85 On Displacement, Blind Immediacy, and the Fallacy of Misplaced Concreteness: Review of Design (plus) Research Conference, Politecnico di Milano, May, 2000

Keith Russell. On Displacement, Blind Immediacy, and the Fallacy of Misplaced Concreteness: Review of Design (plus) Research Conference, Politecnico di Milano, May, 2000. *Design Issues*, Volume 17, Number 1 (January 1, 2001), pp. 85-90

Statement of Editorial Policy

Beginning with the current volume, *Design Issues* expands to become a quarterly publication. This represents a milestone for the journal, reflecting the growing community of writers and readers who want to learn more about the field of design and contribute to its thoughtful development. The editors would like to take advantage of this opportunity to look backward as well as forward in explaining our editorial policy and the vision and direction of the journal.

Developments in design practice, research and scholarly inquiry over the past decade have done little to change our belief that a common forum is needed for serious discussion of the nature of design and its place in contemporary culture. With the proliferation of special interest groups and the growing number of specialized professional and scholarly conferences and journals around the world, we believe there is an even greater urgency to provide a forum for discussions that contribute to the formation of a design community.

Special interest groups are an important part of the field of design, and many have formed over the years. They usually take shape around a particular problem or around a particular approach or philosophy. The special interest serves as the bond and creates the association. But associations come and go as interests are served and as interests move on in new directions. The idea of a community is something different. It embraces the diversity of associations and special interests that are its constituent parts, but it is more than the sum of such differences. It is the shared commitment to a collective enterprise and to long-term goals of greater understanding and accomplishment. As the philosopher John Dewey argues, a community forms around common problems; it encourages individuals to explore those problems in many ways; and it prizes communication among its diverse members so that the constituent elements of the community may be clarified and enhanced.

Building a design community from such diversity of associations is a great challenge. We hope that everyone who participates in associations and special interest groups will remain mindful of the long-term value of building and exploring connections among all of our diverse groups. To this end, *Design Issues* will continue to offer a forum where diverse interests may come together in an exchange ideas and of the results of inquiry. We believe this will properly support the development of the design community as a whole. Building bridges among diverse kinds of design thinking is our goal.

This goal is expressed in the two features that have become the signature of *Design Issues*. First is a mixture of history, criticism, and theory among our articles. From the beginning, the editors reasoned that all three forms of reflection are needed to advance design, because any one kind, if it existed in isolation from the others, could not provide an adequate understanding of a subject so complex and important. The formations of a strong design community depends on *historical* reflection on where design has been, *critical* reflection on where design is at present, and *theoretical* reflection on the assumptions and possibilities for what design may become in the future. This will remain one of the signatures of the journal.

Second is a belief in the importance of pluralism for our field. From the beginning, the editors believed that the collective understanding of design is best advanced through the challenging interplay of contrasting perspectives, approaches, and assumptions. Developments over the past decade have only strengthened our conviction that the field of design will grow best by recognizing and actively cultivating the diversity of perspectives that is one of its central characteristics. This, too will remain one of the signature of the journal.

To understand our editorial policy, consider the kind of writer and reader we hope will participate in *Design Issues*. We seek writers who are curious about design and see their work as a responsible exploration of the subject. They may be designers, design educators, scholars of design, or individuals from any discipline or professional background who want to explore a facet of design. They will be individuals who value not only the concrete experience of design as feature of human culture, but who also value the challenge of expressing the assumptions that lie behind the work of designers, the objects created by designers, and the efforts of those who study design. In short, they will be men and women who pose exciting and challenging questions about design and seek reasonable answers, drawing on whatever evidence, disciplinary knowledge, or inspiration they regard as appropriate.

In turn, we will invite these writers to imagine their readers as people who are passionately interested in design and want to read clear, reasonable discussions of the subject that may shed new and unexpected light on one of the most perplexing and influential features of the contemporary world. These readers may be professional designers, design educators, scholars of design, or experts in some other discipline related to design. They may be museum curators, students, or general readers. Their original interest may be graphic and communication design, industrial and new product development, engineering design, or any of the new areas in which design has been systematically applied in recent years, such as information design, exhibition design, human-computer interaction, experience design, retail and other interior environmental design, robotics, virtual spaces, interface, software, or interactive media. But

most of all, they will be readers who seek an alternative to the short, thin, and sometimes self-promoting articles that have become too common in many commercial design publications in the United States and abroad. Clearly, we recognize that *Design Issues* is not intended for everyone. Our readers are those who seek relevant connections to their own work in any discussion of design and who do not mind wrestling with unfamiliar subjects or ideas.

