Redefining Designing
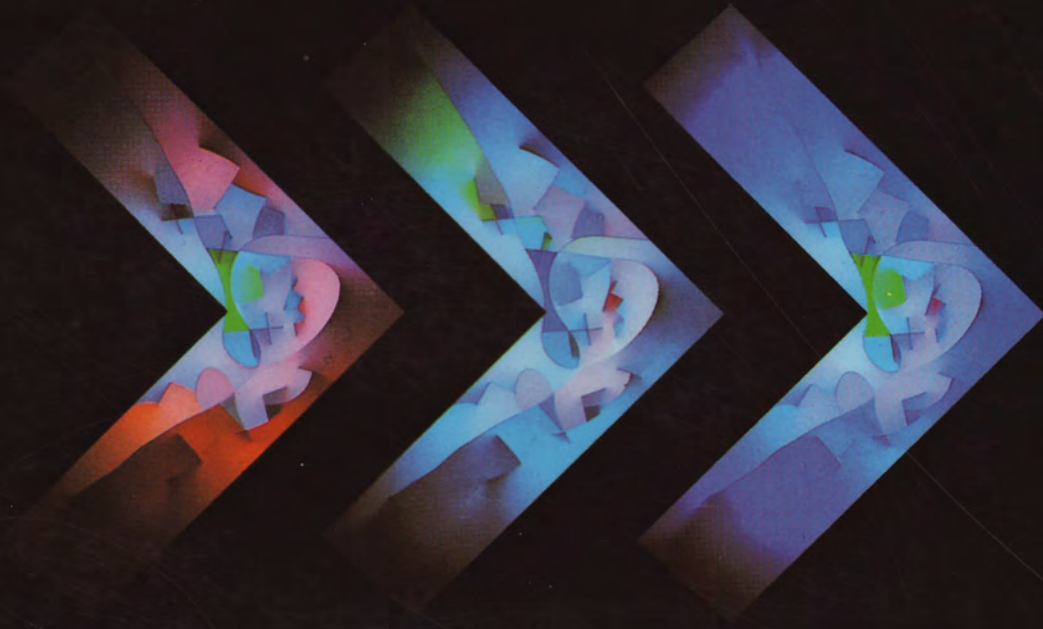## From Form to Experience

C. Thomas Mitchell

REDEFINING DESIGNING

FROM FORM
TO
EXPERIENCE

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COVER ILLUSTRATIONS FROM: BRIAN ENO, INSTALLATION SERIES

FRONT — #9 Three moments from "SMALL PASTURES" (San Francisco, 1988). Approximately 2 metres wide.

BACK — #2 A moment from "Venice 3" (Venice, 1985). One of a group of five pieces, each 120cm x 30cm, and each independently illuminated by a 20" TV monitor.

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CONTENTS

DESIGN METHODS

For all their faults, designers do design — they have a process that works for them, if for no one else. If design researchers hope to make design more responsive to people then they will have to design structural changes into the design process itself, not passively stand by and complain about unfeeling and uncaring designers. Within design research two major trends can be distinguished: those approaches that *directly* address the process of design and those that do not. As we have seen, environment-behavior studies are examples of the latter, in which researchers for the most part tried to apply social science research results to "inform" the design process. This approach has proven ineffective. However, one approach that directly addressed the process of design was the design-methods movement that first developed in Britain during the early 1960s.

The founders of the design methods movement were interested in developing means of design applicable to the new and larger scale design tasks then emerging for which there was no precedent, such as the design of human interfaces with high-technology equipment. The focus of these design tasks was increasingly on human rather than hardware concerns. Designer's traditional ways of working — individually, principally through intuition, and using two-dimensional scale drawings as a design media — were proving increasingly inappropriate in application to these new design tasks. The design-methods movement was an attempt to develop methods that were applicable to these new tasks and that transcended the limitations of the traditional design process. Specifically, design methods were developed to permit many people to collaborate in the design process, in place of the reliance on a single person's ability to know and effectively synthesize all of the information relevant to a design task. In addition, design methods were intended to allow information arrived at rationally to be systematically incorporated into the design process, instead of depending almost exclusively on the intuition of the individual designer, as had previously been the case. Finally, in order to realize these goals, the protagonists of the design-methods movement attempted to change the nature of the design process itself by replacing the principal design technique of the industrial era — "design-by-drawing" — with other, more abstract, methods that permitted a greater "perceptual span" than was possible with traditional design methods.

The two most influential figures in the design-methods movement, John Chris Jones and Christopher Alexander, are both British, though their work developed independently. Jones co-organized the first conference on design methods in London in 1962. Alexander attended the conference and two years later published his book *Notes on the Synthesis of Form,* which had a great impact on the design debate at the time. In 1970 Jones published the first edition of *Design Methods,* a compendium of thirty-five different design methods that was to become the standard textbook on the subject.

The need for new methods of design was eloquently addressed by Alexander:

Today functional problems are becoming less simple all the time. But designers rarely confess their inability to solve them. Instead, when a designer does not understand a

problem clearly enough to find the order it really calls for, he falls back on some arbitrarily chosen formal order. The problem, because of its complexity, remains unsolved.

To match the growing complexity of problems, there is a growing body of information and specialist experience. This information is hard to handle; it is widespread, diffuse, unorganized. Moreover, not only is the quantity of information itself by now beyond the reach of single designers, but the various specialists who retail it are narrow and unfamiliar with the form-makers' peculiar problems, so that it is never clear quite how the designer should best consult them. As a result, although ideally a form should reflect all the known facts relevant to its design, in fact the average designer scans whatever information he happens on, consults a consultant now and then when faced by extra-special difficulties, and introduces this randomly selected information into forms otherwise dreamt up in the artist's studio of his mind. The technical difficulties of grasping all the information needed for the construction of such a form are out of hand — and well beyond the fingers of a single individual.

At the same time that the problems increase in quantity, complexity, and difficulty, they also change faster than before. New materials are developed all the time, social patterns alter quickly, the culture itself is changing faster than it has ever changed before. In the past — even after the intellectual upheaval of the Renaissance — the individual designer would stand to *some* extent upon the shoulders of his predecessors. And although he was expected to make more and more of his own decisions as traditions gradually dissolved, there was always still some body of tradition which made his decisions easier. Now the last shreds of tradition are being torn from him. Since cultural pressures change so fast, any slow development of form becomes impossible. Bewildered, the form-maker stands alone. He has to make clearly conceived forms without the possibility of trial and error over time. He has to be encouraged now to think his task through from the beginning, and to "create" the form he is concerned with, for what once took many generations of gradual development is now attempted by a single individual. But the burden of a thousand years falls heavily on one man's shoulders, and this burden has not yet materially been lightened. The intuitive resolution of contemporary design problems lies beyond a single individual's integrative grasp.[3]

The net result of all this, Alexander notes, is that "the very frequent failure of individual designers to produce well organized forms suggests strongly that there are limits to the individual designer's capacity."[4] For Alexander, however, a "well organized form" is not purely an aesthetic judgment but rather a definition of a condition in which physical form is well suited to the context in which it occurs; i.e., there are no mismatches or "misfits" between the form and the process of use. As he writes: "when we speak of design, the real object of discussion is not the form alone, but the ensemble comprising the form and its context. Good fit is a desired property of this ensemble which relates to some particular division of the ensemble into form and context."[5]

John Chris Jones voiced similar views on the need for new methods of design:

Perhaps the most obvious sign that we need better methods of designing and planning is the existence, in industrial countries, of massive unsolved problems that have been created by the use of man-made things, e.g. traffic congestion, parking problems, road acci-

dents, airport congestion, airport noise, urban decay and chronic shortages of such services as medical treatment, mass education and crime detection.[6]

In analyzing the causes of these mismatches of design and use Jones writes:

What do we see if we take a bird's eye view of our efforts, as engineers, architects, planners and industrial designers, to influence the recent course of human evolution? . . . We see a series of products, services, and buildings that are *well suited* to their markets but *ill suited* to the conditions brought about by their use. Why do these major design errors arise? I suggest that it is because existing methods in engineering design, industrial design, marketing, architecture, urban planning and related areas are *conservative, persuasive* and *rigid.* They oblige us to perpetuate inflexible patterns of activity. Our productions are designed on rigid principles that preclude re-adjustment and adaptation to unforeseen effects. We need methods of designing, planning and testing that are *exploratory, predictive* and *flexible.*[7]

Jones concludes on the basis of his analysis that "neither the professional designer, nor the drawing board upon which the parts of a design can be adjusted relative to each other, are essential to the evolution of complex forms that are well fitted to the circumstances in which they are used."[8] He also remarks, "Rethinking the human or 'software' aspects of the organized man-machine systems that are emerging in these areas, is often a greater design challenge than is the design of the 'hardware' components."[9] A prescient remark, especially viewed in terms of the nature of the emerging postindustrial design tasks.

Jones himself originally became involved in design methods while working as an industrial designer for a manufacturer of large electrical products. He was frustrated with the superficiality of industrial design at the time and had become involved with ergonomics. He set up one of the first labs devoted to the discipline in British industry as a means of designing electrical equipment that better responded to user requirements. When the results of his ergonomic studies of user behavior were not utilized by the firm's engineering designers, Jones studied the design process being used by the engineers. To his surprise — and to theirs — Jones's analysis showed that the engineering-design process was almost purely intuitive and that the designers had no way of incorporating data arrived at rationally early on in their design process when it was most needed. Jones then set to work redesigning the engineers' design process itself in such a way that intuition and rationality could coexist, rather than having one present to the exclusion of the other. This was Jones' first experience with design methods.

I discussed his ideas and work in an extensive series of interviews with Jones. Addressing the origin of his work with design methods Jones said:

I didn't want to get involved with design theory or methods, I just wanted to get the ergonomics work into action. I only did the design methods in order to get the ergonomics accepted, and that was there in order to get the product better. I thought, well the right thing is to understand their design process so we'll do ergonomics on the design process. So I did this ergonomics study of how the designing was done purely with the view of getting the ergonomic information, which was obviously sound and

well tested into the engineering decision process at the point where it wouldn't be reject-ed — so the human limitations would come first and the machine limitations would come second, instead of the other way round. In doing that I hit on what's now called design methods, I called it "systematic design methods" originally.[10]

Both Jones and Alexander contrasted the rigidity and unresponsiveness of the then-current design methods with previous craft methods that produced objects much more suited to the contexts in which they were used. Jones contrasts prein-dustrial craftwork with the design-by-drawing approach of the industrial era. His comparison is not based on idle romanticism, but rather was an attempt to dis-cover the structural differences in the processes themselves as a means of under-standing why the results of craftwork are so often more satisfying than the products of the industrial age. About the qualities of craftwork Jones writes, "Farm wagons and carts were not designed at all in our sense of the word. No single person had ever sat down to conceive them as a whole . . . [but] they were what we would call 'good designs'."[11] Jones was heavily influenced in his views by *The Wheelwright's Shop,* a book by George Sturt, one of the few traditional craftsmen explicitly to set out the craft process he followed. Jones cites the two positive aspects of wagon making as specified by Sturt, "the accuracy with which the wagons matched the requirements of users, and the way in which the designs transcended conflicts between these requirements to produce a situation which Sturt calls 'the interaction of parts.'"[12] Jones continues:

It is clear therefore that the tremendous time taken to discover the wagon shapes through centuries of evolution was a most important factor. Herein lie both the weak-ness and the strength of the "design method" used. Long evolution by trial and error, and we may be sure that there were countless failures and disasters, is out of the ques-tion in anything but an extremely stable society. In our own society, requirements and materials are never still and this is probably the greatest obstacle to good design.

