses a faith in the concept of design as an indeterminate process
when he says, "How to do it is infinitely less important than knowing
what to do; for it gives you the means to do it."^48

It is obvious that each individual is concerned with the process of
urban structuring in an effort to accommodate the unknown as a criterion
of form. The process of urban structuring is understood as a continuous
indeterminate system which depends upon feedback from the existing built
environment. Inherent in the idea of such an indeterminate process is
the involvement of the people of a society and the need to respond to
their ever changing needs. These concerns have generated a need for an
aesthetic of indeterminacy.

The Aesthetics of Change

The ability to recognize patterns of related cycles is facilitated
through an understanding of the city as a continuous indeterminate process.
A philosophy which supports such an indeterminate process must include
a visual understanding of the phenomenon of change. The aesthetic which
it supports is an open, indeterminate aesthetic of change.

For Alison and Peter Smithson, "The aesthetic of the buildings in
an urban environment should reflect the appropriate cycle of change--
'fixes' should look fixed and 'transients' transient, even if their actual
life as a building (so-called permanent construction) is the same."^49
The Smithsons feel that by expressing the cycles of change they will pro-
vide an immediate visual context for the orientation of the individual.
They believe that "the form grasped by the eye should be confirmed by
experience and building use". ^50 Not only do they feel the relative life
cycles of the building components should be expressed, they contend that
the structure "should postulate a relationship with something that does

52 Smithson, Alison, Team 10 Primer, op. cit., p. 35

53 "Kahn's Second Phase at Pennsylvania", Progressive Architecture, September 1964

54 Van Eyck, Aldo, "Kaleidoscope of the Mind", Via 1, Ecology in Design, Student publication of the Graduate School of Fine Arts, University of Pennsylvania, 1968, p. 93

55 Nitschke, Gunther, "Cities Stasis or Process", op. cit., p. 169

56 Smithson, Alison, Team 10 Primer, op. cit., p. 22
not yet exist—shape must not only be able to take change but should imply change". In advocating this philosophy for a new aesthetic of change, the Smithsons are simply building a case for an architecture without classical principles; one that is derived from a new involvement in architecture and urbanism. It makes use of change by acting on the human built situation. It is open and impermanent; "its aesthetic has built into it—creative change".

An understanding of architectural and urban structuring as an indeterminate process is implicit in Kahn's Medical Laboratories where the structure provides a powerful framework which can accommodate a high degree of flexibility and change. This is evidenced by the Biology addition where Kahn has demonstrated the Smithsons' idea of an aesthetic of change. These later laboratories are in every way looser and freer than the earlier Medical Laboratories.

Aldo van Eyck also advocates an aesthetic of change and contends that the cycles of change visually expressed would assist the provision of identity for man. "It seems to me that past, present, and future must be active in the mind as a continuum. If they are not, the artifacts we make will be without temporal depth of associative perspective and hence inaccessible." The idea that man's identity is relative and dynamic with respect to time has generated "a new architectural language of change and relativity by visually expressing themes of progression and interrelationship". Van Eyck defines this attitude by saying, "The identity of the whole should be latent in the components, whilst the identity of the components would remain present in the whole" and it is exactly this potential to face change without losing identity that must be brought to city design. Paradoxically enough "because of
ALDO VAN EYCK

"THE PATTERN OF RELATED CYCLES, ... INTERDEPENDENCE, AND OF IDENTITY IN RELATIVITY..."

"...WOULD BE GENERATED BY THIS NEW AESTHETIC OF CHANGE."

57 Nitschke, Gunther, "Cities Stasis or Process", op. cit., p. 169
the ability to recognize the pattern of related cycles, the pattern of interdependence, and of identity in relativity, a feeling of identity and security would be generated by this new aesthetic of change.⁵⁷ To recognize the patterns of related cycles requires an understanding of the city as a continuous indeterminate process.

Summary

The architectural and urban forms of today must respond to the phenomenon of change as well as growth. In order to facilitate change with minimum disruption of the building system, it is necessary to recognize the varying life spans of the building components and their relative cycles of change. The concept of servant and served spaces has universal application in the ordering of these components; the servant spaces corresponding to long life span components and the served spaces corresponding to short span components.

The degree to which the physical linkage between these components is formally expressed is a product of each individual's design emphasis. That expression must be compatible with the needs of a society with respect to scales of time, geography, and population if change is to be accommodated. The concept of linkage forms the basis for understanding urban structuring as an indeterminate process.

The unknown has become a criterion of form, thus, urban structuring as a continuous, indeterminate process depends upon feedback from the existing built environment. Such a process involves the people of a society and the need to respond to their ever changing goals and aspirations. Such a philosophy is supported by a visual aesthetic of change for the city as open, indeterminate process.
Identity – The Psychological Dimensions of Form
IDENTITY

"AT ALL SCALES OF ENVIRONMENT."

REGION

CITY

HOME
Identity - The Psychological Dimensions of Form

The phenomena of growth and change have generated new concepts of architectural and urban form. These new concepts encompass an understanding of the urban environment, not as a physical entity, but as a dynamic, indeterminate process. To recognize the physical implications of these phenomena is indeed a significant contribution. There is also the need to recognize the psychological implications of these new determinants of form.

During the past half century the phenomena of growth and change have not only altered the physical patterns of the urban environment, but its social patterns as well. The impact of these phenomena has generated conflicting trends between man's need for identity and his capacity to adapt to a rapidly changing environment. Man's psychological and functional identity with his environment is a constant need and the accommodation of his identity has become a primary determinant of architectural and urban form.

The objective of this chapter is to demonstrate that each of the individuals considered has responded to man's need for identity as a primary determinant of form. From their understanding of man's need for identity, the individuals considered here seek to express in their architecture the symbolic meaning of its existence. Their search represents a special obligation to an accurate expression of that meaning. In order to accommodate man's identity, his perception of the environment must be confirmed and given meaning through his experience.

Man experiences his environment at all scales. From the individual dwelling to the collective institutions of society, his need for identity at each scale must be accommodated. Identity within the urban environment
FUMIHIKO
MAKI

"A SET OF
MUTUALLY...

... INTERDEPENDENT
VARIABLES IN A
RAPIDLY EXPANDING
INFINITE SERIES..."

KENZO
TANGE

"WE LIVE
IN A WORLD WHERE
GREAT INCOMPATIBILITIES
COEXIST: .... "


3 Tange, Kenzo, "Technology and Humanity", *Architectural Design*, February 1961, p. 68
can no longer be considered in terms of points of departure and arrival, but must be understood in terms of a continuous experience.

**Mass Society and the Individual**

The impact of the forces of growth and change during the past half century have indeed altered the physical and social patterns of the urban environment. As a result, there have developed conflicting trends toward the anonymity of a mass society and the identity of the individual.

Fumihiko Maki views urban society as a "dynamic field of interrelated forces—characterized by (1) coexistence and conflict of amazingly heterogeneous institutions and individuals; (2) unprecedented rapid and extensive transformations in the physical structure of society; (3) rapid communications methods; and (4) technological progress and its impact upon regional cultures". The force of these contemporary urban characteristics makes it impossible to visualize urban form in traditional terms. The City, for Maki, is "a set of mutually interdependent variables in a rapidly expanding infinite series". Maki's observations are reflected in David Crane's efforts to reestablish the clarity and order of the city. Both are seeking to order the forces of growth and change and in doing so accommodate the identification of the individual. Maki encompasses these objectives in his theory of Group Form; and Crane, his Capital Web Theory.