As editors, our primary test in selecting manuscripts is simply this: "Why should anyone interested in design read this article?" The answer, for us, must be that it contributes to the understanding of the conception, planning, and making of the cultural environment—an environment of graphic images and symbols, industrial products, services and activities, and systems shaped by designers to support the activities of men and women in all walks of life. The understanding may be historical, critical, or theoretic. It may be derived from the experience of designing or the fruit of scholarly research. It may focus on the classic expressions of graphic or industrial design or on one of the many new areas of design application and technology. It may probe issues of design education or the display of design in museums. It may address problems of design policy and management in corporations or the difficulties of integrating marketing, engineering, and design in product development. It may seek to clarify the subtle problems of information design and the new blending of words and images found in many areas of design. It may examine the career of products in everyday life. It may even address aspects of architectural design or urban planning—provided that ideas about design emerge in a form that is potentially useful to all designers and those who seek to understand design.

The identity of *Design Issues* does not lie in the limits of one branch of designing. Nor does it lie in an area of professional or academic specialization illustrated by any one of our contributors. Nor does it lie in a signature style of writing and reasoning that excludes contributions from individuals of different backgrounds. Instead, the unity of the journal lies in the judgment of the editors that these articles contribute to the advance of design in practice or in study.

But who shall judge our judgment? The first judge will be our readers. Please tell us what you like and do not like about the journal. And also tell us where you think the journal *should* be headed if it is to successfully pursue the changing character of design in the contemporary world. The second judge will be our Editorial and Advisory Boards, comprised of distinguished individuals who represent alternative perspectives and excellence along the wider path that *Design Issues* seeks to explore. And the third judge will be time. Time will tell what work has really made a difference in the understanding of design.

As at the founding of *Design Issues*, we continue to believe that a forum is urgently needed for serious discussion of the role of design in the contemporary world, and we want this journal to be the best forum available today for thoughtful reflection.

Richard Buchanan
Dennis Doordan
Victor Margolin

Introduction
Rethinking Design

Back in 1996, the Department of Art and Design at the University of Alberta was one of three successful recipients of funds from a (then) new government program designed to support new educational initiatives that promised increased enrollments and job prospects for the graduates. The success of the Department was based on its new Bachelor of Design degree with Pathways. We had moved recently to the new degree denomination, leaving the Bachelor of Fine Arts for the students who concentrated on fine arts subjects. We thought there was confusion in the province about the expertise in design that the BFA stood for, given that students majoring in Painting, Printmaking or Sculpture, came out with the same degree—and often sought similar jobs—as students concentrating in industrial or visual communication design.

Once the new denomination was accepted (it took twelve years to convince the administration) we looked at the changes that had occurred in our understanding of the profession and decided that two fundamental educational moves were necessary: first, we needed to recognize the interdisciplinary nature of design and act on this recognition through becoming associated with other departments and faculties in the university. Second, we wanted to provide possibilities for a number of different students, with different talents, to study different aspects of design. As a consequence of this, pathways were created so that students in the Bachelor of Design program could take between thirty and forty-five percent of their credits in other departments. These "pathways" are offered by Computer Science, Engineering, Business & Marketing, Social Sciences (Anthropology, Psychology and Sociology), and Printmaking. This new administrative structure was the consequence of recognizing the importance of methodological, contextual and technical aspects that required more attention than what had been the case in traditional design education.

The need to develop and articulate our conception of design education in this new ground, made us earmark part of the funds received for the creation of a series of lectures by recognized local and foreign design theorists, educators, and practitioners. In this way we promoted reflection and dialogue, and contributed to the development of our position as design educators. This volume of *Design Issues* is dedicated to reproduce a selection of the lectures delivered during the last three years. They represent part of the ongoing reflection in which we are embarked.

The issue is opened by Alain Findeli, who concentrates on a conception of how the design profession should be in order to make sense. He writes about the historical development of design, in both its reactive relation to industrial and commercial development, and the conceptual innovations that expanded the role of design from time to time, as it happened in industry itself, or in educational institutions like the Bauhaus and the HfG Ulm. He does not characterize this as a magical, progress-related line, but as a series of shifts defined by changes in focus, priorities, interests, allegiances, and methods. In this context, he discusses the relations between design and art, and design and science, and the notion of the "applied." He proposes to go back to Moholy Nagy in search for a study of the fundamentals of the act of designing, and sees in design "not a profession, but an attitude" (borrowing words from Moholy). He argues this so as to prevent design from becoming an exclusively reactive—and submissive —extension of the business world. Instead, he proposes to foster design's potential for a proactive role in the construction of culture.