[The] absence of fashion, or the need to introduce conscious symbolism of feelings not directly associated with the wagon itself, is the second important condition that we seek. It is this "*un*aesthetic" (or *unconsciously* aesthetic) attitude that allowed the wheelwrights to persist until they discovered those beautiful "invisible lines." It is clear that very many of our domestic products do not have the two most striking qualities described by George Sturt; exact matching to requirements and interaction of parts.[13]

Jones contrasts the rigidity and limitations of the process of design in the industrial era, which he terms design-by-drawing, with the responsiveness of the craft process: "The essential difference between [drawing], the normal method of evolving the shapes of machine-made things, and the earlier method of craft evolution, is that trial-and-error is separated from production by using a scale drawing in place of the product as the medium for experi-ment and change."[14] And he notes that the separation of thinking from mak-ing brought about by the use of drawings has several important effects: it enables production work to be split up, it enables the planning of things that are too big for one craftsman to build, and it enables the rate of production of things to increase.

The scope for using drawings as a means of producing well adapted designs is, however, extremely limited, as Jones notes: "the principle of deciding the form of the whole *before the details have been explored outside the mind of the chief designer* does not work in novel situations for which the necessary experience cannot be contained within the mind of one person."[15] Further, when comparing the processes of craftwork with the possibilities opened up by the use of drawings as a medium for design, he writes:

What strikes me most, about this new freedom to design instead of just evolve, is that it is obtained at such high cost, the loss of the ability to adjust the shape of things to reflect what makes life really human. There arises a profound conflict between the geometric uniformity of what the designers *have* understood and the barbaric ignorance of everything non-visual that the scale drawing *fails to represent*.[16]

In discussing design-by-drawing Jones said:

It's just a grotesque procrustean exercise. It's bound to seem very satisfactory to the designers because they can see this beautiful bird's eye view and they can control it. Provided one's skillful enough with a pencil, it'll do what they want so you get beautiful shapes. And it's bound to seem an imposition to the users. But the users will not be aware that it's miles from what they want, they'll be tricked into accepting the professional values — the geometric beauty as the criteria. . . . I've always been annoyed or irritated, or amused if not annoyed, by the way architects say "it doesn't work" or "it does work" and I can never get them, when I question them, to say what they mean by "work," though I think I vaguely know what they mean. It means visual articulation and getting it to look right, really, and in better architects this produces a wondrous quality which still might disregard some things the people in the building need. There's this over simplifying quality always in architecture. But they try, they cover all the fields in a very engaging way and have a great willingness to combine the aesthetic and technical and all those other contradictions. There's an arrogance that goes with it, which gives beautiful confidence but an unfortunate lack of depth, a lack of willingness to get involved in the detail. I think this comes because it's a gentlemanly pursuit originally, not a necessary craft but a luxury.[17]

The extent to which architecture is a luxury and not a necessary craft is borne out by the fact that architects are estimated to be involved in only three to five percent of all building activity worldwide.[18]

Alexander addresses the contrasting methods of craftwork and design-by-drawing as well, but terms them differently. He speaks of "unselfconscious" processes instead of craftwork and "selfconscious" processes instead of design-by-drawing:

The modern designer relies more and more on his position as an "artist," on catchwords, personal idiom, and intuition — for all these relieve him of some of the burden of decision, and make his cognitive problems manageable. Driven on his own resources, unable to cope with the complicated information he is supposed to organize, he hides his incompetence in a frenzy of artistic individuality. As his capacity to invent clearly conceived, well-fitting forms is exhausted further, the emphasis on intuition and individuality only grows wilder.[19]

Alexander's views have been proven correct by recent developments in architecture, particularly by such movements as deconstruction in which — as seen with Peter Eisenman's Cannaregio project in Venice — the design task is completely disregarded if it is too complex. Instead an individual, artistic "creation" unrelated to client's brief is offered in place of a design solution to a specific task.

Alexander goes on to write of the self-conscious process of design-by-drawing:

Let us remember, however, just what things a designer tries to diagram. Physical concepts like "neighborhood" or "circulation pattern" have no more universal validity than verbal concepts. They are still bound by the conceptual habits of the draftsman. A typical sequence of diagrams which precede an architectural problem will include a circulation diagram, a diagram of acoustics, a diagram of the load-bearing structure, a diagram of sun and wind perhaps, a diagram of the social neighborhoods. I maintain that these diagrams are used only because the principles which define them — acoustics, circulation, weather, neighborhood — happen to be part of current architectural usage, not because they bear a well-understood fundamental relation to any particular problem being investigated. In this fashion the selfconscious individual's grasp of problems is constantly misled. His concepts and categories, besides being arbitrary and unsuitable, are self-perpetuating. Under the influence of concepts, he not only does things from a biased point of view, but sees them biasedly as well. The concepts control his perception of fit and misfit — until in the end he sees nothing but deviations from his conceptual dogmas, and loses not only the urge but even the mental opportunity to frame his problems more appropriately.[20]

And here we find the present condition of the architectural profession, whose members, having found their methods inadequate in application to increasingly complex design tasks, are now taking refuge in their own formal conceptual dogmas. As Alexander foresaw, they have now lost both the desire and the ability to produce designs that are responsive to the real contexts in which they will be used.

In unself-conscious processes, such as craftwork, the media of design and making were unified, the model of the object and the object itself were the same; they could be continuously tested and refined in their contexts of use in order to ensure a good fit of form and use. Drawings, however, are abstract representations that bear no relationship to the context of use. As Alexander writes:

We do not know how to express the criteria for success in terms of any symbolic description of a form. In other words, given a new design, there is often no mechanical way of telling, purely from the drawings which describe it, whether or not it meets its requirements. Either we must put the real thing in the actual world, and see whether it works or not, or we must use our imagination and experience of the world to predict from the drawings whether it will work or not. But there is no general symbolic connection between the requirements and the form's description which provide criteria; and so there is no way of testing the form symbolically. . . .

In present design practice, this critical step, during which the problem is prepared and translated into design, always depends on some kind of intuition. Though design is by nature imaginative and intuitive, and we could easily trust it if the designer's intuition were reliable, as it is it inspires very little confidence.[21]

The large number of designs that have failed the test of use in the quarter century since Alexander wrote his book demonstrates that his is a realistic, not a jaundiced, view of the implications of purely intuitive, self-conscious design.

As we have seen, in contrast to present methods such as design-by-drawing, unself-conscious processes rely on trial-and-error experimentation to evolve, rather than design, objects. Of this Alexander writes: "Trial-and-error design is an admirable method. But it is just real world trial and error which we are trying to replace by a symbolic method, because real trial and error is too expensive and too slow. . . . In the unselfconscious process there is no possibility of misconstruing the situation: nobody makes a picture of the context, so the picture cannot be wrong. But the selfconscious designer works entirely from the picture in his mind, and this picture is almost always wrong."[22] He concludes that in this sense "architecture did actually fail from the very moment of its inception. With the invention of a teachable discipline called 'architecture,' the old process of making form was adulterated and its chances of success destroyed."[23]

Here we return to the idea that architects are incapable of producing well adapted environments. Architecture is a self-conscious process in which drawings are used as symbolic media for design. The use of drawings permits a division of labor to take place, separating, for the first time, designing from making. Among the consequences of the use of drawings is that they increase the potential scale of design tasks and the speed with which designing and building can take place. But these gains are realized at the expense of the meaningful consideration of user requirements and the context in which a design will be used. Craftwork, on the other hand, is very well tailored to the conditions in which it is used. It is an unself-conscious process in which trial and error is used to evolve objects directly in their context of use. But the trial and error through which craft objects are developed is slow, expensive, and largely impervious to innovation. The design methods movement was an attempt to capture the quality of craftwork in the new, larger design tasks that were then emerging. Specifically, the methods were attempts to develop a means for symbolically representing the design task that matched physical form to contexts of use, unlike the geometrical criteria of drawings, which is a symbolic representation responsive only to itself.

Design methods were intended to overcome the limitations of design-by-drawing and regain some of the adaptability present in craftwork. The central purpose of design methods, as Jones conceived of it, was to permit collaboration in the design process, rather than being limited to the intuitive decisions of individual designers:

The kinds of design skill which are called for in using the newer design methods, which the professions as yet do not seem to take seriously, are suited to collaboration, to the sharing of responsibilities between users and experts, and to designing imaginatively in a collective process, as was the case in craft evolution.[24]

Jones is consistent on this point throughout his work. In *Design Methods* he writes:

The ultimate answer to the dilemma is not for designers to become as gods but for the design process to become more public so that everyone who is affected by design decisions can foresee what can be done and can influence the choices that are made. The purpose of this book is to explore some first attempts at permitting many brains, rather than one, to grasp, and to explore, the complexities of designing.[25]

When interviewed about this point Jones said:

I've always been keen on collaborative design. I think that's the purpose of design methods, to enable people to be creative in groups. That's the purpose. Most of the criticisms and the reaction of the seventies against design methods said it was not necessary or didn't fit individual thinking, particularly of architects, and I say, well it wasn't meant to.[26]

Jones's view of the importance of explicit consideration of users in the design process permeates his work. He remarks, for example:

It is astonishing how much designing goes on in gross ignorance of user requirements.
. . . There is little chance of locating the limits of human performance without careful measurements and there is every chance of completely overlooking, or misunderstanding, user behaviour if no consultation or observation of users precedes designing. . . .
    In the writer's opinion nobody should be allowed to practice design until he has subjected himself to the humbling but rewarding experience of seeing how far from reality is his conception of what users really think.[27]

Collaboration was made possible — the design process was to be made public — by making the process explicit and externalizing design thinking. In other words, Jones attempted to redesign the design process itself in such a way that all those people who would be affected by designing could become involved in decision making. Of this he writes:

The first question to be answered is "What do the new methods have in common?" The most obvious answer has already been given: it is that all the methods are attempts to make public the hitherto private thinking of designers; to *externalize* the design process. A major advantage of bringing design thinking into the open is that other people, such as users, can see what is going on and contribute to it information and insights that are outside the designer's knowledge and experience.[28]

Elsewhere he writes, "The benefit of expressing design thinking systematically in terms of 'maps', or 'navigational aids', is to make the early stages of the design process accessible to many people instead of restricting it to an experienced few."[29]
    Another major reason for externalizing design thinking was so that both rationality and intuition could be incorporated into the design process. This is clearly set out in a course book written by Chris Crickmay in collaboration with Jones:

Success depends upon being able to mix rational and intuitive thinking. Rational thinking on its own wastes the vast information patterning capacity of the nervous system. Intuition on its own depends too much upon the experience and bias of one designer. A skill must be exercised in choosing between one and the other which could be called meta-intuition, or meta-rationality.[30]

In order to externalize design thinking, to make design a public process, Jones "disintegrates" the design process into three stages: divergence, transformation, and convergence. The traditional breakdown of the design process — analysis, synthesis, and evaluation — was considered by Jones too limited, not providing the opportunity to question the aims of the design process itself. He told me: "I think all of those three fit into the convergence stage myself. I think it's a much longer and wider process. *So it's not another way of doing design, you see, it's another way of doing what designers don't do at all.*"[31] In this sense Jones is expanding the design process, adding to convergence, which constitutes the whole of a traditional design process, two predesign stages: divergence and transformation.

The divergence stage enables everyone involved in the design process to do some unlearning, some *de-signing* as Edwin Schlossberg calls it. The key stage of the design process as conceived of by Jones, however, is transformation, which is "the critical part of all creative acts. The essence of transformation is generating a *new* option or insight that didn't previously exist. Whereas the usual political way of overcoming conflict is compromise, the creative way is transformation, or conflict resolution."[32] This is a critical point; unlike in politics, design done well does not result in compromise. Rather, using the divergence and transformation stages of the design process, an approach that is mutually satisfactory to all of the people to be affected by designing is sought.

The disintegrated design process is, according to Jones, in contrast to the process used by professional designers: "in professional designing, design strategies are to a large extent fixed. The professional designer is committed from the start to a professional strategy leading to a standard solution however much evidence he may encounter on the way to suggest he switches."[33] One of the principal motivations of Jones in his work with design methods was to increase the scope, or the "perceptual span" of designing.