Maki and Crane's concerns are shared by Kenzo Tange, who contends, "We live in a world where great incompatibles coexist: the human scale and superhuman scale, stability and mobility, permanence and change, identity and anonymity, comprehensibility and universality". In the physical environment these incompatibilities, as Tange calls them, are expressed in terms of scale conflicts. "A natural human scale exists
KENZO TANGE

"CONFLICTING TRENDS TOWARD...

INDIVIDUAL?

MASS SOCIETY

...ANONYMITY AND IDENTIFICATION"

ALISON & PETER SMITHSON

"IDENTITY...

...IS THE OBJECTIVE OF A COMPREHENSIBLE COMMUNITY STRUCTURE"

FIGURE 1 - THE INDIVIDUAL AND COLLECTIVE REALITY OF SOCIETY-
ALDO VAN EYCK, World Architecture 3, p. 124

in the same space with a superhuman scale created by technology, and there is nothing to bring harmony between them.4 Tange seeks to resolve these two scales in both a functional and a symbolic sense by searching for the "dynamic balance between technology and human existence, the relationship between which has a decisive effect on contemporary cultural forms and social structure".5

Tange contends that the great cultural dilemma of our time is the conflict between the identity of the individual and the mass society. People throughout the world are becoming more and more alike each day under the influence of mass communications and advertising. "The desire for individuality, however, seeks to be basic to human nature....in sum, there are conflicting trends toward universality and individuality, toward anonymity and identification."6 Tange, like Crane and Maki, is searching for a new direction in architecture; one which seeks to resolve the conflicts between man's need for identity and the dynamic forces of growth and change.

These ideas are parallel to those of Alison and Peter Smithson. Identity of the individual is a major objective of their philosophy of a new architecture and urbanism. They contend, "this missing quality is essential to man's sense of well-being, and must be evident at the building and the community scale. Identity is the objective of a comprehensible community structure."7

It is with the basic conflict between anonymity and identification that Aldo van Eyck is deeply concerned. For van Eyck the need for identity is a universal constant. His theory of reciprocity takes on greater meaning when considering the identity of man. Van Eyck writes that "Man is both subject and object of architecture....The city proper is the

FIGURE 2-BAGNOLS SUR CEZÉ, EARLY THOUGHT IN TOWN PLANNING-SHADRACH WOODS, Building for People, p. 133


FIGURE 3-TOULOUSE LE MARIL, RECENT THOUGHT IN TOWN PLANNING-SHADRACH WOODS, Building for People,

10 Shadrach Woods, Georges Candilis and Alexis Josic, "Recent Thoughts in Town Planning and Urban Design", Pedestrian in the City (Princeton, New Jersey, 1966), p. 188

FIGURE 4-MOROCCAN HOUSING PROJECT-SHADRACH WOODS, Building for People, p. 76
counterform of society's reciprocally individual and collective reality..."8

The implications of van Eyck's statement suggest a non-hierarchical expression of the environment as a reflection of today's society. This position is clarified by Shadrach Woods. While recognizing the impact of the changes in urban society, he does not believe them to be in conflict with the basic nature of urban man. In fact Woods presents a unique view of urban society as an "unhierarchical association of autonomous individuals".9

To Woods, visual hierarchical expressionism served well the societies of the past; but he is in search of an expression of today's society, one that must dispense with the use of symbols and monuments of authority. "Indeed, if authority can be said to exist, it can only be through consent and has no need of formalism or allegories to impose itself."10 Woods is referring to the formal connotations of state and national capitals of democratic societies which recall the formal or symbolic expressions of totalitarian empires of the past. These concerns have not eliminated Woods' concern for man's identity, but have modified its formal expression.

The point is that whatever formal expression is offered, each individual's objective is to resolve the conflict between the changing nature of man's social and physical environment and his need for identity. Such a resolution can only be accomplished through an understanding of the psychological dimensions of form.

The Psychological Dimensions of Form

From an understanding of man's need for identity, each individual seeks to express in his architecture the symbolic meaning of its existence. This objective requires a special obligation to an accurate expression of that symbolic meaning. Man's perception of his environment must be con-

12 Crane, David, "The Meaningful Content of Physical Forms in Development", unpublished paper delivered to planning seminar, University of Pennsylvania, 1958, p. 1

13 ibid., p. 3

14 ibid., p. 5

15 Van Eyck, Aldo, "Kaleidoscope of the Mind", Via 1, Ecology in Design, Student publication of the Graduate School of Fine Arts, University of Pennsylvania, 1968, p. 90

16 Alison Smithson, Team 10 Primer (Cambridge, Mass., 1968) p. 99
firmed and given meaning through his experience.

David Crane contends that we are too quick to design containers for human activities when we do not know or understand their symbolic meaning. He believes that there must be "a relationship of architecture to the physiological and psychological requirements of people living in our cities". crane further explains that where physical forms do possess communicative and symbolic qualities they may be "internal symbols, representing existing values, or ideas, or external symbols, representing some new want, a rejection of an old value, or a little of both". Changes in form affect cultural change. "Expanding communications systems play a large part in the change of ideas, values, and techniques, and therefore communication has a lot to do with changing meaningful shapes." Chandigarh is an example.

The city should be a symbolic intelligence system which is capable of providing the citizen with visual references to assist his orientation and a symbolic expression which establishes in a psychic sense an association with his cultural values. For Crane urban design requires a "concern with the aggregate patterns of these symbolic shapes".

The idea of creating an environment to which man must be able to relate visually and symbolically is the subject of much of van Eyck's writings. In them he distinguishes between the concepts of place and occasion as opposed to space and time. Van Eyck contends that "Whatever space and time mean, place and occasion mean more, for space in the image of man is place, and time in the image of man is occasion". Man's distinction between space and place depends upon a conscious experiencing of the space. "Place experience is the reward of space experience." Implicit in this relationship is the distinction between time and occasion. "Thus space and time identified reciprocally (in the image of man) emerge humanized as place and
ALDO VAN EYCK

"THE PHYSICAL AND PLACE & OCCASION

SPACE & TIME

...PSYCHOLOGICAL DEMENSIONS OF FORM..."

KENZO TANGE

"...EXPRESS THROUGH FORM A SPACE'S PHYSICAL FUNCTION...

...BUT ITS METAPHYSICAL ONE AS WELL."

LOUIS KAHN

"EACH INSTITUTION IS AN EXTENSION OF....

...MAN AND HIS NEEDS"

17 Van Eyck, Aldo, "Kaleidoscope of the Mind", op. cit., p. 92


19 ibid.

20 ibid., p. 27

21 Kahn, Louis, "A Statement", Arts and Architecture, May 1964, p. 33

22 ibid.
occasion. Places remembered and places anticipated dovetail in the tem-
poral span of the present. They constitute the real perspective of
space."17 Man's psychological interaction with his environment is van
Eyck's ultimate concern.