John Heskett, as his title shows, includes the past, the present, and the future in his paper. He begins by analyzing the different meanings of the word "design," seeing this as a challenge to our possible understanding of the phenomenon. He, as Buchanan, argues that the knowledge of the past can help the understanding of the present. He discusses cultural and physical contexts, and the way they have fostered the development of certain ranges of design concerns. His analysis borders on cultural anthropology, with a view to awakening our attention to the objects that surround us, whose characteristics we take for granted. Through discussions of history, he identifies critical points in which the design of products has been affected by institutions that facilitated the spread of information, therefore affecting the material culture and the life of people. But he not only ascribes design development to abstract forces of social history: he also identifies the impacting role of the exceptional individual. The processes of massification created by the macroeconomics of today's markets, and the new possibilities of customization created by new production technologies characterize for Heskett the new dimensions that design faces today. He suggests that adapting to new situations is the very task of design, and the challenge, our time faces.

Charles Owen discusses the advantages of structured planning for design. With fine attention to details, he breaks down the design process into its component parts, discussing strategy, context, project definition, action analysis, synthesis, and communication, developing diagrammatic models that assist the reader in the mapping of his conceptual terrain. He looks at the many challenges that business face in a very competitive market, and at the need to carefully position products and maximize efficiency in order to succeed. To close, he proposes three basic dimensions that define

good design, and makes a forceful point for a well contextualized, thorough, and structured design planning.

Dietmar Winkler proposes that it is time for Modernism to fade away, that its naive social concerns, and its misunderstandings of social complexity, should make room for more sensitive approaches to solve the problems of our time. He suggests that today we are not looking at a replacement of a theory with another theory: but at the coexistence of different theories, all containing their partial currency, the resulting complexity being compounded by contemporary notions of relativity, chaos, probability, and utopia. He discusses the value of utopia, as the idealistic concept for intellectual reform, and proposes a central challenge for designers: either to continue building objects and images, or to build cultures. Building cultures puts emphasis on values, on distinctions, on tolerance, on multiplicities, and places responsiveness and responsibility at the center of the designers task, while leaving, at the end of the day, a number of unanswered questions.

Bernd Meurer suggests that the developed world has become opaque: the systems we use and the scales within which we operate (travel, commerce, communications) are so beyond our perceptual systems that we live through representations. These representations, however, challenge our capacity for information processing, and demand the creation of representations of representations, a somewhat labyrinthian world of information that reminds one of Jorge Luis Borges. He discusses the tensions created by overpopulation, development, and technology and the limits (however blurred) posed by the environment. Technological developments in communication and transportation, he claims, have fundamentally altered our perceptions of space, time, motion and speed, and all this has affected our social structures. Sustainability as an inescapable requirement and interdisciplinarity as a working method characterize design at the end of this century. He proposes that we perceive the world through action, that this action is oriented to the creation of objects, and that the task of design is not the solution to the design of those objects, but the invention of new tasks.

Richard Buchanan closes the issue. I could not agree more with him when—implicitly—he criticizes the name of the lecture series: “Rethinking Design for the XXI Century,” arguing that it is the present that we can discuss and try to understand. Indeed, when I proposed the series, I just called it “Rethinking Design,” since that was the task as I saw it. The rest was added by others with other concerns in mind. As a practitioner, what has been moving me to learn since I remember, is the drive to act, and the need to act as well as I can. Buchanan discusses the principles, the frames, and the options, in an effort to take positions or formulate patterns of meaning. He proposes an “ecology of design culture” as the necessary broad perspective to take, above partisan visions of the essential dimensions of design. He explores the value of the

past, and of history—both as what has happened and as the accounts of what has happened—or the understanding of the present, but insists that it is in the present where our attention as students of design should focus. He also explores the broadest definitions of design, and outlines what he considers the four basic causes that different groups subscribe to as central to design.

The ideas are multiple. None of the writers pretends to address the whole truth. Each one, however, contributes insights, enriches our understanding, and challenges our thinking. I hope that the sample provides a glimpse of the wealth of discourses we enjoyed during the lectures series, and contributes to fostering reflection amongst the readers of *Design Issues.*

It has been invaluable to have hosted the series of lectures in Alberta. It would be wonderful to be able to increase the possibilities for this kind of interaction amongst people who work in distant institutions but who can share a space for reflection. I thank Desmond Rochfort, former Chair of Art and Design, for his creative management that made this series possible. I also thank *Design Issues*, for the possibility of sharing with their readership a selection of the series. I hope the dialogue will continue, so that constantly, and intensely, we continue rethinking design.