As noted earlier, Jones developed his initial views on design methods while in industry as a means of getting the results of his ergonomics studies incorporated into the design process. After working in industry, however, Jones entered academic life, organizing and conducting a course in Design Technology that focused on developing new approaches to design research and design methods. Jones wrote that this program was

an attempt to extend the education of architects, engineers, and others to include the new applied sciences that are increasingly relevant to designing and planning the physical environment but are not yet included in the conventional training of professional designers and planners. These new sciences, of which the best known are computing, ergonomics (human factors engineering), operations research, systems engineering, and systematic design methods, have been blended together under the title "design technology," to form courses for the Master of Science degree for the University Diploma in Technical Science at the University of Manchester Institute of Science and Technology.

The purpose of this experiment in design education is to find ways of removing the barriers between arts and sciences and between the many professions that are increasingly relevant to design problems. The working principle is to give each student enough

experience of the seemingly conflicting methods of science and of design to enable him to resolve the differences within himself. It is argued that the barriers between disciplines and professions are much more easily crossed by persons who understand both sides than by attempts to communicate between persons each of whom knows only one side. The practical aim is to train people for work in inter-disciplinary and interprofessional planning and development teams.[34]

Unfortunately, at the time of Jones' course, the 1960s, industry in Britain was not clamoring for Jones's graduates with interdisciplinary training. As evidenced by recent trends in postindustrial design, however, these skills are now very much needed.

After a decade running the course in design technology, Jones went on to become the first professor of design at the British Open University, an institution whose students do not regularly attend classes but rather work at home, receiving their lectures via television and radio. Jones's stay at the Open University was brief, however. He soon retired from institutional life altogether and began a series of personal design experiments that have occupied him since; these will be discussed subsequently.

Many of the ideas underpinning the design methods movement are extremely important: the role of collaboration, the enhancing of design thinking through the incorporation of rationality and intuition, and the attempt to find alternatives to drawing as the principal mode of design activity. Most significantly, Jones and Alexander recognized the failings and inapplicability of the then contemporary design methods and proposed structural changes to the design process itself to realize designs that better match their contexts of use. That was the idea, anyway. In practice the design-methods movement was a failure and is now, in its original form, a largely abandoned and discredited approach.

Several specific areas can be identified that led to the failure of the design-methods movement. One of the primary complaints was the apparent complexity of much of the early work in the subject. Alexander's set theory and tree diagrams along with Jones's dense text and complex diagrams all looked too analytical, too abstract, too inapplicable to the task of design as then understood. Designers are well known for their aversion to science, so much of the writing on design methods must have seemed foreign. As Jones himself notes:

Perhaps the most characteristic feature of the literature on design methods is the prevalence of block diagrams, matrices and networks of many kinds that resemble, to varying degrees, the diagrams and calculations that computer programmers use. We can regard this mapping of interrelationships as an attempt to find something more tangible than thinking, but less detailed than a scale drawing, with which to portray the complexity of designing at the systems level: a means of giving the systems designer a wide enough "perceptual span."[35]

Maybe, but for a designer or student with a deadline tomorrow this seems to offer little help. Another obstacle to the adoption of design methods was the scholarly orientation of the movement in view of designers' equally famous
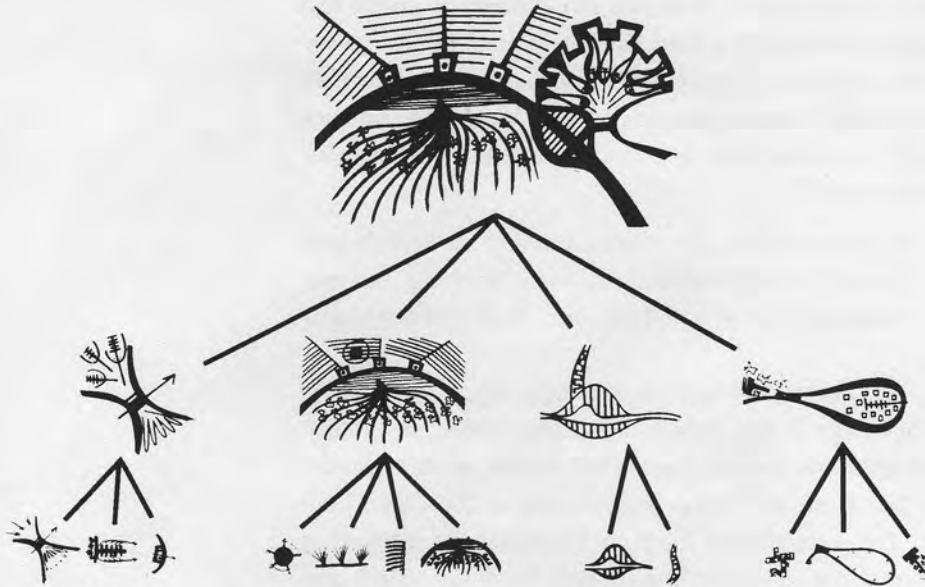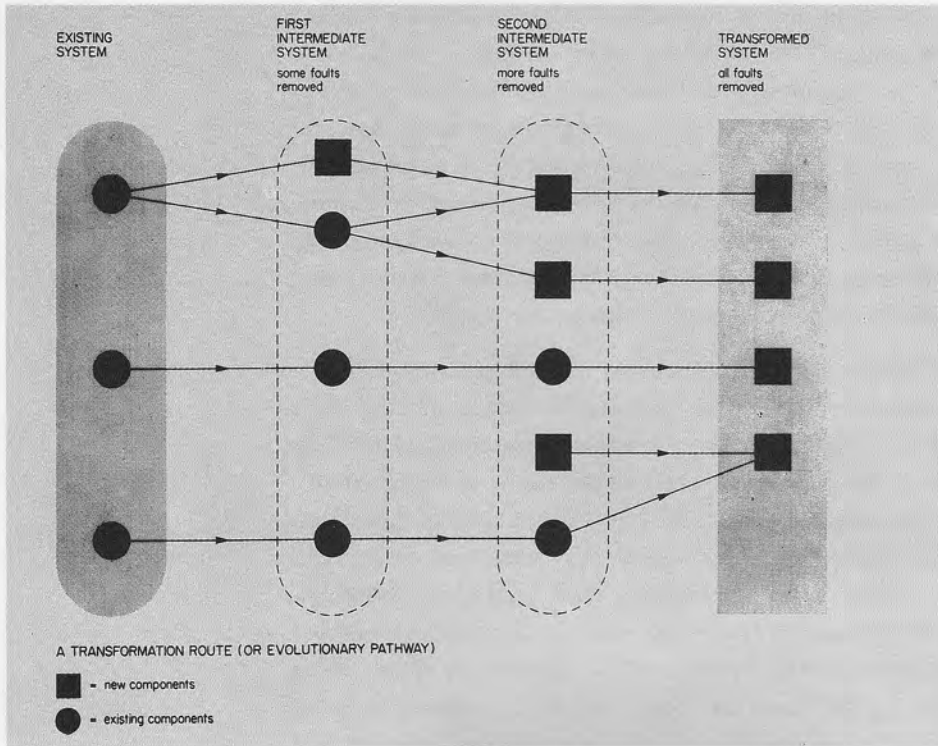
Christopher Alexander. Tree Diagram. This diagram, from *Notes on the Synthesis of Form*, reflects the design methodologists' attempt to map ideas in a way that was more tangible than thinking but less detailed than a scale drawing.

aversion to reading, a condition perhaps understandable in view of the vacuous nature of much of the writing on architecture and design.

The failure of design methods to significantly affect design as practiced cannot be blamed, however, on the designers who didn't take up the subject. There were a few structural problems and mistaken assumptions within the movement itself that are largely responsible for the failure of design methods to affect positively the responsiveness of design to users. There was, for example, a conflict between the founders of the movement — such as Jones and Alexander — who wished to augment designers' intuition with a wider rationality, and those who wished to *replace* intuition with rationality. The latter group, who came to be most numerous in the movement, believed the design task itself to be completely calculable; this is as dangerous and misguided an assumption as we have yet come across in this study. Of this approach Jones writes: "There was a phase in the sixties when many architects had a mania for design methods, but it wasn't everyone that had the mania. I think it was only the rational part of design methods which became popular, and it only became popular with the kind of person who is very keen on rationality."[36] Design methods seem to have been embraced only by those who mistakenly believed design to be a completely explicable, rational proposition. In view of this it is perhaps just as well that the design-methods movement proved to be a practical failure.

Another mistake, common to most approaches to design methods, was the separation of the design task itself into two general stages — analysis and synthesis, or programming and design. The assumption on which this was based, a feature of most design research, is that a design problem can be investigated, understood, in short "known" *before* designing itself takes place. This idea was present, for example, in Alexander's early work:

| EXISTING SYSTEM | FIRST INTERMEDIATE SYSTEM some faults removed | SECOND INTERMEDIATE SYSTEM more faults removed | TRANSFORMED SYSTEM all faults removed |

A TRANSFORMATION ROUTE (OR EVOLUTIONARY PATHWAY)

■ = new components

● = existing components

**John Chris Jones.
A Transformational
Route (or Evolutionary
Pathway).**
This diagram, from
Design Methods, reflects
Jones' desire to repre-
sent the interrelationship
of systems-level design
ideas graphically.

Finding the right design program for a given problem is the first phase of the design process. It is, if we like, the analytical phase of the process. The first phase of the process must of course be followed by the synthetic phase, in which a form is derived from the program. We shall call this synthetic phase *the realization of the program.*[37]

Jones similarly wrote of the pedagogical method for his course in design technology:

The formal teaching is more concerned with principles and methods than with particular design problems. Projects are likewise more concerned with gathering information on which to base design decisions than with making design decisions, i.e. the program is concerned with design research rather than actual designing. The main emphasis, in both teaching and practice, is on the ability to deal formally and precisely with the many uncertainties that present themselves at the start of a design problem.[38]

Jones has since revised his view on this, advocating an interdependency of problem and solution. He now believes that the design task cannot be fully understood in the abstract but rather the "problem" or task can only be proper-ly formed in view of potential solutions or problem synthesis. He writes:

To think of designing as "problem-solving" is to use a rather dead metaphor for a lively process and to forget that design is not so much a matter of adjusting to the status quo as of realising new possibilities and discovering our reactions to them. To make or invent something new is to change not only one's surroundings but to change oneself and the way one perceives: it is to change reality a little. For this reason it is, I believe, a mistake to

begin designing by thinking only of the problem, as we'll call it, and to leave the thinking of how it is to be solved to later stages. One's mind, though not one's paper-work, is best kept in a constant intermingling of both problem and solution so that the interdependency of each is evident throughout. The initial expression of objectives, or needs, however abstract and absolute it may seem, is, I think, full of hidden assumptions about how the person stating it thinks it can be satisfied, eg the statement "solve the unemployment problem" could imply that we are to become engaged in a search for jobs of some kind, but an imaginative response may well suggest ways of workless living in which unemployment is no longer the problem. If realised, the inspired solution changes our minds.[39]

The principal failure of design methods, however, was a social one. Like the environment-behavior researchers, design methodologists tended to view their work as a "good thing" that would naturally be taken up once publicized. They gave insufficient attention to the profound social implications of design methods. Specifically, adoption of design methods as they were originally conceived would entail: users being "reeducated" (yet again), organizational changes in design offices, and design methodologists changing their own ideas and roles. In each case the people with the power to change were, at the time, disinclined to do so. Some of the oversights of the design methodologists are shared with other movements. Addressing the need for "reeducation," for example, Jones writes, "The real difficulty is that of re-educating both professional opinion and public opinion to understand and to believe in the new principle of planning, not for what is feasible at the present, but *for what is likely to be feasible* when the plans are put into effect."[40] He does, however, allude to the difficulty of this, while not questioning its desirability: "Once we recognize that ideas are not easily-changed figments of the mind but the necessary prelude to any kind of human action we can see how unlikely it is that one person's new idea will be acted upon by others."[41]

Jones further reveals that design methods could not really be effective without structural change in design offices:

I have previously suggested that a new kind of design organization may be necessary to permit a complete change to systematic work. The elaboration of the preliminary stages of design is likely to require the setting up of specialist predesign sections, which are insulated from day-to-day contingencies and which operate on longer budgeting periods than are normal in design and development. The cost and time of this extra work early in designing would be justified only if the total development costs are lessened, and if the tendency to over-run delivery dates is thereby kept under better control.[42]

The organizational change that Jones prescribed is a reality now, as seen in the "Human Age" design teams in Japan, but was not adopted by British industry in the 1960s. Another difficulty with design methods from a pragmatic point of view is noted by Jones:

The great difficulty of introducing Systematic Design is that its advantages are not obtained in first attempts. Successful application is much more likely when changes in organization have been introduced beforehand. As with many new things it involves an acclimatization period during which things may get worse before they get better.[43]

In most cases attempts to use design methods were abandoned *during* the acclimatization process, before any benefits accrued.