Van Eyck's distinction between "space and place" and "time and occasion"
are recalled by Kenzo Tange who is keenly aware of the communicative func-
tions of space and its implications for the accommodation of man's identity.
Tange contends, "Until now, we have abstractly called spaces a place to live
or a place to work; we cannot prescribe a space from such a static pattern
alone. The prescribing factor must be the mobility and flow of people and
things and visual communication".18 The essential criterion here is the
level of conscious awareness of the individual participating in the space.
At the urban scale the principle is equally applicable and provides the
structure for the "interior spaces of cities or vast complex buildings".19
Such principles of communication incorporate symbolic meaning. Tange ex-
plains that "we can express through form not only a space's physical func-
tion, but its metaphysical one as well".20

In the realization of the metaphysical functions of space the profound
insight of Louis Kahn dominates even the most creative of his contemporaries.
Kahn's foremost objective is to express the institutions of man because the
existence of institutions is "an extension of man and his needs".21 For
Kahn every building belongs to some institution of man. It may be the in-
stitution of learning, the institution of home, the institution of govern-
ment, or any other institution of human activity. Each activity of man is
different even though they may be in the same realm of activity.22

Kahn seeks to realize the order or form of the individual institutions
of man and seeks to express their symbolic meaning in his architecture.
23 Kahn, Louis, "Statements in Architecture", *Zodiac* 17, p. 57

24 Crane, David A., "A New City for India", Notebook of Programs and Student Reports, University of Pennsylvania, 1959, p. 1

25 Kahn, Louis, "A Statement", op. cit., p. 33


27 Kahn, Louis, "Statement in Architecture", op. cit., p. 57

Kahn has the greatest respect for what he calls the "inspirations" which have given life to the many institutions of man. "The inspiration to live gives a life to all institutions—the manifestations of man that come from the inspiration to live forever."23

"In us
Inspiration to express
Inspiration to question
Inspiration to learn
Inspiration to live
These bring to man his institutions.
The architect is the maker of their spaces."24

As the maker of spaces for the institutions of man, Kahn contends the first obligation of the architect is to realize the "order" or symbolic meaning of man's institutions. Here the distinction is made between the meaning of the institution and the programmatic requirements of the building which will house the institution. The architect must renew or redefine the institution—"to change the program for what is good for the institution"25 and "to make the program alive to the very 'existence will' which started the institution".26 Kahn's position is clear with respect to the program which the architect receives. The final architectural translation must come "from the spirit of man not the program".27 This realization is not an individual whim but one of the expectations and aspirations of collective man—"The reality you believe isn't your belief, it's the belief of everyone."28 Kahn is seeking to express the institutions of man through a hierarchy of spaces and relationships which accommodate man's meaningful identity with his institutions.

Each of the individuals is seeking an understanding of man's relation—
PERCEPTION & MEANING

"THE DEPTH OF MAN'S UNDERSTANDING.....

....IS LIMITED OR REINFORCED BY THE NUMBER AND FREQUENCY OF HIS EXPERIENCES."

FIGURE 8-MEDIEVAL CITY-DRAWING BY DENISE SCOTT-BROWN, American Institute of Architects Journal, January 1965, p. 28

29 Scott-Brown, Denise, "The Meaningful City", American Institute of Architects Journal, January 1965, p. 28

30 ibid., p. 29

FIGURE 9-AMERICAN CITY-DRAWING BY DENISE SCOTT-BROWN, American Institute of Architects Journal, January 1965, p. 29

31 ibid., p.

32 ibid., p. 30
ship to his institutions in order to facilitate his identity. Man's meaningful perception of his relationship to these institutions, however, is subject to several inherent limitations. In order to facilitate man's identity, his perception of the environment must be confirmed and given meaning through his experiences. Implicit here is the dimension of time and the fact that the temporal depth of man's understanding of his environment is limited or reinforced by the number and frequency of his experiences.

Aldo van Eyck's statement, place experience is the reward of space experience, depends upon meaningful experience as the reward of perceptual experience. Denise Scott-Brown supports this idea with an analogy between the accepted clarity of the medieval city and the apparent chaos of the American city today in order to demonstrate the difference between perception and meaning. Both cities offer perceptual images to the observer, but the meaning of what is perceived is clear only in the medieval city. In the American city the understanding of the meaningful order is prevented by "a condition called agnosia, in which the individual perceives with his senses but cannot give meaning to what he perceives." In the medieval city functions were clearly associated with recognizable forms; the church dominated the town. Its symbolic meaning and formal expression were clearly compatible. The meaningful perception of the American city is difficult for the observer. Denise Scott-Brown contends that "he sees a large, ornate building which could be a bank, a beer hall, or a parking garage. To turn left off an expressway, he must first turn right." This is not to suggest that the American city is without order. Certainly the skyscrapers of city centers are a direct response to the laws of proximity and land economics generated by the transport-technology of the nineteenth century, the railroad. The significant difference between
ROBERT VENTURI

"A special obligation toward the whole..."

"...must employ the difficult unity of inclusion—rather than the easy unity of exclusion."

THE CITY IN TIME

david crane "Experiences Contact & Frequency"
fumihiko maki "A Kind of Linkage—The City is an Event"

aldo van eyck "The Past, Present, and Future Must Be Active in the Mind as a Continuum"

33 Venturi, Robert, "Complexity and Contradiction", Zodiac 17, p. 27

34 ibid., p. 14

35 ibid., p. 23

36 Crane, David, "Form of the City--Research Project", unpublished letter to Kevin Lynch, May 21, 1956, pp. 6-15

37 Maki, Fumihiko, Investigations in Collective Form, op. cit., p. 34
the two examples is that the symbolic expression of the former form a meaningful and imageable whole while those of the latter, the American city, are latent.

Robert Venturi is also concerned with the condition of agnosia or perceptual ambiguity. Ambiguity here refers to the "paradox inherent in perception and the very process of meaning in art: the complexity and contradiction that result from the juxtaposition of what an image is and what it seems". His philosophy of complexity and contradiction is fundamental to the nature of life itself and "values, before all else, the actions of human beings and the effect of physical forms upon their spirit". His philosophy of complexity and contradiction has a "special obligation toward the whole; its truth must be in its totality or its implications of totality. It must employ the difficult unity of inclusion rather than the easy unity of exclusion."

The condition of agnosia or perceptual ambiguity can be reduced by the number and frequency of man's experiences with his environment. David Crane states that perception is limited by "The ranges or depth of an individual's experiences, familiar elements, contact, and frequency". At the same time, these temporal experiences also heighten perception. Maki suggests secondary linkage systems can provide the observer an orientation with respect to time and the nature of the city form itself. The constant cycle of decay can become a linking force in our cities--"such diversity in age is itself a kind of linkage. It gives a morphological demonstration of the ever changing and diverse character of city life". This consideration goes back to the essence of the traditional philosophies of Zen to which both Maki and Kurokawa have been linked. The physical city cannot be conceived or described without consideration
38 Van Eyck, "Kaleidoscope of the Mind", op. cit., p. 93


42 ibid., p. 37

of the time dimension. The city itself is simply an event. The idea is echoed by van Eyck when he says, "It seems to me that past, present, and future must be active in the mind as a continuum. If they are not, the artifacts we make will be without temporal depth or associative perspective and hence inaccessible".  

Kenzo Tange also utilizes the concept of time and its symbolic connotations. "Tange's aim has always been to integrate Japan's architectural traditions with the needs of modern society." He does not rely upon the past for his formal expressions. "Tradition cannot live of its own force, and cannot be considered in itself a creative energy. To be transformed into something creative, tradition must be denied, and in a sense, destroyed." Tange's position is clarified in the Yamanashi Communications Center at Kofu, which is a significant transitional structure for that community. In fact, "the Japanese name for this center—Bunka Kai Kan—means cultural meeting house". Tange has provided a transitional building which links the traditions of the past to the mainstream of contemporary consciousness. In addition the ideas of symbolic and visual reference points are implicit at the city scale. The communications center is one of two dominant focal points in Kofu, the other being the remaining portions of a 17th century castle.