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Guest Editor
Department of Art and Design
University of Alberta

Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion

Alain Findeli

A New Worldview?

Even the most cursory look at recent literature and production in design would be sufficient to reach the conclusion that the general landscape is safe, quiet, and serene. It is, therefore, not really original to claim that we are in a period of necessary change, be it in design education, practice, or research. Although the reasons invoked in support of this diagnosis may vary considerably, they generally are considered to reside within the field of design itself. For instance, Hugues Boekraad and Joost Smiers mention "the disturbing effect of product engineering and marketing on design and the visual arts" as the main issue to be addressed currently.[1] This problem is, without doubt, a central concern today, but it can be considered as a symptom of a wider issue to which all other professions also are confronted: engineering, medicine, education, social work, law, etc., as if in its very foundations, contemporary practical philosophy were in crisis. In other words, one is bound to conclude that the reasons for the current situation in design are to be found mainly outside of the field of design. This explains the very wide—and, to some extend quite ambitious and pretentious—scope of this essay.

I do not think it necessary to dwell too long on the diagnosis of our current situation. Let me just say that I tend to agree with the idea that we are in a paradigm shift, although I don't necessary share all the analyses and reports which have been made on this quite controversial topic. Our current paradigm; by that I mean the shared beliefs according to which our educational, political, technological, scientific, legal, and social systems function without these beliefs ever being questioned, or discussed, or even explicitated, this paradigm may be—and indeed has been—characterized in various ways. For my part, I retain the following main characteristics: its materialistic underlying metaphysics; its positivistic methods of inquiry; and its agnosticist, dualistic worldview.

There is no reason why the disciplines of design would escape the influence of this general framework. Indeed, all the drifts one is witnessing today in design can be attributed to one or all of

1 H. Boekraad and J. Smiers, "The new academy," *European Journal of Arts Education* II: 1 (Nov. '98): 60-65. This text actually is a manifesto calling for the foundation of a "new academy" of arts and design. The manifesto was launched as a working paper at the European League of Institutes of the Arts (ELIA) conference in Lisbon (November 16, 1996) under the full title of "The New Academy. Uniting Visual Intelligence With Ethics and Research." A symposium was organized thereafter in Barcelona in October 1997, where thirteen design scholars and practitioners from seven different countries were invited to contribute to this debate, the conclusions of which were made public at the 1998 ELIA conference in Helsinki by Hugues Boekraad and Alain Findeli. A collection of the most important elements of the New Academy Project currently is being edited by Joost Smiers and Hugues Boekraad, and is scheduled for publication soon. This essay is a reworked and enlarged version of the working paper presented in Barcelona, on which the lecture I delivered in Edmonton on November 12, 1997 was based.

these three central pillars: the already mentioned "effect of product engineering and marketing on design," i.e., the determinism of instrumental reason, and central role of the economic factor as the almost exclusive evaluation criterion; an extremely narrow philosophical anthropology[2] which leads one to consider the user as a mere customer or, at best, as a human being framed by ergonomics and cognitive psychology; an outdated implicit epistemology of design practice and intelligence, inherited from the nineteenth century; an overemphasis upon the material product; an aesthetics based almost exclusively on material shapes and qualities; a code of ethics originating in a culture of business contracts and agreements; a cosmology restricted to the marketplace; a sense of history conditioned by the concept of material progress; and a sense of time limited to the cycles of fashion and technological innovations or obsolescence. All these aspects have contributed to the current state of design, but nevertheless should be considered as necessary steps in its historical development; as such, it is much too easy to condemn them today, as if they could have been avoided. However, there is no reason to resign ourselves to them any longer.

In this perspective, I will try to contribute to the following three problems: (1) What theoretical model of design could be used as a basis for education? (2) What is an appropriate epistemology of design practice and its import on design methodology? and (3) How can the issue of ethics in design be problematized? Needless to add, the following propositions are to be considered as an endeavor to lay down new foundations[3] for design education and research within a non-materialistic, non-positivistic, and non-agnosticist, non-dualistic worldview.