Reflecting on the failure, or failures, of the design methods movement to positively affect designing Jones writes:

We sought to be open minded, to make design processes that would be more sensitive to life than were the professional practices of the time. But the result was rigidity: a fixing of aims and methods to produce designs that everyone now feels to be insensitive to human needs. Another result was that design methods became more theoretical and many of those drawn to the subject turned it into the academic study of methods (methodology) instead of trying to design things better. The language used to describe designing, and to describe the aims and purposes of things designed, became more and more abstract. The words lost touch with how it feels to be a designer and how it feels to inhabit the systems being designed. . . .

So the fault in method-making was that we made methods as "products" and handed them on to the designers expecting them to use them, as "tools", as means to an end. Which became a logical trap, turning the idea of process into its opposite? And many designers rejected these tools, which was fortunate, perhaps.[44]

Elsewhere he writes:

In the case of design methods my intention was to find ways to make the design process more sensitive to life but what happened was the imposition of methods that were of a larger scale than those we had before but which are less sensitive. Rationality, originally seen as the means to open up the intuition to aspects of life outside the designer's experience, became, almost overnight, a toolkit of rigid methods that obliged designers and planners to act like machines, deaf to every human cry and incapable of laughter.

. . . our world of design, seems to have driven design methods out of its right place as a practical way of enlivening design and into the sterile function of being a vehicle for some pretty useless and fruitless academic nonsense.[45]

As Jones notes here perhaps the major failing of the design methodologists was their inability, at that time, to do themselves what they were asking everyone else to do — to change *their* aims, to abandon the design of artifacts altogether. As Jones himself admits, "My thought about this, is that, though we saw the need to change the processes of designing we did not see the need to change its aims. We retained the concept of 'product' as the outcome of designing."[46]

At this stage the reader may fairly wonder why so much space has been given to an outdated, failed design approach. Well, for all its many failings there is implicit in the philosophy of design methods, if not in the application of them, the seeds of the most advanced approach to user-sensitive design yet developed. The failure of the design methods movement was not that it went too far, but that it did not go far enough. At the time of its inception even the founders of the movement could not come to terms with the implications of their work. A measure of the underlying vitality of design methods can, however, be gauged by looking at the more recent work of Alexander and Jones, in which they attempt to realize their original intentions in found-

ing the design-methods movement in terms of the knowledge gained from that movement's failure.

THE PATTERN LANGUAGE

Both Christopher Alexander and John Chris Jones reacted against the overrationalization that resulted from their early work with design methods. While they both intended to expand the scope of designing — to improve design — the net result of the design-methods movement was, by their own admission, an increase in the rigidity of the design process and a worsening of the quality of design. Alexander wrote of design methods as originally conceived, "they actually prevent you from being in the right state of mind to do the design."[47] Whereas originally Alexander focused on the rational, explicable side of designing, in his work since that time he has addressed the more qualitative aspects of building. Discussing this approach he said:

I really cannot conceive of a properly formed attitude toward buildings, as an artist or builder, or in any way, if it doesn't ultimately confront the fact that buildings work in the realm of feeling. . . . Actually, it's been my impression that a large part of the history of modern architecture has been a kind of panicked withdrawal from these kinds of feelings, which have governed the formation of buildings over the last 2000 years or so.[48]

In his work over the past two decades Alexander has tried to develop a fairly simple, directly applicable design method through which building tasks could be carried out, a method that possessed this "feeling" that was present in architecture and building until the industrial era. The result of Alexander's work, which was carried out with his team at the Center for Environmental Structure at the University of California, Berkeley, has been the formulation of an explicit "pattern language." In 1977 Alexander and his collaborators published *A Pattern Language*,[49] which consists of 253 patterns ranging from the largest scale — towns — through buildings and down to construction details. Each pattern is given a name, a diagram of its spatial layout, the rationale for its inclusion, and a specification of the links between the given pattern and those related to it at a larger and smaller scale. The strength of Alexander's work is that in the patterns he explicitly links the patterns of events that take place in a space to the layout of the space itself, rather than focusing, as did the designers of the industrial era, on geometrical criteria alone. As he writes:

We must begin by understanding that every place is given its character by certain patterns of events that keep on happening there. These patterns of events are always interlocked with certain geometric patterns in the space. Indeed, as we shall see, each building and each town is ultimately made out of these patterns in the space, and out of nothing else: they are the atoms and the molecules from which a building or a town is made.[50]

Alexander emphasizes this throughout his writings, noting:

Those of us who are concerned with buildings tend to forget too easily that all the life and soul of a place, all of our experiences there, depend not simply on the physical environment, but on the patterns of events which we experience there. . . . We know, then, that what matters in a building or a town is not its outward shape, its physical geometry alone, but the events that happen there. . . . The action and the space are indivisible. The action is supported by this kind of space. The space supports this kind of action. The two form a unit, a pattern of events in space . . . [but] this does not mean that space creates events, or that it causes them.[51]

Citing an example of the interaction between patterns of events and patterns of space, Alexander writes:

Each sidewalk is a unitary system, which includes *both* the field of geometrical relationships which define its concrete geometry, *and* the field of human actions and events, which are associated with it. For since space is made up of these living elements, these labeled patterns of events in space, we see that what seems at first sight like the dead geometry we call a building or town is indeed a quick thing, a living system, a collection of interacting, and adjacent, patterns of events in space, each one repeating certain events over and over again, yet always anchored by its place in space. And, if we hope to understand the life which happens in a building or a town, we must therefore try to understand the structure of space itself.[52]

Alexander emphasizes that his team's book constitutes *a* pattern language, not the only one possible. He views each pattern in the book as a hypothesis, though he feels more confident that some patterns represent underlying, invariant relationships between form and activities than do others. In different cultures and in application to new building tasks new patterns may have to be developed. Moreover, Alexander believes that each of us carry our own pattern language within us that, while largely shared with our culture, is personal and independent. It was these implicit pattern languages that were the source for building and craftwork before geometrical design criteria began to predominate with the onset of industrialization. According to Alexander it is now necessary to rediscover and make explicit pattern languages as a means of reacquainting people — designers and non-designers alike — with what he terms "the timeless way of building":

The people can shape buildings for themselves, and have done it for centuries, by using languages which I call pattern languages. A pattern language gives each person who uses it, the power to create an infinite variety of new and unique buildings, just as his ordinary language gives him the power to create an infinite variety of sentences.

But in our time the languages have broken down. Since they are no longer shared, the processes which keep them deep have broken down: and it is therefore virtually impossible for anybody, in our time, to make a building live. . . .

In a traditional culture, these patterns exist as independent entities within your mind, but it is not necessary for you to recognize them as separate atomic units, nor to know them by name, nor to be able to speak about them. It is no more necessary than it is for

you to be able to describe the rules of grammar in the language which you speak. However, in a period when languages are no longer widely shared, when people have been robbed of their intuitions by specialists, when they no longer even know the simplest patterns that were once implicit in their habits, it becomes necessary to make patterns explicit, precisely and scientifically, so that they can be shared in a new way — explicitly, instead of implicitly — and discussed in public.[53]

In contrast to the traditional use of implicit patterns, Alexander writes:

In the early phases of industrial society which we have experienced recently, the pattern languages die. Instead of being widely shared, the pattern languages which determine how a town gets made become specialized and private. Roads are built by highway engineers; buildings by architects; parks by planners; hospitals by hospital consultants; schools by educational specialists; gardens by gardeners; tract housing by developers. The people of the town themselves know hardly any of the languages which these specialists use. And if they want to find out what these languages contain, they can't, because it is considered professional expertise. The professionals guard their language jealously to make themselves indispensable. Even within any one profession, professional jealousy keeps people from sharing their pattern languages. Architects, like chefs, jealously guard their recipes, so that they can maintain a unique style to sell. The languages start out by being specialized, and hidden from the people; and then within the specialties, the languages become more private still, and hidden from one another, fragmented. . . .

Those few patterns which do remain within our languages become degenerate and stupid. This follows naturally from the fact that the languages are so highly specialized. The users, whose direct experience once formed the languages, no longer have enough contact to influence them. This is almost bound to happen, as soon as the task of building passes out of the hands of the people who are most directly concerned, and into the hands of people who are not doing it for themselves, but instead for others. So long as I build for myself, the patterns I use will be simple, and human, and full of feeling, because I understand my situation. But as soon as the few people begin to build for "the many," their patterns about what is needed become abstract; no matter how well meaning they are, their ideas gradually get out of touch with reality, because they are not faced daily with the living examples of what the patterns say.[54]

This, Alexander explains, is because "experts try to make towns and buildings which are adapted to people's needs, but they are always trivial. They can only deal with general forces, which are common to all men, and never with the particular forces that make one particular man unique and human."[55]

Central to the use of pattern languages is the concept of repair. For Alexander this is not an attempt to regain an ideal state, but rather to discover one. In this sense a building when built is at best a hypothesis, one that must be tested and modified by those who will use it. This is the "repair" to which Alexander refers. The pattern languages provide the medium through which building users can participate directly in the formation of environments to suit their activities:

No building is ever perfect. Each building, when it is first built, is an attempt to make a self-maintaining whole configuration. But our predictions are invariably wrong. People

use buildings differently from the way they thought they would. And the larger the pieces become, the more serious this is. The process of design, in the mind's eye, or on the site, is an attempt to simulate in advance, the feeling and events which will emerge in the real building, and to create a configuration which is in repose with respect to these events. But the prediction is all guesswork; the real events which happen there are always at least slightly different; and the larger the building is, the more likely the guesses are to be inaccurate. It is therefore necessary to keep changing the buildings, according to the real events which actually happen there. And the larger the complex of buildings, neighborhood, or town, the more essential it is for it to be built up gradually, from thousands of acts, self-correcting acts, each one improving and repairing the acts of the others. . . .

This goes vastly beyond the normal conception of repair. In the commonplace use of the word repair, we assume that when we repair something, we are essentially trying to get it back to its original state. This kind of repair is patching, conservative, static. But in this new use of the word repair, we assume, instead, that every entity is changing constantly: and that at every moment we use the defects of the present state as the starting point for the definition of the new state.[56]

Alexander writes further:

The prismatic buildings of our own time, the buildings built with the simple geometry of cubes, and circles, spheres, and spirals, and rectangles; this geometry is the naive order, created by the childish search for order. We happen to think of this order as the proper order for a building, because we have been taught to think so; but we are wrong. The proper order for a building or a town, which comes about when buildings are correctly fitted to the forces in them, is a much richer order, with a far more complex geometry. But it is not merely rich and complex; it is also very specific. And it will show itself, under any circumstances, where buildings are actually correct. Whenever anyone manages to make a building which is alive, it will have this specific character, because that is the only character which is compatible with life.[57]

The design-methods movement, as originally conceived, often led to a situation John Chris Jones terms "method over mind," in which slavish adherence to design-methods procedures removed all humanity — all thoughts and feelings — from the design process. In view of this Alexander is very careful to point out that the pattern language is not an end in itself, but rather is a means to an end:

This ageless character has nothing, in the end, to do with languages. The language, and the processes which stem from it, merely release the fundamental order which is native to us. They do not teach us, they only remind us of what we know already, and of what we shall discover time and time again, when we give up our ideas and opinions, and do exactly what emerges from ourselves. . . .