The utilization of a dominant visual reference point was also utilized by Tange in the City Plan proposal at Skopje. The government tower of the Republic Square is the symbolic heart of the city and provides the major visual focus. In organizing the scheme major functional components were established as: the two existing old quarters, the city gate, the city wall, and the Republic Square. Each has its own symbolic connotation: the city gate as the symbol of entry; the city wall recalls the medieval
FIGURE 13 - MOROCCAN HOUSING - SHADRACH WOODS, *The New Brutalism*, p. 59

44 Woods, Candilis, Josic, Woods, *Building for People*, op. cit., p. 73

45 ibid., p. 9

FIGURE 14 - MOROCCAN HOUSING, SECTION - SHADRACH WOODS, *Building for People*, p. 32

FIGURE 15 - MOROCCAN HOUSING STUDY MODEL - SHADRACH WOODS, *Building for People*, p. 75
heritage of the city; and the Republic Square reflects the people's aspirations for the future. Thus, man's identity is reinforced through the formal expression of these elements.

This concern for reinforcing man's identity with respect to his past, present, and future is shared by Shadrach Woods. A response to traditional patterns of life is evident in Woods' Moroccan Housing Project in Africa. The traditional dwelling forms of the region served as the prototype for this structure. "The typical Moslem house consists of a series of rooms for various purposes grouped around an open, interior court, ", These inner oriented forms were conditioned by the climate requiring a "shady patio to supply light and air to the rooms". Woods translated these requirements into housing suited to the demands of our time. In the highrise blocks he provided two-story shaded loggias, onto which the individual dwellings open. The significant point here is the ability to create transitional buildings which are sensitive to the cultural patterns and utilize their potential as opposed to the superimposition of unfamiliar forms.

The individuals considered are each seeking to understand the psychological dimensions of architectural form in order to accommodate man's need for identity. Their search is for an honest expression of man's institutions. In doing so they facilitate the meaningful perception of form so that what is perceived is confirmed by man's experience.

The Individual and Collective Identity of Man

The forces of growth and change have generated conflicting trends toward the anonymity of a mass society and the identity of the individual and the individuals considered are seeking to resolve these conflicts through the formal expression of man's psychological need for identity.
ALDO VAN EYCK

environmental scale & identity

INDIVIDUAL ENVIRONMENT

COMMUNITY ENVIRONMENT

URBAN ENVIRONMENT

"A TOTAL ENVIRONMENTAL EXPERIENCE — WHERE EVERY MAN IS HE MUST BE AT HOME...."

46 Smithson, Alison, Team 10 Primer, op. cit., p. 96

47 ibid., p. 48

48 ibid., p. 34
Implied in this search is the emphasis of certain institutions in order to hierarchically order and clarify their expression. However, man experiences his environment at all scales, from the individual dwelling to the collective institutions of society. The need to accommodate his identity must be simultaneously considered at each scale. Man's identity within the urban environment can no longer be considered in terms of points of departure and arrival, but in terms of a continuous experience.

Utilizing the psychological dimensions of place and occasion, Aldo van Eyck's description of his reciprocal concepts of "The realm of the in-between" and "The homecoming of man" takes on greater meaning. Van Eyck asks, "What is the reality of a door?" His reply is the definition of the realm of the in-between. A door must be more than a borderline which separates inside and outside. The greater reality of a door is the realm of the in-between, It is "the localized setting for a wonderful human gesture: conscious entry and departure—a door is a place for an occasion. A door is a place made for an act that is repeated millions of times in a lifetime between the first entry and the last exit."46

The symbolic meaning of the door or the realm of the in-between is to provide for the homecoming of man. There is a duality of meaning here as van Eyck distinguishes between the act of homecoming and the state of being at home. "Architecture can assist man's homecoming—departure must mean entry—for leaving 'home and going home' are difficult both ways."47 This concept expands to accommodate man's identification within the total environment, "to be where he wants to be; at home no matter where he is".48

Van Eyck is suggesting that the relationship between architecture and urbanism can no longer be conceived in terms of points of departure or arrival. Man's psychological experience of his environment is essential at all levels
FIGURE 16 - GOLDEN LANE HOUSING
ALISON AND PETER SMITHSON, The New Brutalism, p. 50

49 ibid., p. 48

50 ibid., p. 75

FIGURE 17 - GOLDEN LANE STREETS IN THE AIR
ALISON AND PETER SMITHSON, Urban Structuring, p. 22


52 ibid., p. 361

FIGURE 18 - HAUPTSTADT BERLIN MOTORWAYS
ALISON AND PETER SMITHSON, Team 10 Primer, p. 50

53 Gunther Nitschke, "Cities Stasis or Process", Pedestrian in the City (Princeton, N.J., 1966), p. 171

54 ibid.
of participation.

Alison and Peter Smithson contend "the aim of urbanism is comprehensibility, that is, clarity of organization". By clarity of organization they are not referring to the formal urbanistic principles of C.I.A.M. In fact, their position is defined as a reaction against these principles. Like Kahn's "institutions" and van Eyck's "human reality", the Smithsons seek a symbolic expression of a "pattern of reality which includes human aspirations". At the building scale, particularly housing, the Smithsons are seeking an immediately comprehensible visual identity in order that "the form grasped by the eye should be confirmed by experience and building use". Architecturally this is accomplished by expressing in visual terms the systems of circulation as well as the individual dwelling, "fully validating the presence of human beings as part of the total image".

These objectives were an essential part of their housing proposal for London, Golden Lane. Here the concern for man's identity demonstrated an awakening interest in the real life of cities. Its major significance lies in the fact that the Smithsons clearly established a concern for the individual in the urban environment. In doing so, it provided a direction which has since become fundamental to the philosophy of Team 10. Their concern for identity at the urban scale is fundamental to the conception of the Hauptstadt Plan. It is the Smithsons' contention that "mobility is the key, both socially and organizationally, to town planning". In this project the Smithsons are primarily interested in expressing the idea that mobility, both social and physical, has become the major characteristic of a free and open society. "Mobility is not concerned with roads, but with the whole concept of a mobile, fragmented community." As stated earlier the Smithsons believe the objective of urbanism is comprehensibility or
FIGURE 19-HAUPTSTADT BERLIN URBAN PLAN-ALISON AND PETER SMITHSON, Team 10 Primer, p. 56

55 Alison and Peter Smithson, Urban Structuring (New York, 1967), p. 57


FIGURE 20-HAUPTSTADT BERLIN MUSEUM OF TECHNOLOGY-ALISON AND PETER SMITHSON, Urban Structuring, p. 53

57 Smithson, Alison, Team 10 Primer, op. cit., p. 30

clarity of organization in order to establish identity. They have lifted the urban motorway up from "an ameliorative function to a unifying function". In doing so they intend to reinforce the "identity of their urban architecture by visually creating a formal equivalent for each function of the city center. This is consistent with their belief that architecture should confirm by experience that which is grasped by the eye. The city should express in symbolic terms the "aspirations of a technological society".

The Smithsons' London Roads Study is a regional application of many of these same principles. Because of their scale, urban roadways could be supported by such elements as parks, public buildings, geographical landmarks, and monuments; and by relating to these other elements, the roadways can also define areas of the urban region. The Smithsons recognize the potential psychological functions as well as the physical functions of the road. They propose that movement systems be utilized to provide visual and symbolic meaning. The objective is "to provide the urban interior society needs; the built counterform of its dwindling identity". In the London Roads Study, the motorways are used to identify and define the areas of the city by routing them in such a manner as to relate to existing zones or historic structures, thus providing a series of fixes or points of local identity.

Louis Kahn's concern for the institutions of man encompasses his identity at all scales of experience. In order to express the nature of man's institutions, Kahn seeks the inspirations which created their existence.