Updating the Bauhaus Heritage: A Model for Design

One of the most famous slogans for which the Bauhaus is renowned is Gropius's catch phrase used for the 1923 international exhibition held in Weimar: "Art and Technology: A New Unity." This is the theoretical model in which the philosophy of the Bauhaus was grounded. The distinction between *Formlehre* and *Werklehre* in the curriculum is the most visible embodiment of this model. Yet this is not what was originally planned in the 1919 program which Gropius had included in the famous leaflet containing the Feininger woodcut of the cathedral illustrating the founding manifesto. The program read as follows:

> Instruction at the Bauhaus includes all practical and scientific areas of creative work […] Students are trained in a craft (1), as well as in drawing and painting (2), and science and theory (3).[4]

As can be seen, instead of the polar art / technology structure, a threefold technology / art / science structure originally was planned to support the curriculum. In Dessau, a new curriculum had been

2 The task of philosophical anthropology is to deliver a "theory" of the human being in general. It is, therefore, not to be mistaken for the anthropology of our academic "Departments of Anthropology." All major philosophers have devoted a part of their work to anthropological issues, either explicitly or implicitly. The design disciplines and, for that matter all professional disciplines, adopt a—usually implicit—anthropology when dealing with their "client," "patient," "customer," "user," "beneficiary," "addressee," etc. An explicit and systematic discussion of anthropological issues remarkably is absent from design curricula. For a comprehensive overview, see B. Groethuysen, *Anthropologie philosophique* (Paris: Gallimard, 1980, 1953).

3 In a paper read at the 1999 International Conference on Design Research of the UIAH (Helsinki), Wolfgang Jonas declared the use of the term "foundation," irrelevant pretending that "there are no (and will never be) 'foundations' that could serve for building a stable and consistent theory in the scientific sense on them." He is right if "foundation" is meant in a very classical, eighteenth/nineteenth century philosophical and epistemological sense. However, in a constructivist (or constructionist) framework, which is the approach adopted here as will be stated later, "foundation" has the meaning of "starting point," of a kind of consensus around some key issues, without which any further discussion would be impossible or meaningless. My attitude in this paper is not apodictic, but rather propositional.

4 Quoted in H.M. Wingler, *The Bauhaus* (Cambridge: MIT Press, 1979), 44.

printed, which mentioned as "areas of instruction" the following: "(1) practical instruction; (2) form instruction (practical and theoretical); and supplementary areas of instruction.[5] Here again, the original threefold structure transformed itself into a polarity, in this case practice / theory.

When Moholy-Nagy founded the New Bauhaus in 1937 in Chicago, he wished to remain faithful to the original philosophy. However, some changes were introduced both in the structure and the content of the curriculum. For the structure, he relied heavily on the philosopher Charles Morris, one of the main representatives of the Vienna Circle in the U.S., and coeditor of the *Encyclopedia of Unified Science* which can be considered as the "bible" of logical positivism. Morris, who was, at that time, working on his general theory of signs or semiotics, taught a course in "intellectual integration" at the New Bauhaus, in which he attempted to articulate what he believed to be the three main dimensions of design: art, science, and technology. In short, Morris considered the design act to be a kind of semiosis, and he drew a parallel between the syntactic, the semantic, and the pragmatic dimensions of a sign and, respectively, the artistic, the scientific, and the technological dimensions of design.[6] For various reasons, this ambitious and highly original philosophical project never was satisfactorily achieved.

The Hochschule für Gestaltung (HfG), opened at Ulm in the early '50s, explicitly claimed the heritage of the Bauhaus. After a while however, this historical reference appeared somewhat cumbersome to its directors. In 1958, Tomás Maldonado already had declared that "these ideas [had] now [to] be refuted with the greatest vehemence, as well as with the greatest objectivity." "A new educational philosophy," he proclaimed, "is already in preparation; its foundation is scientific operationalism."[7] As a consequence, the artistic dimension of the original curriculum became less and less important, whereas its scientific content was increased and emphasized, especially with contributions from the human and social sciences. "Science and technology; a new unity" could well have been the new slogan at Ulm. The idea that design was **applied esthetics** had been replaced by a new theoretical model, considering design as **applied (human and social) science**, but the underlying dualistic epistemological structure remained the same in Weimar / Dessau and in Ulm.

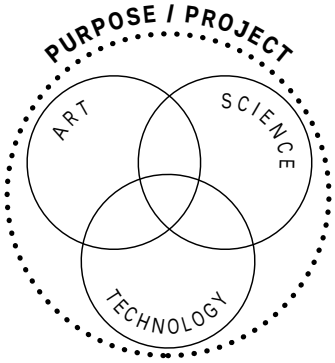
After this more than hasty overview of the evolution of the Bauhaus lineage, one can draw the following conclusion. It seems that the optimal, archetypal, structure of a design curriculum within the Bauhaus tradition would be a threefold articulation of art, science, and technology (fig. 1). The three examples I briefly described could be pictured as in fig. 2, where we can see that none of them managed to actualize the ideal model. The problem lies both in the relative weight of the three dimensions, and in their adequate articulation.