So paradoxically you learn that you can only make a building live when you are free enough to reject even the very patterns which are helping you. The more I watch our pattern language being used, the more I realize that the language does not teach people new facts about their environment. It awakens old feelings. It gives people permission to do what they have always known they wanted to do, but have shunned, in recent years, because they have been frightened and ashamed by architects who tell them that it is not

"modern." People are afraid of being laughed at, for their ignorance about "art"; and it is this fear which makes them abandon their own stable knowledge of what is simple and right.[58]

I have quoted at length from Alexander because he so clearly sets out his views on the nature and importance of pattern languages. In his analysis he demonstrates how the patterns now used by designers are oversimplified, solely based on geometry, and isolated from the needs and experience of users. In contrast, Alexander, in his pattern language, explicitly links the patterns of events that take place in a space — its use — with the patterns of space that house the activity, rather than focusing on geometry alone. The philosophy behind the pattern language constitutes a fundamental challenge to all of the mainstream design approaches that have emerged since modernism. Through use of the pattern language the design process is radically transformed; the principal benefit is that the people affected by designing become empowered to shape their environments for themselves.

DESIGN AS A RESPONSE TO THE WHOLE OF LIFE

Like Alexander, John Chris Jones reacted strongly against what became of design methods. To his regret, rather than improving design in practice, as he had originally intended, design methods became an overly rationalized, academic pursuit. In fact where the methods were used they often made things worse, eliminating intuition and imagination from the design process rather than encouraging them. Responding to what had become of design methods in practice, Jones wrote:

I have to admit that, where they have been used, new methods such as system-designing, computing, etc, have made life more rigid, more homogenized, less human. . . .

My thoughts about the subject have not changed since, in the late forties, I found myself drawn to find ways in which it might be possible to make the man-made world of machines and industrial living better fitted to human life. . . . But something has gone wrong. In ways that are clearer to me now than when I wrote [Design Methods] this wealth of new thinking seems not to have had the effects expected, at least by myself. Instead of being the means by which professional practices in design and other fields could be despecialized and made more sensitive to human needs the new methods have become convenient tools for larger and more rigid planning and have also become the means of making design into a barren academic subject removed from life, from the lives of those for whose benefit it's supposed to exist, ourselves as consumers and users of industrial products. More and more we recognise ourselves not as users of industrial life but as non-persons, tools, objects that are used by the system. What has gone wrong?[59]

Jones states further:

So to me now, as in the past, the purpose of seeking changes in methods not only in design but in all departments of life is to change the pattern of life as we make it, artificially and collectively, not to support the status quo and the inhumanization we inherit

but to permit the composing of a form of life that is free of the errors of specialization and of alienation. To make a way of living that is beautiful, (can laws be beautiful, can work, can millions of people act together as trusted friends not as distrusting manipulators of each other's lives?), to attempt the best we can imagine and to use all intelligence to make it real.[60]

Jones's beliefs, which led him to undertake design methods in the first place, have not fundamentally changed, but the nature and the scope of his work is now radically different. He writes:

Since 1968 I have found myself leaving most of what, up till then, I had been doing. I left design methods, feeling that it had become a rigid and inhuman activity, and I left academic life, at the Open University, feeling that that too had become rigid and inhuman. And now there are many critics of design methods, as applied to architecture, who imply that the rigidity came from the misconceptions of those, like myself, who foisted mechanical ways of thinking onto the architectural profession, which thus lost some of its freedom. The methods did not fit the mind. . . .

What I suddenly recaptured was the conviction that, whatever may have become of design methods in recent years, the original intentions of those of us who tried to improve design processes, ten or more years ago, was to respond to the connectedness of everything. To cease splitting life into fragments, particularly when it is people and the experience of life that is being fragmented. I realised that the intention of the new methods, (mine anyway, and I think its true of many others) was to overcome the limitations of professional procedures in all the design professions. Their inability to respond to life itself, which was becoming the object of design, as the extent of what is man-made grew and grew. . . .

Collective inventiveness, and intelligence: that seems to be the quality most needed in design, a quality without which the new design methods are ineffective. The ability to act on intuition, with suspended judgement. To risk, to enjoy, to learn from, the finding out of the extent to which one's picture of reality can change . . . that's not something one can do on a drawing board, or by computer simulations of behaviour. You have to live it. . . .

When I took leave of design I was reacting against what I called the "inhuman" use of abstract functional language to describe and fix life in the dreary and numbing formulae of design methodologists, environmentalists, ecologists, and others. Somehow, I felt, my friends, those with the good intentions of improving life, have become the enemies of mankind, of ourselves as persons.[61]

When I questioned Jones on his present view of design methods he said, "Forget the methods until you get the atmosphere right, then choose a method that fits *that*."[62]

Jones concluded that the failure of the design methods to affect designing positively, as had been intended, could be traced to the fact that the design methodologists themselves had not fully recognized that for design methods to be adopted the goals and nature of the design process itself would have to be changed — that the problems with design were not technical or procedural but rather personal and social. In reacting against design methods Jones left his job at the Open University and began independently to pursue experiments explor-

ing a wider view of design, "at the scale of modern life,"[63] a view of "designing WITHOUT A PRODUCT . . . as a process or way of living in itself."[64]

Since the early seventies Jones has been pursuing this radically expanded vision of the design process through experiments with the "time arts" — films, performance plays, poetry, fictions — and through exploration of new publication formats, such as photocopies, microfiche, and computer disks and networks, as means of using new technology in a personal way. He wanted to ensure that his work was no longer simply *about* design, but instead *was* design itself, a reflection of the ideas within it. It is important to recognize that Jones's new direction was not in fact a repudiation of design methods themselves, nor of the motivations behind them; rather it reflected a belated recognition of the social aspects of design that, ironically, had been the purpose of the movement initially.

Like Alexander, Jones in his current work is focusing more on the feeling, the atmosphere, brought about through the use of methods, rather than overtly addressing the methods themselves. Whereas Alexander, in developing the pattern language, focused on relating patterns of events to patterns of space for different scales of building tasks, Jones has abandoned the design of physical artifacts altogether, instead conducting personal experiments that explore new ways of living. Of this transition Jones writes:

If, as I think now, the main purpose of "the design process" is collective learning, the deliberate seeking of new ways of living, then we must expect to make changes in our processes and procedures (for this learning often takes the form of sudden insights). . . .

It is time that we begin to de-mechanize our lives, that we dismantle the monstrous extension of production methods to life itself, as if we, and everything else, existed only as a means and never as an end, never as something good in itself. In design, this undoing of the mistakes of our industrial past can begin, not by abandoning goals altogether, but by switching from fixed goals to variable ones.[65]

In his recent work Jones begins by changing his own mind, his own ways of working, his own way of living, rather than simply prescribing approaches for others to follow.

Earlier in his career Jones sought to overcome the limitations of engineering by taking up the then emerging field of industrial design. Upon recognizing the superficial, style-oriented nature of industrial design, however, he took up ergonomics as a means of more effectively accounting for user requirements in design. When his ergonomics data weren't incorporated into engineering designs, he developed design methods as a means of integrating rationality and intuition explicitly in the design process. From industry he went into education, first in a traditional setting, then in a potentially innovative one. Upon recognizing, with disappointment, what had become of the design methods movement, Jones retired to initiate his series of personal experiments in an attempt to make design responsive to life as a whole, as a means of transcending the fragmentation of experience common to industrial life:

Generally design seems to be becoming a social art and to do this properly it seems we need to learn from experimental artists whose happenings and other events are making art

a way of living. Both art and design at last seem like meeting, across the Cartesian split of mind from body, to enable us to find a new genius for collaboration not in the making of products and systems and bureaucracies but in the composing of contexts that include everyone, designers too. To be a part. To find how to make all we do and think relate to all we sense and know, (not merely to attend to fragments of ourselves and our situations.)[66]

In the early 1970s Jones began to study the work of experimental artists such as John Cage, whose work with chance processes constituted an attempt to erase the distinction between composer and audience. The element of chance in Cage's compositions makes everyone present both a listener and, in a sense, a creator of each piece. Similarly, Jones adopted the use of chance processes to open up his writing to influences outside his own intuition, as a means of bringing more of the world into his work. Jones uses, for example, the *I-Ching or Book of Changes*, an oracle that is essentially an interactive book of philosophy and that is consulted via chance process. Of this he writes:

Although, in using the *I Ching*, I've often had what seem, at first, to be magical coincidences, I've realised with much experience of the book and of using chance in composition, and in living, that what it does is to enable one to be aware of a mass of connections, between all we experience, that is hidden by our intentions. It's not that the oracle is uniquely the cause or trigger of what one then sees is happening: it is I'd say the means of losing the engrossment in one's purposes and thoughts that hides what is happening, makes one unable to look.[67]

Another chance technique Jones adopted from Cage is the use of random numbers as a compositional tool. While Cage advocates pure chance, or indeterminacy, Jones's application is more modest; he calls it "systematic chance" and uses it to select quotes, for example, from five different sources with which he has empathy for inclusion in a text. Sometimes he also uses chance to determine the placement of the quotes in the text, which results in "prepared pages" that frame and precede the writing he does himself. Jones always includes the relevant context for any quote selected by chance and will, on rare occasions, reject the results of the chance process. Though it might sound from this description as though the use of chance is simply the result of laziness or carelessness or mental bankruptcy of some sort, it can actually be a very enlivening process that is, according to Jones, "applicable to anything that has to be organized before one can experience it."[68]

Jones describes the process of using chance in composition:

I find, as always, during the tiny drama of seeing what comes next (which makes chance processes more interesting to operate than to see the results of) that I lose all ability to react to the words as a reader of the text I am composing. Even now, minutes later, it has a not-from-me quality that is nice, and a quality of nobody, me included, having been in on its composition, and so not yet having understood it, or "read" it in the sense of letting it form what meanings it can in my mind. The writer becomes a reader, no more informed than any other. That, I think, is very nice. Also the fact that anyone can do it, provided they have some sensitivity to the making of the initial decision of what to sample, what text or repertoire of items, and of what constitutes a unit of sampling.[69]

One of my students, Lew Neuman, composed a performance play using the method of chance processes developed by Jones. In this play, *A Revolution of the Senses: A Play on the Future of Design*, Neuman used chance to select from the writings of Jones, Andrea Branzi, and John Cage, as well as the artists Brian Eno and Christo, both of whose work will be discussed later. I was taken aback by the appropriateness of the "randomly" selected quotes that resulted from the chance process, as well as the aptness of their sequence and relationship to one another. I will mention too, because it is not always the case, that not only was the use of chance invigorating and enjoyable to Lew and me, but the audience for his play enjoyed it as well. When they were afterward told the process used many found it truly difficult to believe that it had not been composed in a traditional, meaning-oriented way.