"The institutions are the houses of the inspirations."—The architect considers the inspiration before he can accept the dictates of a space desired. He asks himself what is the nature of one that distinguishes
58 Kahn, Louis, "Remarks", op. cit., p. 310

59 Smithson, Alison, Team 10 Primer, op. cit., p. 207

60 Paul Heyer, Architects on Architecture (New York, 1966) p. 396
itself from another. When he senses the difference, he is in touch with its form. Form inspires design.\textsuperscript{58}

The design of cities must likewise be inspired by the nature of its institutions and reflect them in their built form. For Kahn "every city is made up of institutions. If you were to consider the making of a city, you would have to consider the organization of the institutions. Urbanism is a study of the institution of housing, the institution of schools, the institution of anything you like. You see, they are all institutions really because around them somehow there must be an idea—a need must have been established."\textsuperscript{59} The symbolic meaning of the city itself must be expressed for each city is itself an unique institution of man. In essence "the city is a melting of singularities—the place of the institutions. Their particular expressions by individuals and their environment combine to characterize one city from another."\textsuperscript{60}

The individuals considered here have demonstrated their concern for the identity of man at every scale of environment. Through their investigations they have recognized that man's identity within the urban environment can no longer be considered in terms of points of departure and arrival, but in terms of a continuous experience.

Summary

The impact of the phenomena of growth and change have altered the physical and social patterns of today's urban environment. These phenomena have generated conflicting trends between man's need for identity and his capacity to adapt to a rapidly changing environment. As a constant need of man, his psychological and functional identity within his environment must be accommodated as a primary determinant of architectural and urban form.
From an understanding of man's need for identity, the individuals considered have sought to discover the symbolic meaning of man's institutions and to express that meaning in their architectural and urban forms. Their search represents a special obligation toward the accurate expression of that meaning in order to facilitate man's identity. Man's perception of his environment can then be confirmed and given meaning through his experience.

Because man experiences his environment at all scales, from the individual dwelling to the collective institutions of society, his identity must be accommodated not in terms of departures and arrivals but as a continuous experience. The concerns of the individuals considered here demonstrate that they have responded to the need for man's identity as a primary determinant of architecture and urban form.
Patterns of Human Association
Patterns of Human Association

The phenomena of growth and change and the subsequent need to respond to man's need for identity have generated new concepts of architectural and urban form. These new concepts express an understanding of the urban environment as a dynamic, indeterminate process and seek the accommodation of man's psychological need for identity. To provide for these phenomena and to recognize man's need for man's identity is a significant contribution. There is also the additional need to consider human associations as a determinant of form.

The phenomena of growth and change have greatly altered the physical and social patterns of the contemporary environment. As in the case of the conflicting trends between mass society and the individual, these phenomena have also generated conflicting trends between man's constant need for human association and his changing patterns of activity. Therefore the accommodation of man's need for association has become a primary determinant of architectural and urban form.

The objective of this chapter is to demonstrate that the individuals considered have responded to man's need for association as a primary determinant of form. Their investigations have sought to discover the nature of both man's constant need for human association and of the changing patterns of activity generated by an ever changing physical and social environment. Spontaneous, interpersonal contacts in man's patterns of association are recognized as a basic human need. In order to facilitate meaningful, spontaneous associations, the activity patterns and flow of people are utilized as organizational principles.

Man's new patterns of association do not preclude the necessity to provide for spontaneous associations. However, meaningful interpersonal
FIGURE 1 - EUROPEAN URBAN HOUSING - Urban Structuring, p. 18

FIGURE 2 - LIFE OF THE PLAZA, Urban Structuring, p. 39

FIGURE 3 - LIFE OF THE STREET, Urban Structuring, p. 10

1 Alison and Peter Smithson, "The Theme of C.I.A.M. 10", The Architects Yearbook 7 (London, 1956), p. 28

2 ibid., p. 29

3 ibid., p. 31

FIGURE 4 - GOLDEN LANE STREET IN THE AIR - ALISON AND PETER SMITHSON, New Directions in British Architecture, p. 30

4 Alison and Peter Smithson, Urban Structuring (New York, 1967), p. 22
associations must also be recognized as a function of patterns of disassociation, especially at the larger urban scale. These new patterns of disassociation are also being recognized as basic to the nature of man.

**Association - A Constant Need of Man**

Although man's patterns of association are rapidly changing, man's need for human association is constant. The need to consider these patterns of association as a primary determinant of architectural and urban form become a central issue primarily as a result of mass housing and renewal projects which followed World War II.

Outspoken with respect to the issue of association were Alison and Peter Smithson. They contend that under the C.I.A.M. Chartre d'Athens—vital human associations were inadequately expressed. In most cases the grouping of buildings did not reflect "any reality of the social organization, but rather were the result of political, technical, and mechanical expediency". The Smithsons believe that in order "To comprehend these human associations, we must consider every community in its particular total complexity". Thereafter they are seeking a valid community structure based on these human needs and patterns as a prerequisite to design. Although the Smithsons' view this new society as being open and mobile, they do not see any changes in the nature of man which would preclude his basic need for association. Their approach "is aimed at regenerating—(the city's) very reason for existence—people living together for their mutual convenience and pleasure".

The Golden Lane Housing proposal for London clearly expresses the Smithsons' concern for the need for human association within the urban environment. The "traditional street, considered as an active environment, is now being changed by increasing mobility". This observation
FIGURE 5 - DACCA MASTER PLAN - LOUIS KAHN, L'Architecture d'au Jourd'hui No. 142, p. 50

FIGURE 6 - NATIONAL ASSEMBLY, DACCA - LOUIS KAHN, L'Architecture d'au Jourd'hui, No. 142, p. 51


6 ibid.

FIGURE 7 - NATIONAL ASSEMBLY, DACCA - LOUIS KAHN, L'Architecture d'au Jourd'hui, No. 142, p. 53
prompted the idea of "street decks" in the highrise residential units. The objective of the "street decks" was to reestablish the idea of the urban street which had traditionally been the public gathering place and playground until the coming of the automobile. The project also allowed greater flexibility of organization so that a variety of family types was possible. Together, these considerations produced a rich scale of activities and associations which otherwise would not have been possible. The proposal was never realized but was significant in that the concern for human association within a changing environment was reestablished as a determinant of architectural form.

Louis Kahn's writings on the institutions of man express his concern for human association. The essence of his project at Dacca is its expression of the institution of government and its "transcendent nature of assembly". Given an extensive building program, Kahn sought meaningful relationships to establish proper position and form of the building elements. The relationships were given meaning by Kahn's "realization that assembly is of a transcendent nature. Men came to assemble to touch the spirit of community." Kahn realized that the Supreme Court was to test the acts of legislation created by the legislative assembly. This realization was further reinforced by the symbolic nature of the legislative assembly's corollary, the hostels for its members. The three elements became inseparable in the thinking of the transcendent nature of the assembly. Kahn has profoundly expressed man's constant need for association.

Aldo van Eyck is equally concerned with man's need for association. Like Kahn he contends that the basic needs of man have remained constant through time. Van Eyck is extremely concerned with the humanistic qualities of the physical environment. He suggests that architecture is the
7 Alison Smithson, Team 10 Primer (Cambridge, Mass., 1968), p. 22

FIGURE 8—CHILDRENS HOME, AMSTERDAM—ALDO VAN EYCK, Investigations in Collective Form, p. 14

8 ibid.

9 ibid., p. 44

FIGURE 9—CHILDRENS HOME, AMSTERDAM—ALDO VAN EYCK, The New Brutalism, p. 162

10 ibid.

11 ibid.