5 Ibid., 109.

6 C. Morris, "The Intellectual Program of the New Bauhaus" (typescript), University of Illinois at Chicago Special Collection, 5 pages, 1937; and "Science, Art, and Technology," *Kenyon Review* I (1939): 409–423.

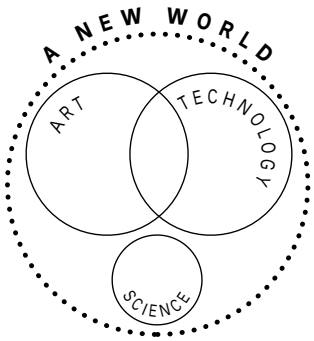
7 T. Maldonado, "Neue Entwicklungen in der Industrie und die Ausbildung des Produktgestalters" *Ulm* 2 (Oct. 58): 25–40 (also in English and French); see also "Ist das Bauhaus aktuell?" *Ulm* 8/9 (Sept. '63): 5–3, and Walter Gropius's reply in *Ulm* 10/11 (May '64): 62–70. (Also in English.)

Figure 1
Archetype (UrmodeII) of Design Curriculum

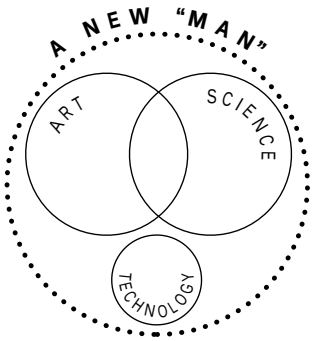


Today, everybody tends to agree upon the necessity of including art, science, and technology in a design curriculum. But disagreement will soon arise, on the one hand, as to their relative importance, and, on the other hand, as to their respective function, i.e., the way they should be articulated. A third and highly critical aspect inevitably will provoke even stronger disagreement, a factor without which no curriculum, be it as filled with theoretical courses, workshops, seminars, and studio work as possible, will ever find its coherence: the overall purpose of design education and practice. This is what is indicated in figs. 1 and 2 by the large circle of dotted lines. The questions to be asked are: To which meta-project (anthropological, social, cosmological, etc.) does a design project and a design curriculum contribute? For what end is design a means? Can design find its *raison d'être* within its own field and remain autarchical? How autonomous can design be? All these questions are related to the ethical dimension of design, which will be discussed later.

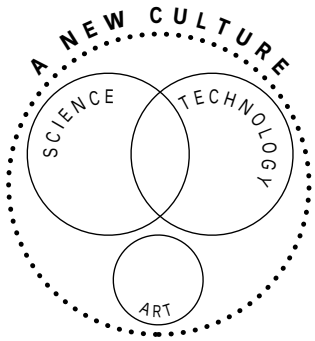
Figure 2
Three Historical Embodiments of the Archetype of Figure 1



BAUHAUS
Gropius
1919–1928
Weimar, Dessau



NEW BAUHAUS
School of Design
Institute of Design
Molholy-Nagy, Chermayeff
1937–1955
Chicago



HOCHSCHULE
Für GESTALTUNG
Maldonado, Aicher, Ohl, Rittel, etc.
1958–1968
Ulm

Epistemological and Methodological Dead Ends

From "Applied" to "Involved" Science

An inquiry into the historical development of design theory reveals that the discipline has adopted two major paradigms to account for the logics (or epistemology) of design thinking: **applied art** and **applied science**. Both take their roots in the nineteenth century, and must be considered as outdated today.

Applied art is the very first model under which design operated, according to the long tradition of the decorative arts, sometimes renamed industrial arts. The word "applied" refers to the utilitarian side of the artifacts, the other side being the artistic. "Disciplined arts" is another variant, coined by Goethe. At the Bauhaus, this model was slightly modified, insofar as the artistic component began taking a scientific coloration, for instance in Kandinsky's and Klee's "theoretical" courses. Influenced by nineteenth-century scientism, design was considered at the Bauhaus as artistic or esthetic theory applied to practice. In other words, students were expected to apply in the *Werklehre* what they had learned in the *Formlehre*.

Applied science follows the same structure: instead of art, science now is playing the role of referent, i.e. of "fundamental discipline" to be applied into practice. An implicit deductive link is established in this model between theory (science) and practice (technology). The underlying theoretical model of design at the HfG was the following: design tended to be considered as applied science, mainly human and social science. In other words, the design project was to be deducted from the knowledge gathered in the theoretical courses.