Addressing the benefits of the use of chance Jones writes:

I suppose using chance processes is no different in principle than for instance deciding to use the sonnet form. What it does is to enable one to operate one's intuitions at a larger scale than usual, to compose using a far larger range of sources than is in one's memory, in detail, and is outside the capacity of one's word-producing-and-choosing process-skill to do itself. BUT, I find repeatedly, that after some hours/days/months of persistent and seemingly dumb-headed attempts at composing thus, one's intuitive process of word-and-thought-making-and choosing is much improved, more catholic, and one has learnt not to censor one's words etc and to accept as relevant much that one could not use before.[70]

Jones's recent direction has been heavily criticized by those who feel he has abandoned the cause of design methods, retreated into an individual backwater of insignificance, or simply gone off the deep end. And while it's true that Jones has made few concessions to ready intelligibility, either personally or through his work, it is equally true that his recent work has profound implications for the organization of postindustrial life, if one chooses to accept them.

Jones's focus now is on experimental living in which "design" is conceived of in the broadest sense — as a response to life as a whole. In a sense Jones's experiments with approaches to postindustrial living are analogous to William Morris's earlier attempts to find ways of coping with life in the industrial era. In comparing his expanded vision of designing to previous design research approaches, Jones writes:

Design research, in the sense of confronting "what is", does not tell us all we need to learn in deciding how to shape the new. My picture of the improved design research we need now is of experimental villages, cities, networks, etc, in which it *is* possible to explore and experience the social and personal changes that can accompany new products, systems and environments.[71]

3. From Product to Process Design

As has been demonstrated, the principal concern of most designers, whatever trend they associate themselves with, is the adherence to certain geometrical criteria. The designers' view is in sharp contrast to that of users, who are concerned with how well a design works. In short we may contrast the designers' view, which is static and object dependent — product based — with design users' requirements, which are dynamic and experiential — process based. John Chris Jones writes of the design professions: "As professionals . . . we are . . . tied to thinking of the product as central and the users as existing only in relation to what we provide. 'We are here to help the others: what the others are for I've no idea'. This is product-thinking, the not always laughable weakness of industrial life."[1] As long as the success criteria of designers and the public they are to serve differ so greatly there is little chance of design being successful.

Designers' efforts have not resolved the issues raised by industrialization but instead have worsened them. The piecemeal aggregation of designed objects, with little regard to their contexts of use or their aftereffects, has led to some of the most pressing of contemporary problems. The designs for automobiles, for example, are judged by criteria such as styling, performance, efficiency, and status-conferring power. Highway systems, parking lots, garages, and so on are developed independently to cope with the ever-growing number of cars. But the design of the elements of the system as products, as objects, in isolation from one another, has led to a range of problems that have not been adequately addressed. The most serious of these problems is traffic accidents, which claim roughly the same number of lives each year in the United States as were lost by Americans in battle during the whole of the Vietnam War (about 48,000). In addition, there are traffic jams and parking problems brought on by the inability of the system to cope with such an influx of cars. Further, the manufacture and operation of cars leads to pollution and resource depletion. So rather than providing a means of coping with industrialization, the billions of hours of product-design effort spent on the automobile have merely made matters worse.

Other examples of the failure of product-based design to provide an adequate response to industrialization abound, notably environmental pollution as an unforeseen (or disregarded) outcome of the industrial process. Another is the failure, as earlier demonstrated, of architects to provide comfortable, desirable housing — the deconstructivist architects have stopped even trying to do

so, constructing buildings to complement modern man's sense of alienation, as they see it. Perhaps, however, this alienation is not an intrinsic quality of the age, but rather results from living in a world that has been fragmented into individual products or things, a world that has been *objectified* with little regard to the connections — the *human* connections — that are, or should be, of preeminent importance in any design effort. As Jones writes:

At what point do we recognise that centralized designing ceases to be effective and becomes an obstacle, and not the means, to "good design". Surely there is such a point. I believe we have already passed beyond it and that it is time to rethink designing, design education, and the need for design professions, in relation to the growing dissatisfaction with technology, design, planning, and their effects. The new competence which the situation now requires is, I believe, not that of deciding the shape of a product of system but the shape of a new context or process in which everyone, not just designers or experts, is enabled to see what is needed of him or her if the form of industrial life is to get better, for everyone, and not worse. To arrive at this is not to continue to design but to do something at a different scale from that, the scale of the whole problem, the scale of decentral action, thought, imagination.[2]

If a single culprit can be blamed for the developments in design since industrialization it must be the two-dimensional scale drawing. The drawing allowed the immediacy of craftwork to slip away and replaced it with a means that was isolated both from the users of design and from the contexts of its use. Drawings permitted larger projects to be undertaken and a division of labor in the planning and making of things. The result of this was that almost all of the important design decisions were taken away from those with immediate knowledge of the product — users and makers — and given to someone who operated according to a static, geometric criteria — the only possible criteria against which to test the "success" of a drawing on the board. In craftwork, on the other hand, the medium of design and its object were the same, they could be tested in the actual context in which they were to be used via trial and error to ensure a "goodness of fit" with both context of use and users.

Goodness of fit was not realized, nor even attempted, in the design of the industrial era. In recent years the flaws in the design process since industrialization have become increasingly apparent. The failures of the industrial design process have been further highlighted by the emergence of new, postindustrial design tasks, such as the design of computer software, to which the design methods of the industrial age, such as drawing, are totally inapplicable. The new postindustrial design tasks are increasingly process-oriented. The focus of the new tasks is on the dynamic experience of users, not on product design per se. As we have seen, companies are increasingly trying to develop products that are more responsive to users, in which user wishes are of foremost importance, realizing William Morris's vision of making technology the servant and not the master of people. In Japan, for example, "humanware" products are now evolved by interdisciplinary product planning teams that concentrate on adapting products to the lifestyle of design users, rather than having a single designer present his or her intuitive "creation" as a fait accompli.

Clearly a new approach to design is needed — one in which the world is viewed not as an aggregate of ill-fitting objects, but rather as a collection of dynamic processes centered on the experience of people. In place of drawings, there must arise a way of looking at how all the objects produced fit together in the widest sense — in their context of use and with their users. Design research was developed to address the perceived failures of the industrial-design process, but most design-research approaches have been ineffective, failing to provide workable alternatives to existing design processes. The design-methods movement, though itself a failure, contained within it the seeds of a new, user-sensitive approach to design. The two founders of the movement, Jones and Alexander, have, in rather different ways, done the most to develop the ideas implicit in the original design-methods movement.

Through the development of the pattern language, Alexander has provided a tool directly applicable to environmental design, which explicitly links the activities that take place in a space — the patterns of events — with the physical forms in which the activities are housed — the patterns of space. Alexander's purpose is to overcome the exclusively geometrical focus of the industrial-design process, to transcend the limitations of design-by-drawing as a design method, and to permit collaboration by everyone, designers and nondesigners alike, in the design process.

Jones, on the other hand, in his recent work has rejected the design of artifacts altogether, choosing to pursue instead "intangible designs" in which the design of experience over time is itself the focus. As noted earlier, Jones believes that the chief failure of the design-methods movement was the failure to change the aims of the design process, the failure to question whether products need always be the outcome of the design process. Through his individual experiments with what he terms "design in space and time," in which he adopts methods from avant-garde artists, Jones demonstrates that designing need not always be linked to the planning of products or objects.

As seen from the failure of the design philosophies since industrialization, and in view of the post-design-methods developments of Alexander and Jones, the product orientation in design is of increasingly limited usefulness. We have reached a major juncture: the nature and purpose of the design process are changing. "Design" itself is being redefined in terms of design users' experience, not geometrical criteria.

Jones began his book *Design Methods* with the question "What is designing?" He reviewed a range of definitions and concluded at that time that design was "the initiation of change in man-made things."[3] But even then he noted, "The objectives of designing become less concerned with the product itself and more concerned with the changes that manufacturers, distributors, users, and society as a whole, are expected to make in order to adapt to, and benefit from, the new design."[4] Similarly in *Notes on the Synthesis of Form* Alexander wrote that "the ultimate object of design is form,"[5] though when Alexander speaks of form he means one that is well fitted to the context in which it is used. Nonetheless, these definitions reflect the limited view with which the founders of the design-methods movement began.

Following his experience with design methods Jones radically altered his own thinking:

A potter modelling a piece of clay into the "perfect" shape for a cup is an ancient, and I think unhelpful, metaphor for the process of designing. When design was limited to the shaping of objects it perhaps sufficed, but now, when the scale has grown to that of systems of objects, and the activities of people, the metaphor has become destructive. We are not clay, not infinitely malleable, not dead. What is the right metaphor now?[6]

Hints of what he believes the right approach might be are given in the course book he wrote in collaboration with Chris Crickmay:

What I shall describe here is a view of *what design might be like if applied in a wider context than it is now.* In so doing I feel that I have brought from design something that could make all activities imaginative, perhaps the quality they have lost most through industrialization. In fact the end result of the process may well be constructive inaction rather than destructive action, because a major intention is to avoid doing the wrong thing in the wrong place at the wrong time.[7]

Recall that the Bronx Development Center was, according to one informed observer, "the wrong concept at the wrong time in the wrong place"[8] and the need for a new, wider, and more user-sensitive conception of design becomes clear.

In the preface to his book *Designing Designing*, which recorded the results of the first decade of Jones's individual design experiments, he notes:

In my earlier book [*Design Methods*] I defined design as the initiation of change in man-made things. Looking now at that definition I still like the emphasis on change but not the assumption that design is limited to the thinking of a few on behalf of many. Nor do I like the assumption that it is to do with change in things but not in ourselves. In my re-thinkings of the nature of design in these pages I have moved far from the picture of "it" as the specialised activity of paid experts who shape the physical and abstract forms of industrial life which we all as consumers accept or adapt to. That notion cannot possibly last for ever — it's too limiting, too insensitive to the reactions it provokes. It's too inert. Designing, if it is to survive as an activity through which we transform our lives, on earth, and beyond, has itself to be redesigned, continually. As do all the other false stabilities, ideas of order, which we inherit or construct, as stepping-stones, no more, useful as they may be at this moment. The turning of creative activity upon itself, attempting to change its nature, our own, is to me the most surprising, the most promising, of the changes to be noticed now, not only in design but as a general tendency.[9]

Citing examples of the new conceptions of design, Jones writes:

Alongside the old idea of design as the drawing of objects that are then to be built or manufactured there are many new ideas of what it is, all very different:

designing as the process of devising not individual products but whole systems or environments such as airports, transportation, hypermarkets, educational curricula, broadcasting schedules, welfare schemes, banking systems, computer networks;

design as participation, the involvement of the public in the decision making process;

design as creativity, which is supposed to be potentially present in everyone;

design as an educational discipline that unites arts and sciences and perhaps can go further than either;

and now the idea of designing WITHOUT A PRODUCT, as a process or way of living in itself . . . (a way out of consumerism?)

I suppose there are other views too but these are enough to let one see how quickly the notion has been changing and how far-reaching are its newer implications.[10]

The term *design* itself becomes problematic when discussing these new views of design. As Jones writes in the revised edition of *Design Methods:*

The word "design" is a big obstacle to understanding what this book is about. "The design of WHAT?" people ask, when they hear of it, and look a little incredulous when I tell them that it is supposed to be about the design of "everything". This reply is misleading because it implies that design methods are intended only for the design of "things", physical objects, and are a substitute for the specialized knowledge and skills of architects, engineers, industrial designers, etc. It is truer to say that design methods are intended for the design of "all-things-together", the "total situation" as I called it in the original introduction, meaning the functions and uses of things, the "systems" into which they are organised, or the "environments" in which they operate. These larger entities, which are hardly "things" in that they can seldom be touched, or seen-as-a-whole, are what I mean by "intangible design". But they are, more so than the objects and products within them, the operating wholes of which modern life is being formed and made: traffic systems, computer software, educational programs, hypermarkets, etc. This is the scale of design today. . . . The change in scale, from physical objects to intangible systems and environments, is also a change from designing-in-space to designing-in-space-and-time."[11]

The principal transition in this new focus for the design process — the broadening of the definition of design — is from a concern with products to a focus on processes. As Jones writes:

The shift from the idea of "progress" (towards a goal, a product) to the ideas of "process" (as all there is) is surely a main event of the twentieth century, in all fields of endeavour. The design methods movement can be seen as our modest version of this historic change ("us" being designers, architects, engineers, etc). The change, in physics, was from the idea of space, time, atom, etc, as finalities, as objects, to seeing them as mobile processes, events. In art, the fixities of "object", "meaning", etc, were abandoned for the notion of "the act of painting" or "the act of looking at it" as being the "art". So far, in design, we have gone only part way (no doubt because in changing how we act, we affect not only perceptions and ideas, but also the technologies upon which everyone relies). We've changed from "planning product" to "planning process" but we've yet to admit that designing could become not goal-seeking but shared imaginative living, end-in-itself.[12]

Whereas product planning or "design in space," with its static, geometrical criteria, was the focus of the traditional design process, planning process or "design in space and time" necessitates consideration of users' dynamic experiences. Jones counsels, "At this point designers need to acknowledge their relative ignorance of 'temporal design' and can perhaps learn from the 'time arts'

(music, dance, theater, film, novel, poetry, etc) how to compose-in-time with some sense of beauty,"[13] as he himself has done in his own work.