FIGURE 10—CHILDRENS HOME, AMSTERDAM—ALDO VAN EYCK, Team 10 Primer, p. 21

12 Van Eyck, Aldo, "Place and Occasion", Progressive Architecture, September 1962, p. 155
"constant rediscovery of constant human qualities translated into space". 7

This emphasis on constant human qualities is indicative of van Eyck's position and tempers his understanding of the forces of growth and change as a response to these constant qualities. He contends that architects today have become obsessed with the idea of growth and change without understanding man's constant needs. "Man is always and everywhere essentially the same--the problems will not remain the same, but they will concern the same man, and that is our cue." 8

For van Eyck man's choice of association is limited through modern architecture's elimination of the place for the "imponderable event". 9 Much of his concern is a reaction to the hygienic nature of the new post-war towns of Europe. He contends that the sense of place was expelled in fear of the wrong occasion. "Space, instead of becoming place, becomes void and the unpremeditated event, the spontaneous act, unscheduled gaiety or violence, the unpredictable are eliminated." 10 To van Eyck, this is a violation of the natural order of man's environment. "Instead of inconvenience of filth and confusion, we have now got the boredom of hygiene--hence, no challenge, no duel, and no dialogue--the slum has gone, behold the slum edging into the spirit." 11 Van Eyck has not demonstrated his observations in projects at the urban scale, but his Children's Home in Amsterdam and a small pavilion at Arnheim provide insight into how he would attempt to design the interiors of urban space.

The Children's Home houses over a hundred children of all ages who have no other home. Van Eyck's ultimate concern was to accommodate individual and collective reality of human association by providing the kinds of spaces which facilitate "occasion". Responding to a need to encourage their association, he has provided an "interior street" 12 containing re-

14 ibid., p. 60

15 ibid.

16 ibid., p. 59

17 Smithson, Alison, Team 10 Primer, op. cit., p. 101

18 "Aesthetics and Technology of Preassembly", Progressive Architecture, October 1964, p. 180


20 Smithson, Alison, Team 10 Primer, op. cit., p. 105
fleeting pools, mirrors, and delightful irregularities of all descriptions to encourage the spontaneous occasion. These objects if considered at the urban scale correspond to the billboards and lights of the city. The home is like the city—providing a "place" for every kind of human activity.

Van Eyck extends his reflections on urban life and human association in his small sculpture pavilion at Arnheim; feeling that the pavilion should possess the closeness, density, and intricacy of urban life—"in the sense that people and artifacts meet, converge, and clash there inevitably".13

"Bump!—sorry. What's this? Oh Hello!
Large-small; thin-squat; dark-light,
Polished-rough; all within a single structure. And people—many, too many, or hardly any—passing in and out,
Round, between and through the walls."14

The meaning here is symbolic. Van Eyck begins with a slow impression sequence in the park, and rapidly increases it in and around the pavilion.15 The perplexing and provocative disclosure of events is like those of the city, "kaleidoscopic and labyrinthian".16 The twin phenomena of the intensity and release of man's patterns of association are clearly emphasized.

Even at these smaller scales van Eyck has responded to his own challenge, "Make of each place, a bunch of places—of each house and each city; for a house is a tiny city, a city, a huge house. Get closer to the shifting center of human reality and build its counterform."17

Van Eyck's search for the human reality is reflected in Shadrach Woods' search for the hidden relationships18 operating in what he describes as "systems for human association".19 "Planning is the correlation of human activities; architecture is the housing of these activities."20
FIGURE 14 - MOROCCAN HOUSING -
SHADRACH WOODS, The New Brutalism, p. 58

21 Woods, "Recent Thoughts in Town Planning and Urban Design",
op. cit., p. 188

22 "Aesthetics and Technology of Preassembly", op. cit., p. 180

FIGURE 15 - MOROCCAN HOUSING -
SHADRACH WOODS, The New Brutalism, p. 60


FIGURE 16 - MOROCCAN HOUSING -
SHADRACH WOODS, Building for People, p. 76

24 ibid., p. 32
For Woods, planning is an abstract exercise until architecture is generated from the relationships between human activities. The process is one of seeking out, exploring, and explaining these activities. Finally these activities must be brought together so that the "whole life in the city becomes richer than the sum of its parts". Human association is the ultimate concern of Shadrach Woods. He seeks to structure the city so that it will provide for the "richest interaction of free individuals" and he feels that the hidden relationships operating in human association must be discovered in order to bring greater clarity and identity than possible with compositional, spatial arrangements alone.

Perhaps the most sensitive of all of Woods' housing proposals is the Moroccan Housing Project done while he was with the Atbat Group in North Africa. The concern here was for constructing a container for a very complex social pattern. As previously mentioned as part of Woods' concern for symbolic cultural identity, the traditional Moslem dwelling forms of the region served as the prototype for this structure. Woods sought to capture the pattern of life of the people. In addition the scheme provides for a greater variety of accommodations to fit the requirements of small or large families and the needs of varying temperaments. "This proximity of different family types is a valuable social gain and is further accentuated by other devices for promoting social cohesion." This response to the patterns of human activity was a clear demonstration of the new direction being sought by Woods and others (notably the Smithsons), who were reacting against the C.I.A.M. philosophies in the early 50's. It is particularly significant for its "vision of dwellings at once simple in structure and organization but complex in their social organization".
FIGURE 17-TOULOUSE LE MIRAIL BUILT PEDESTRIAN SYSTEM-SHADRACH WOODS, Building for People, p. 189


26 Woods, "Recent Thoughts in Town Planning and Urban Design", op. cit., p. 185

FIGURE 18-TOULOUSE LE MIRAIL TOWN CENTER-SHADRACH WOODS, Building for People

FIGURE 19-FREE UNIVERSITY OF BERLIN-SHADRACH WOODS, Architectural Forum, May 1966, p. 44


28 Woods, "Recent Thoughts in Town Planning and Urban Design", op. cit., p. 196
Woods has extended his concerns for human association through his concepts of the "stem" and "web" as reflected in his latter projects at Toulouse-LeMirail and the Free University—Berlin. The stem concept which was employed at Toulouse is a link as well as a generator of habitat. By providing an established framework the system encourages the possibility for spontaneous urban events to take place without being part of an ideal formal plan. Woods' "uncertainty relationships" are his way of recognizing Aldo van Eyck's concept of the "imponderable". The stem system provides a total organization "within which various forms of human association occur with considerable freedom and spontaneity" and the buildings, the stem itself, establish the pedestrian movement which serves as a physical and social linkage between the individual and the community. The idea of "street" as opposed to "road" is clearly implied in this organization; the stem or "street" is considered a "place" as well as a way to get from one place to another. It is part of the public domain. The origin of the linear center is an administrative complex of a regional scale; public buildings, offices, shipping centers, theaters and meeting halls. To Woods, this is an expression of the social organization. "The articulation of the public domain is the built form of the social organization, and it is through this articulation that material shape is given the abstract idea of community." 

Woods says that the same potential for vital human association is inherent in the web system which he employed in the Free University at Berlin. The web serves as an organizational device which provides the maximum opportunities for the kind of contact, exchange, and feedback that is the essence of university life. Along the four main spines are located the functions which serve the whole university and encourage
29 ibid.


31 ibid., p. 117

contact with people in other disciplines. Those functions which require privacy are located away from the main stems.

Basically it is a departmentalized campus. A single center was avoided in the "belief that buildings should be places in which men may locate importance through their work, activity and association". The objective is to express the wholeness of the idea of university, not fragmented parts. The linkage between the individual and the institution is psychological. The physical organization provides a framework so that "all disciplines could be associated; and where the psychological and administrative barriers which separate one from the other would not be reinforced through architectural articulation". It is a "minimum structuring system where individual and group determine desirable relationships".