As a result, one often hears, in design schools, that, if the problem is well stated (i.e., if the preliminary scientific inquiry has been thoroughly conducted and the functional criteria precisely established), the solution will follow almost **automatically**. The most widely-accepted (and practiced) logical structure of the design process is, therefore, the following:

1 A need, or problem, is identified: situation A;
2 a final goal, or solution, is imagined and described: situation B; and
3 The act of design is the **causal link** by which situation A is transformed into situation B.

Only recently has the idea that technology is nothing but applied science been challenged by historians and philosophers. Contemporary models accept the fact that the history of technology has followed a path relatively independent from scientific development. These models all claim an autonomous epistemology for technology.[8] Furthermore, by separating human knowledge into two main sectors, the "sciences of the natural" and the "sciences of the artifi-

8 One of the most convincing arguments against the applied science epistemology in the field of design is Donald Schön's introductory chapter to his *Educating the Reflective Practitioner* (San Francisco: Jossey Bass, 1987)

cial," Herbert Simon has clearly claimed the originality of design thinking.[9] Systems and complexity theories have further contributed to a radical transformation of the mechanistic model of the design process[10] The main consequence is the introduction of teleology into an otherwise strictly causal sequence. As such, the concept of **project** gains a much stronger theoretical status. Instead of "applied" science, I propose to speak of "involved," "situated," or "embedded" science. Such a model considers that the scientific inquiry and attitude are **carried into** (instead of applied to) the field of the project and of practice, so that the former are modified by the latter, and vice versa. Donald Schön's concept of "reflection-in-action" thus is transferred from its mainly methodological to the epistemological realm. Better said, the distinction between the methodological and epistemological realms no longer is necessary or even relevant.

A new logical structure of the design process is:

1 Instead of a problem, we have: state A of a system;
2 Instead of a solution, we have: state B of the system; and
3 The designer and the user are part of the system (stakeholders).

The designer's task is to understand the dynamic morphology of the system, its "intelligence." One cannot act **upon** a system, only **within** a system; one cannot act against the "intelligence" of a system, only encourage or discourage a system to keep going its own way; state B of the system is, among various possibilities, the one favored by the designer and the client according to their general set of values; state B is only a transitory, more or less stable, state within a dynamic process, never a solution; the production of a material object is not the only way to transform state A into state B; and since the designer and the user also are involved in the process, they end up being transformed, too, and this learning dimension should be considered as pertaining to the project.

Visual Intelligence and Complexity Theory [11]

In an article published in 1947, Walter Gropius asked: "Is there a science of design?" [12] Although he maintained the irreducibility of the creative aspect of design, nevertheless he proposed to ground the design process into an "objective" scientific context, namely the psychology of visual perception, and thus emphasizing visual intelligence. The problem with such a proposition, as the later development of design has amply demonstrated, is the importance put upon the visual appearance of the material object. On his part, Moholy-Nagy seems to have been more aware of what we now would call the complexity of the design process and project. According to him, "the key to our age [is to be able] to *see everything in relationship*." [13] Whereas an object has a visible presence, relation-

9 H. Simon, *The Sciences of the Artificial* (Cambridge: MIT Press, 1996, 3rd enlarged edition).

10 Jean-Louis LeMoigne, the French translator of Herbert Simon's seminal work cited above, has been very active in trying to provide the most sound, comprehensive, systematic, and critical epistemological basis for all professional disciplines. With his collaborators of the AEMCX (European Association for the Modeling of Complexity), he has been publishing the triannual *Lettre MCX* (MCX Newsletter) since 1988, and organized many transdisciplinary and interprofessional conferences, the themes of which steadily revolved around the central issue of theory/practice relationships. Their Website, <mcxapc.org>, is worth consulting regularly.

11 I follow Boekraad's and Smiers's "The New Academy," in which the issue of "visual intelligence" is raised.

12. W. Gropius, "Is There a Science of Design?" *Magazine of Art* 40 (Dec. 47) reprinted in *Scope of Total Architecture* (New York: Collier Books, 1962), 30–43. (First ed. 1954.)

13 L. Moholy-Nagy, "Why Bauhaus Education?" *Shelter* (March 1938): 7–22 (emphases in original).

ships are, by essence, invisible. Therefore, the kind of visual intelligence needed in such a case is of a different quality.