Jones's views constitute a fundamental challenge to design as we know it, but he is not alone in suggesting that "design" itself must be redefined, and he is not alone in his belief that the proper focus of the design process is users' experience, not physical form. Ralph Caplan, for example, says of the work of Charles and Ray Eames:

To me the most interesting and most sanguine of contemporary design movements is the shift in design attention from objects to situations. The shift is subtle, a matter of empha-sis rather than a new departure. For Charles and Ray Eames it is simply the continuation of their approach to problems. For a while the problems they dealt with were solvable by objects. When they shifted their interest to problems that were not solvable by objects, they began making films.[14]

In addition to the recognition of the changing focus of design, Caplan's quote reveals that for this transition to take place the methods and processes of design will themselves have to change.

Similarly, in discussing the work of the Italian radical architecture move-ments in the 1960s, Andrea Branzi writes:

Mistrust of architecture and the instruments of planning was growing; the now open cri-sis in the Modern Movement came to be seen as a final day of reckoning, symptom of mortal illness in a discipline that, born as the most advanced point of the system, had become its most backward sector. We even began to ask ourselves whether present-day society was still dealing with the problems of managing its own urban and territorial form through architecture, or whether this historical role had not now been taken over by other instruments and other disciplines.

It had been discovered that doing architecture did not just mean making houses, or con-structing useful things in general, but signified expressing oneself, communicating, arguing and freely creating one's own cultural habitat, according to the instinctive right that every individual has to create his own environment, but from which the division of labour in soci-ety had totally alienated him. Doing architecture became an activity of free expression, just as making love means not just producing children but communicating through sex.[15]

The belief in the preeminence of process also underlies Christopher Alexan-der's work with the pattern language:

For once we recognize that much of what we think of as an "element" in fact lies in the pat-tern of relationships between this thing and the things in the world around it, we then come to the second even greater realization, that the so-called element is itself nothing but a myth, and that indeed, the element itself is not just embedded in a pattern of relationships, but is *itself* entirely a pattern of relationships, and nothing else. The patterns are not just patterns of relationships, but patterns of relationships among other smaller patterns, which them-selves have still other patterns hooking them together — and we see finally, that the world is entirely made of all these interhooking, interlocking nonmaterial patterns.[16]

Alexander maintains that the characteristic of the timeless way of building, the quality without a name:

cannot be made, but only generated by a process. It can flow from your actions; it can flow with the greatest ease; but it cannot be made. It cannot be contrived, thought out, designed. It happens when it flows out from the process of creation of its own accord. But we must give up altogether the idea that it is something we can capture, consciously, by working over drawings at the drawing board.[17]

This process can be brought about through the use of a pattern language, which:

guides the acts of all the individuals there in such a way that every act of building, and each smaller act which seems more modest too, is guided by the patterns in the language which are necessary to it, and gradually generates these patterns, day by day, continuously, so that this place is kept alive, continuously, by the gradual process of creation and destruction. It is not the end product of this process which is alive, but the incessant flux itself. There is no product of this process: the buildings and the town, which live, are that incessant flux, which, guided by its language, constantly creates itself.[18]

Jones writes similarly:

So . . . building is a form of living and living is a form of building. That's one way of realising that there are no products, no fixities, only continuous flux. And that designing, making, and using are all processes that are added to, and interact with, the natural processes of the places where these activities occur.[19]

The transition from product to process design is analogous in many respects to the difference in world view reflected in the English and Chinese languages. As Alan Watts writes, "In English the differences between things and actions are clearly, if not always logically, distinguished, but a great number of Chinese words do duty for both nouns and verbs — so that one who thinks in Chinese has little difficulty in seeing that objects are also events, that our world is a collection of processes rather than entities."[20] As with the Chinese understanding of their world, there is an increasing need, in the postindustrial era, to recognize that products do not really exist in isolation from the processes of use that give them their value and meaning. The world of design, like the Chinese world, now needs to be seen as a collection of processes, rather than of products.

In addition to the existing design problems of the industrial age cited earlier, new, postindustrial design tasks, such as computer software, can more usefully be viewed through the experiences of design users, rather than in terms of objects' physical characteristics or the technology involved in them. Jones reinforces this point:

Aims, purposes, requirements, functions: these are words for how we see what's needed. But when we name we tend to exclude the main part, the least predictable: ourselves, our minds, and how they change, once we experience something. It's ourselves, not our words, that are the real purpose of designing. The biggest mistake is to take the product alone as the aim. It's always secondary, always a means, to process, to what we're doing now or will be doing later.[21]

In place of the traditional, object-oriented conception of design, a proliferation of definitions of design has arisen in which the words *design* and *designing*

are qualified in terms of the intention behind design. No longer is designing seen as a unitary activity for the planning of objects; rather the new and varied definitions of design reflect the multiplicity of possible outcomes of the design process and, more importantly, the way in which users' experiences are accounted for in the process.

The proliferation of definitions, or qualifications, of design is perhaps analogous to the range of terms for different qualities of consciousness that are central to the philosophy of Yoga. The more intimately one is acquainted with a phenomenon, the more nuances of meaning can be distinguished. So as user experience becomes more central to designing, the quality of that experience can be more fully identified. As in Yoga itself, a central theme for the new definitions of design is *awareness* — the awareness of the processes, implications, and outcomes of designing — design users and contexts included. Within the disparate new approaches to design I have identified three distinct trends, all derived from Jones' work: collaborative design, contextual design, and intangible design.

Collaborative design does not simply constitute the participation of users in a designer's process, nor is it collaboration solely among designers; rather it is a means through which designers and nondesigners alike may participate as equal partners in the design process, shaping not only the outcomes but the aims of designing as well. Jones writes of the relationship of design methods to collaborative design:

I think this is the crux of the matter: the new methods *permit* collaborative designing whereas the old methods do *not*. They change the nature of designing, or can if one lets them. The essential point is that the new methods permit collaboration before "the concept", the organizing idea, the back-of-the-envelope sketch. . . . The new methods, properly used, release everyone from the tyranny of imposed ideas and enable each to contribute to and to act upon, the best that everyone is capable of imagining and doing. This is not easy. It requires not only new methods but a new conception of self.[22]

Contextual design is the design not of objects themselves but rather of contexts — dynamic conditions or situations. The term *contextual design* as used here is distinct from the more limited use of the term by some postmodern architects in their attempt to fit their work into its surroundings. Contextual design is done as a catalyst to user experience, usually aesthetic experiences. Jones writes of contextual design:

It is unlikely that "design participation", the sharing of the process of design with those affected by its results, will make much difference until the nature of designing itself is changed, e.g. by transferring *responsibility* from designers to makers and users. Such a change is happening spontaneously in computing, where software designers are also the makers, and can be users too. It has happened intentionally in music, where some composers have given up control of the sounds to be heard when performers react to scores which do not indicate notes, or tempo, but perhaps only duration, type of instrument, or state of mind. "The composer becomes a listener" as John Cage says. So does the performer. And the audience has to be far more creative than it was before. "But this is not

music" say the critics. It is, if you accept that we are capable of changing our minds, of learning to enjoy sounds which formerly we'd have ignored, beauties unexpected. I believe that this big shift in the responsibilities of composers, performers, and audiences is a good model of what is needed now in design: a change *from* the specifying of geometry, physical form, *to* the making of a context, a situation, in which it is possible for others, for us all as users, makers, imaginers, to determine the geometry ourselves. It requires a new tradition, a new sensitivity, and much learning by everyone.[23]

Intangible design is design in space and time of experience itself. In collaborative design designers and nondesigners participate equally in the process, and contextual design verges on pure art, but with intangible design users' experience becomes the focus of the design process. Objects may be part of an intangible design, but they are secondary to it. Intangible design is particularly relevant to the emerging postindustrial design tasks. Jones writes of the relevance of *Design Methods* to intangible design:

This central new idea of widening the design process means that you don't use the process for the same things as you use the old process for, you don't actually use these new methods for designing buildings. There's very little in that book about designing buildings, it's mainly about designing intangible things. Design an educational system, a traffic system. A traffic system has hardware in it, it has streets and buildings and cars and things, but the essence of it is the movement, which is somewhat intangible. You're designing the movement.[24]

The protagonists of each of these trends have tended to develop methods of design beyond drawing as necessary to suit their individual circumstances. The design tasks undertaken and the methods developed will be investigated in the sections that follow with a view to better understanding the philosophical and methodological basis for these new trends in design; approaches in which the processes of peoples' experience, not physical objects alone, are the motive for design activity.

Here we see Kroll changing the design process from one of simple consultation to one of active participation. Kroll set out his philosophy of design in an article titled "Soft Zone":

Generally, architects are the sole masters in their specialty and consequently believe that they know enough about this subject and absorb themselves in fashioning and embellishing the "architectural object" without imagining the behaviour this will impose on its inhabitants and without experiencing, even through study groups, the unanimities, the contradictions, the incompatibilities from which a complex *milieu* is woven.[11]

As an alternative to traditional design approaches that effectively ignore user behavior, Kroll recognized the need for and importance of user participation in design, introducing his modular modeling system to better enable laypeople to become involved in the design process.

Not surprisingly, with his rejection of the "architect knows best" philosophy, Kroll and his work have received a great deal of criticism. Geoffrey Broadbent, for example, writes that the net result of user participation in the design of the buildings at Louvain is

. . . gross discomfort for those who have to use these buildings. Yet the rich and intricate forms in which they are conceived could have been turned by Kroll himself to maximum environmental advantage — *if* he had possessed, and insisted on exercising, the necessary expertise. Instead of that, his insistence on total participation — for the best of possible motives — has resulted, sadly, in buildings which are *less* acceptable to their users than they could have been if a well informed architect had exercised his personal skill![12]

Broadbent's comments must be interpreted in terms of his belief that design professionals are uniquely qualified to shape the built environment. He has written:

Like all professionals, architects and planners have particular responsibilities. Our job is to look at humanity, to look at the environment in which humanity finds itself, and to find ways of reconciling the two. By becoming architects we have chosen to affect this reconciliation between the needs of those people and the environment through the medium of making buildings.[13]

In contrast, the designer who seeks to bring about meaningful user involvement in the design process must undergo a change of role and self-image. This change is not an abdication of responsibility, but a change from actively to passively shaping the outcomes of designing. Kroll, for example, defined a structural grid and then initiated the participatory process that determined the overall building shape. In his work we see an increasing focus on the process and effects of design, with less emphasis on the properties of the designed object. It may be true that Kroll's building wasn't fully successful from the users' point of view, as Broadbent suggests, but this perceived failure is not intrinsic to user involvement in design, as he also seems to imply.