Certainly, the work of Alison and Peter Smithson, Louis Kahn, Aldo van Eyck, and Shadrach Woods express concern for human association as a determinant of form. Their work represents a particular emphasis upon the nature of these associations. Their concerns are also reflected in the work of Kenzo Tange, Noriaki Kurokawa, and Fumihiko Maki. This group, however, places its emphasis upon organizational principles. The only real distinction here is the fact that these organizational principles have been explicitly described. In either case, human association as a determinant of form is a common concern.

Kenzo Tange utilizes a concept which he calls "equipment design". It is employed in addition to the functional aspects of urban structuring. Equipment design is a method for structuring movement systems in terms of architectural space. It involves the movement of people and vehicles and their relationship to the spaces, facilities, and activities of the city.
FIGURE 23-OLD AXIS, SKOPJE URBAN PLAN-KENZO TANGE, Japan Architect, May 1967, p. 36


FIGURE 24-NEW AXIS, SKOPJE URBAN PLAN-KENZO TANGE, Japan Architect, May 1967, p. 36

34 Nitschke, Gunther, "The Metabolist of Japan", Architectural Design, October 1964, p. 510

35 ibid.
This concept is described by Tange in conjunction with his urban plan for Skopje, Yugoslavia. "Equipment design" was employed to establish the relationships between facilities and paths of movement. From this concept came the idea of establishing two axes. The "old axis" between the two existing centers was to be reinforced by shops, historical monuments, and the city square. The "new axis" between the city gate and the city square is reinforced by public facilities, government offices, universities, and other community facilities.\textsuperscript{33}

Although the original proposal made by the Kenzo Tange Design Team for Skopje formally expressed the random pylon concept of the Yamanashi Community Center, growth and change were not the major ordering determinants. Certainly each structure possesses the potential for growth and change, but at the city scale it was the concern for patterns of human activity which ordered the scheme.

In addition to Noriaki Kurokawa's concern for the Metabolic processes of growth and change, he emphasizes the changing nature of human activity patterns. In this respect he has been influenced by his association with members of Team 10 and their investigations into patterns of human association. The Smithsons have had an acknowledged influence on the work of Noriaki Kurokawa in his Agricultural City project.\textsuperscript{34} Kurokawa's proposal for the agricultural city project was developed in response to the idea of "cluster"\textsuperscript{35} as a special form of human assembly. This idea was originally developed by the Smithsons in their effort to distinguish "cluster" from traditional connotations, such as house, street, and district.

Kurokawa visualized the traditional Japanese agricultural village as a "cluster". Within this larger whole he visualized smaller functional "clusters" such as industrial, consumer, and recreational uses. These func-
FIGURE 25-AGRICULTURAL CITY-
NORIAKI KUROKAWA, Investigations in Collective Form, p. 14

36 ibid.

FIGURE 26-TEL AVIV- JAFFA PROPOSAL-
NORIAKI KUROKAWA, Architectural Design, December 1964, p. 604

37 Kurokawa, Noriaki, "Two Systems of Metabolism", Japan Architect, December 1967, p. 81

tions are primarily vertically organized as opposed to the traditional horizontal village organization. There are three levels of organization: work, social, and individual. All jointly performed agricultural activities occur on the ground or work level. The middle, or social level, contains all community facilities and arteries of circulation. The upper, or individual level, contains private residences. Each level is supported by vertical service and communications shafts. In terms of human association, it is doubtful that this vertical organization really achieves a richer degree of intermix since circulation tends to localize around the vertical communication shafts, but the same potential present in Woods' "web" concept for human association is still applicable in the horizontal plane.

Kurokawa utilizes a concept for structuring activity patterns which he identifies as "energy metabolism". This organizational concept is equivalent to Kenzo Tange's ideas for "equipment design". In either case the objective is to grasp a clear understanding of human activity patterns in order to reinforce human associations. He calls these activity patterns "energy flow", "human information flow", or the "flow pattern of life". Regardless of his terminology, he is seeking the relationships which determine spatial organization.

Kurokawa has employed these ideas in his proposal for Tel Aviv-Jaffa which is primarily concerned with the enrichment of patterns of human activity. Kurokawa has extended to the city scale his concern for movement systems and an "architecture of the street". Concerning his organizational principles, he explains:

"We conceived of people, things, and energy as information and attempted to clarify their flow patterns."
39 Kurokawa, "Two Systems of Metabolism", op. cit., p. 81

40 ibid., p. 80


42 Fumihiko Maki, Investigations in Collective Form, Special Publication No. 2 (St. Louis, 1964), p. 21

43 "The Architects", Architectural Review, September 1962, p. 91

44 "Development Project for Dojima District in Osaka", Japan Architect, June 1962, p. 16
We combined these flow patterns in flexible ways.

We gave order to the relationships between the information patterns and spatial units".\textsuperscript{39}

Kurokawa states, "A city should be nearer a living thing than a machine, and streets should fulfill more than just traffic functions. They should be places where children play and other activities interact".\textsuperscript{40} In this case the objective was to develop an infrastructure which links the two existing conurbations of Tel Aviv and Jaffa. This was accomplished by reinforcing the existing flow patterns with shopping and community facilities.\textsuperscript{41}

Fumihiko Maki similarly incorporates these ideas into his theory of group form; he states that group form is evolved from the people of a society. The generative human qualities in urban architecture as envisioned by C.I.A.M, are viewed by Maki as extremely limited. "If the function of urban design is the pattern of human activities as they are expressed being alive in cities, then the functional patterns are crystalized activity patterns,"\textsuperscript{42}

Maki has employed the idea of crystalized activity patterns in several of his design proposals. The Dojima Center is a multifunctional urban superblock. Into its commercial, communal, and business functions he has introduced the idea of the "pedestrian precinct".\textsuperscript{43} It seeks to link these functions as a direct response to an understanding of the movement and activity patterns of people. Eighty per cent of the pedestrians approaching the redeveloped area would come from the vicinity of the Osaka Station east of the shopping zone.\textsuperscript{44} The business functions become the destination objective and the commercial shops and community services filter the flow of people in order to generate spontaneous
FIGURE 30-SHINJUKU DISTRICT, TOKYO-FUMIHiko MAKI, *Investigations in Collective Form*, p. 54

FIGURE 31-SHINJUKU DISTRICT, TOKYO-FUMIHiko MAKI, *Investigations in Collective Form*, p. 54
interaction.

The functional flow patterns of people in his Shinjuku District Proposal for Tokyo were utilized in a similar fashion by Maki. Although the main pedestrian axis indicates movement from the offices to the amusement center, the actual patterns of movement will be short-circuited by the transportation center. This does not negate the possibility of meaningful, spontaneous human association. It also points up the fact that simply because functional generators of human activity are located in such a manner as to create a flow of people through a particular space does not mean that any meaningful contact or interaction will occur at all. This point of view is examined in the following section, "Patterns of Disassociation".

The objective of this section has been to demonstrate that even though patterns of human activity are changing as a response to the phenomena of growth and change, man's need for association is constant.

Changing Patterns - Association/Disassociation

Although human association is a constant need of man, his patterns of activity are in fact being altered within today's urban society. Man's new patterns of association do not preclude the necessity to provide for spontaneous associations. However, meaningful interpersonal associations also must be recognized as a function of patterns of disassociation. These patterns are particularly evident at the urban scale. Significantly these new patterns of disassociation are also being recognized as basic to the nature of man.

Alison and Peter Smithson, while concerned with association as a constant need of man, recognize new patterns of human association which are a product of the mass media, the automobile, and communications systems.
45 Smithson, Alison, Urban Structuring, op. cit., p. 34

46 ibid., p. 20

47 Smithson, Alison, "The Theme of C.I.A.M. 10", op. cit., p. 29

48 ibid., p. 28

49 Smithson, Alison, Team 10 Primer, p. 208

50 Woods, "Recent Thoughts in Town Planning and Urban Design", p. 183
It is these new patterns of human association to which the Smithsons are trying to respond. Their objective is to express this understanding in their architecture. It is their belief that "for every form of association there is an inherent pattern of building". They are fully aware that association does not necessarily mean face-to-face contact. In fact, "the pattern of human association in some countries may turn out to be a pattern of disassociation". There is also a "scale of association" to which most societies respond. The more personal associations are identified with the family and neighborhood scales.

The Smithsons have also realized that meaningful associations cannot be achieved by simply using historical forms and dwelling groupings because "the social reality they represent no longer exists". They contend that today's new society demands a new environment. Picturesque city plazas of the European new towns fail to recognize the patterns of disassociation at the city scale. Louis Kahn expresses this same point of view with respect to the changing patterns of association. "Participation - the original existence - will, that which made city hall a city hall, a village green a village green, a place for gathering together (and participation was the most important part of it) does not exist any more."  

Like Kahn and the Smithsons, Shadrach Woods is concerned with the changing patterns of human association. Woods views society as being in a profound period of change in terms of economic goals. Shifting from a production to a consumption base has generated new social patterns. "Today we are involved in mass production, mass distribution, mass consumption, mass housing, mass education, and mass leisure." Mobility has created new relationships between each of these mass activities.
SHADRACH WOODS

"AN UNHIERARCHICAL SOCIETY.....

CONSTANTLY CHANGING FORMS AND INTENSITIES OF HUMAN INTERCOURSE"

51 ibid., p. 188


54 "Aesthetics and Technology of Preassembly", op. cit., p. 180


56 ibid.


58 Kurokawa, "Two Systems of Metabolism", op. cit., p. 80
The ultimate expression of this society is termed by Woods as "universal". Here governing ethics are transformed from an "internal moral discipline to a social interrelationship". All share on a "basis of total participation and complete confidence" in an unhierarchical society. Therefore, the urban environment, if it is to fulfill its role, must be so structured as to be "able to adapt itself constantly to the changing forms and intensities of human intercourse.

Kurokawa and his fellow Metabolists visualize today's society as dynamic, heterogeneous, and ever changing. They list four phenomena which have brought about these new patterns of activity: 1. dense communications networks; 2. the automobile; 3. resulting violent movements of people and goods; and 4. mass production, demand and consumption. These phenomena have radically altered the activity patterns of the traditional community by expanding it from without (physical forces) and from within (psychological forces). Kurokawa contends, "Our environment (aesthetic spaces, buildings, and cities) must express and conform to the total characteristics of our civilization."

Certainly, the urban freeways have become a new medium for association which is in fact a pattern of disassociation. Noriaki Kurokawa reflects the influence of the Smithsons and of Louis Kahn when he writes, "Life is movement; road is architecture." "Life is developing on the roads, which up till now have played no part in functional space placement. We find ourselves forced to think of traffic not as the empty void among objects but as an object in itself. Making a real thing of these so-called empty areas is what we mean by street architecture."

David Crane also is keenly aware of the significance of these reciprocal patterns of association/disassociation and their implications for
59 Crane, David, "Public Art of City Building", Annals of the American Academy of Political and Social Sciences, March 1964, p. 87

60 Crane, David, "The Meaningful Content of Physical Forms in Development", unpublished paper delivered to planning seminar, University of Pennsylvania, 1958, p. 7

61 Crane, David, "Chandigarh Reconsidered", American Institute of Architects Journal May 1960, p. 39


63 ibid.
the role of the urban freeway. In addition to its role as a builder, Crane contends that the urban freeway also must fulfill the role of "communicator". The city is experienced in "time lags and sequence" and it is the role of capital design to make the streets into channels or corridors of "visual" and "symbolic" intelligence. If the objective is to reestablish a meaningful city order, then it must be realized that today "most of the citizens' time is spent not in the 'piazzas' but in the channels of movement".

It is significant that the individuals considered have recognized that meaningful, interpersonal associations at the urban scale are also a function of patterns of disassociation. The new patterns of disassociation take on greater meaning in the search for understanding man's need for association as a primary determinant of architectural and urban form.

Summary

The phenomena of growth and change have greatly altered the physical and social patterns of the contemporary environment. These phenomena have generated conflicting trends of man's constant need for association and his changing patterns of activity.

The investigations considered in the course of this chapter have probed the nature of both man's constant and changing needs. There is the need to provide for meaningful, spontaneous associations. Meaningful interpersonal associations are also responsive to patterns of disassociation, particularly at the urban scale. These new patterns of disassociation are equally significant in the search for an understanding of man's need for association. The individuals considered here have responded to the need to consider human association as a primary determinant of architectural and urban form.
Conclusion
Conclusion

The architecture and urbanism of human settlements will continue to reflect the physical and cultural determinants which influence their form. However, unlike the settlements of past societies man's ability to influence the formal expression of his environment has been greatly expanded. Contemporary structural technology and environmental control systems have greatly increased the capacity to alter and control the physical limitations of geography, climate, and topography. In addition, transportation technology and mass communication systems have greatly increased man's physical mobility and experiences by exposure to the culture and artifacts of every society both contemporary and historical.

As man becomes less constrained by the traditional physical determinants he is no longer limited to the regional characteristics of materials, construction, and climatic expression. The unlimited exchange of cultural ideas and construction technologies is also effecting architectural and urban expression throughout the world. The physical and cultural limitations which contributed so much to a homogeneous vernacular or community architecture within past societies are no longer evident.

This freedom has failed to produce a harmonious physical environment. Instead it has produced an environment of violent juxtapositions and contradictions. The freedom of expression which has resulted from technological change requires new philosophies of architecture and urbanism capable of ordering the physical environment.

New and more dynamic determinants are becoming the primary concerns. The pressures of growth and the rapidly changing environment require the accommodation of man's identity and also his changing patterns of association.
These concerns have been developing in architectural and urban thought since the second world war. The dissolution of the Congress of International Architecture Modern at Otterlo in 1959 witnessed the modern movement's split into several submovements. The once unified architectural and town planning philosophies of C.I.A.M. had been under question for almost a decade. Dominant concerns were for a reconsideration of the Master Plan approach to city design and the re-evaluation of the realities of a rapidly changing urban society.

Architectural and urban thought during this period appears to be characterized by a lack of single purpose or theoretical position. Since the Otterlo Conference these different groups have been attributed the development of new theories of architecture and urbanism. The idea that each group has developed independently their theories is reinforced through the unique formal expressions and the personal rhetoric which describes each expression. Consequently the classification of these groups has become polarized around geographic regions and is reinforced by the similarities of unique formal expression and terminology.

One of the fundamental aims of this investigation has been to distinguish between the determinants of form and unique formal expression as a product of the design process. Based on the validity of this distinction a framework for comparative analysis has been established which facilitates the examination of conceptual and organizational principles rather than being dependent upon the similarity of formal expression.

It has been demonstrated that the individuals considered have responded to the forces of growth and change and to the accommodation of man's need for identity and association as primary determinants of architectural and urban form. The comparative investigations with respect
to these determinants support the thesis that these several submovements of modern architecture and urbanism are in fact representative of a common theoretical position.

Although somewhat fragmented and still in formative stages these concerns are representative of architectural and urban thought for the past two decades. The generation of these more dynamic determinants of growth, change, identity, and association have demanded new concepts of form and expression. The individuals considered have responded to these determinants and have evolved theories of architecture and urbanism which have provided a conceptual framework which is to play an increasingly significant role in the development of contemporary architecture and urbanism.
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