Christopher Alexander, for example, has sought to embody the expertise that Broadbent claims is required for design in his pattern language. Alexander observes that through use of a pattern language people, any people, can understand and effectively participate in a design process:

A person with a pattern language can design any part of the environment. He does not need to be an "expert." The expertise is in the language. He can equally well contribute to the planning of a city, design his own house, or remodel a single room, because in each case he knows the relevant patterns, knows how to combine them, and knows how the particular piece he is working on fits into the larger whole.[14]

Alexander and his team have applied the pattern language to a wide variety of tasks, including clusters of low-cost, self-built houses in Peru and Mexico, a café in Austria, a college campus in Japan, and a number of offices and single-family dwellings in the United States.

Most so-called "design participation" schemes that have been reported in the literature consist simply of, as Charles Jencks notes, "one-sided consultation with those being designed for: they could see the plans beforehand, but didn't have the expertise or power to propose viable alternatives."[15] Such was the case with Ralph Erskine's Byker project. True collaborative environmental design, on the other hand, necessitates a fundamental change in the design process, and in designers' roles within it. Instead of imposing a formal solution, the designer in a collaborative process sets up the circumstances, for example through the use of models or a language, through which nondesigners are able to participate directly in the design process. It is essential, as John Chris Jones points out, that user involvement take place *before*, not after, concept fixing, even in sketch form, takes place. To a greater or lesser extent this was the case in my applications of modular scale models, and in Kroll's, as well as in the work of Alexander's team.

CHANGING ROLES, CHANGING AIMS

The importance, the necessity, of user involvement in architectural design is clearly set out by Christopher Alexander: "It is essential that the people of a society, together, all the millions of them, not just professional architects, design all the millions of places. There is no other way that human variety, and the reality of specific human lives, can find their way into the structure of the places."[16] But, as John Chris Jones points out, "To share the design process with users is not as easy as it sounds. It needs a change of roles, of self-images, on both sides."[17]

It is precisely this changing of roles that is an essential precursor to any collaborative designing. Jones develops this thought by further noting:

As larger groups begin to work together in design, we need not only looser roles but more public ways of thinking aloud. More visible design processes so that everyone can see what is being decided, and why, *before*, not after, the main decisions are made. Collaboration before concept-fixing is perhaps the main strength of the new design methods. The other strength is to provide means of *un*learning, publicly, with changing, not fixed, self-images.[18]

As designers make this transition, the aims and purposes of designing themselves change. In the case of successful collaborative environmental design, the

principal focus of designing is on user experience and the process of collaboration itself is seen to have value. Put another way, with collaborative design the "software" aspects of environments — use, perception, and experience — take precedence over the "hardware" aspect — physical form.

The experience of collaboration, and the attention to people's activities, wishes, and desires, suggest new dimensions of designing, many of which are independent of physical form altogether. This seemingly radical notion is termed "contextual design" by Jones. Contextual design represents an attempt to design explicitly for user perception and experience; the means chosen for designing depending on the experience sought. This approach to designing will be examined in detail in the following chapter.
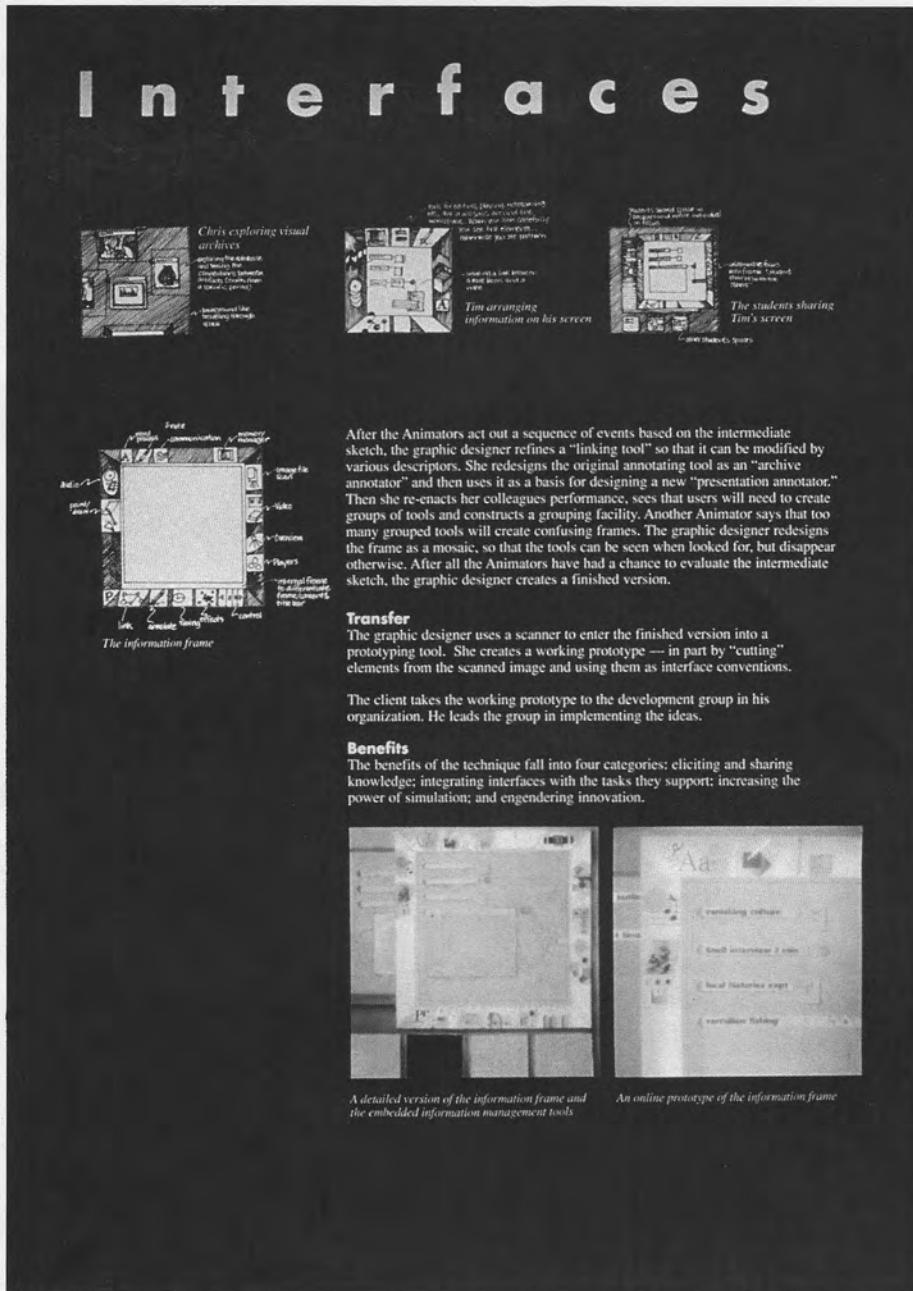
Exploratory Design Lab. "Animating Interfaces" project presentation. In this project, EDL set out principles for the design of an animated interface.

Chris exploring visual archives

Tim arranging information on his screen

The students sharing Tim's screen

The information frame

After the Animators act out a sequence of events based on the intermediate sketch, the graphic designer refines a "linking tool" so that it can be modified by various descriptors. She redesigns the original annotating tool as an "archive annotator" and then uses it as a basis for designing a new "presentation annotator." Then she re-enacts her colleagues performance, sees that users will need to create groups of tools and constructs a grouping facility. Another Animator says that too many grouped tools will create confusing frames. The graphic designer redesigns the frame as a mosaic, so that the tools can be seen when looked for, but disappear otherwise. After all the Animators have had a chance to evaluate the intermediate sketch, the graphic designer creates a finished version.

Transfer
The graphic designer uses a scanner to enter the finished version into a prototyping tool. She creates a working prototype — in part by "cutting" elements from the scanned image and using them as interface conventions.

The client takes the working prototype to the development group in his organization. He leads the group in implementing the ideas.

Benefits
The benefits of the technique fall into four categories: eliciting and sharing knowledge; integrating interfaces with the tasks they support; increasing the power of simulation; and engendering innovation.

A detailed version of the information frame and the embedded information management tools

An online prototype of the information frame

Much of the intellectual stimulus for these transparency concepts has come from Rheinfrank's association with the Institute for Research on Learning, and in particular Etienne Wenger and John Seeley Brown.

Because of the highly situated nature of the design tasks EDL undertakes it is very difficult to generalize from one project to another. Reporting on the firm's work is further complicated because many of their ongoing projects are confidential. Two key aspects that seem to be common to all of EDL's work, however, are their use of design languages and of physical prototypes. Not surprisingly, John Rheinfrank cites Christopher Alexander's pattern language, with its explicit link-

age of patterns of events to patterns of space, as an influence on the group's work. In fact EDL collaborated with Alexander's Center for Environmental Structure on a "Future Workplace" project for furniture manufacturer Haworth.

More surprisingly, perhaps, EDL always construct physical prototypes that embody their design ideas in order to begin a dialogue of response from people. In discussing this I commented to Rheinfrank: "It seems that all of your projects are conceptual, but they are not abstract. To me that's the big surprise. The net result of that is there is no applicability gap, as present in much early design research which was done in the abstract and never applied. It seems you never do anything in the abstract even though it's all highly conceptual."[9] He responded, "That's right, it is highly conceptual. It's about re-registration, but at the end of the day it's very concrete. There may be abstractions used as explanations and as kinds of tools, but they are very quickly replaced by models or by sketches or running prototypes."[17]

I further observed: "I suppose another thing that I'm surprised about is that these complex processes, and the social understanding behind them, can be so readily embodied in objects. I would have thought that the object would have left out some of these things, but I guess that's the key to what you're doing, to make sure that they are built in." To which he replied, "Yes, and it actually is one of the most difficult parts of what we're doing, to make sure that they are present, essentially that the representations embody the conceptualizations."[18]

EDL's work with transparency provides a concrete example of how designing can be turned inside out, through the tailoring of the tangible aspects of designing — form, materials, and technology — to the intangible processes of experience and use. The implications of this transition for design are profound. As Rheinfrank and his co-authors write, "These new understandings are leading to a re-registration of attention to user-centered as activity-oriented design — design that enables people to work, play, learn and engage in other activities as fully as they possibly can."[19]

SOFTECNICA

As John Rheinfrank noted of his work on transparency in design, the newly emerging information technologies provide an opportunity, should we choose to act on it, to change the relationship between people and machines radically. With the advent of firms such as EDL, it seems that the nature of technology, and in consequence the nature of designing, may finally be changing, becoming more responsive to the dynamic processes of user experience. John Chris Jones has addressed this theme since his earliest writings in the 1950s, theorizing about ways of softening the impact of technology, making it more responsive to people instead of, as has largely been the case, forcing people to adapt to the requirements of technology.

Jones uses the term *softecnica* to describe a condition in which technology explicitly supports user activities:

REDEFINING DESIGNING
From Form to Experience
C. Thomas Mitchell

Redefining Designing: From Form to Experience offers a comprehensive new theory of design in which user needs and wishes are central. This landmark work focuses on design in terms of human experience rather than physical form.

The book offers a highly critical study of design philosophies that have emerged since industrialization: modernism, late modernism, postmodernism, and deconstruction. C. Thomas Mitchell points out how many designs, particularly in architecture, fail to suit their intended purpose — not because of their style but because of the design process itself.

Mitchell then reviews user-responsive design methods, which he calls "design turned inside-out." He explores collaborative, contextual, and intangible design, and cites examples of each. International case studies illustrate up-to-the-minute topics such as "humanware," softecnica, the pattern language, and soft design. Also featured is an interview with Brian Eno and graphic work by artists Christo and Robert Wilson. Many never-before published illustrations enhance the book throughout.

A broad synthesis of new thinking on design, *Redefining Designing: From Form to Experience* will be of great interest to a wide range of professionals, including architects, planners, and landscape architects, as well as product, interior, and industrial designers.

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