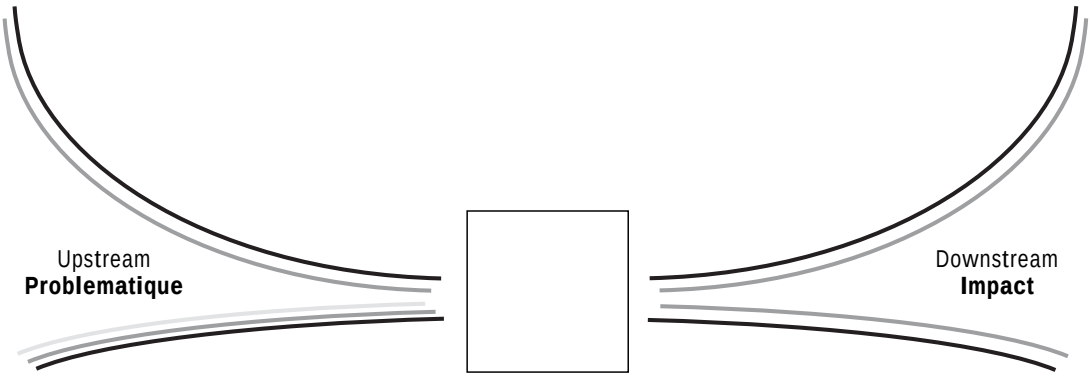
If we accept the epistemology and methodology described above for the design process, it is easy to understand why a different kind of visual intelligence—similar to the one intuited by Moholy-Nagy—will be required from the designer and, therefore, taught to the students. Future visual intelligence is bound to depart from its traditional connection with the material world and its artifacts, otherwise, as Goethe wrote in 1817, "One faces the danger of seeing and yet of not seeing." Everybody remembers Oskar Schlemmer's diagram showing a running human surrounded by a complex, multidimensional cosmos. Such an image must be considered as the basis for future visual intelligence in design, since any design project evolves between the two poles of anthropology and cosmology. The underlying anthropology of design usually is reduced to anthropometrics, ergonomics, and consumer psychology and sociology. But a user is more than the statistical "being of needs and desires" of the designer. Likewise, the designer him / herself is more than a rational computer, as depicted by contemporary cognitive psychology and as produced by design education. A contemporary anthropology will have to take into account the complex interplay and relationships of the various layers and subsystems which build up the inner world of the thinking, feeling, and willing human being. Conversely, the outer world is much more than what even environmentalists and ecodesigners call the environment, usually reduced to its biophysical aspects. Here, we also are dealing with various interrelating subsystems, which function and evolve according to very different logics: the technical or man-made world, the biophysical world, the social world, and the symbolic world or "semiocosm." These inner and outer worlds interact with each other.[14] As a consequence, before any project can be launched within such a complex situation, a designer indeed must make sure he / she has an adequate representation of the content, the structure, the evolutionary dynamics, and the trends or "telos" of such a system. This is why future visual intelligence must be capable of penetrating into the invisible world of human consciousness (thoughts, motivations, purpose, fear, needs, aspirations, etc.) and into the intricate ecologies of the outer world.

The potential of complex systems theory for design has been identified by some authors within the last decade.[15] Emphasis has been put mainly on the complexification of the models describing the design process, and on the semiotic complexification of the perception and reception of the products of design. All of these endeavors tend to remain within the domain of design, however. My suggestion is that we should not restrict ourselves thus, but, instead, open up the scope of inquiry, i.e., in systems theory terms, and push back the boundaries of our system in order to include other important aspects of the world in which design is practiced.

14 I have presented my own interpretation of this systemic model in "Ethics, Aesthetics, and Design. Educational Issues" *Design Issues* 10:2 (Summer 94): 49–68.

15 Wolfgang Jonas in Germany and Harold Nelson's "Whole Systems Design" program in the U.S. are two important names in this respect.

Figure 3
The necessary upstream (problématique) and downstream (impact) complexification of the design project.



Let us discuss this with Hickling's model.[16] The input "PROBLEM" and the output "ACTION" of the design process are considered as not being part of the design process. The "problem" is a given, and usually is considered as such in design practice and in the design studio of our schools. An "action" comes out of the process, ready to live a life of its own, in another realm. But, in reality, problem and action dwell in the same world, of which the designer also is part, not only as a professional, but also as a citizen. It is not my intention to discredit the efforts to complexify the internal components of the system of design, i.e., to yield an even more complex and sophisticated model of the design process and of the design product. But if we are interested—and designers should be interested—in the origin and the destination of their projects, then the complexification of the **process** and the **product** should be completed, on one hand, by the complexification of the ***problématique***[17] (or problem-setting), and, on the other, by the complexification of the **impact** of the project (fig. 3).

How will this intelligence of the invisible be taught? I do not consider the mathematical or formalistic approach to systems science relevant for such a task, due to its manipulative, "objective" nature. A system, and especially a human or social system, is best understood from within, through a qualitative, phenomenological, approach.[18] **Basic design**, if properly reconsidered, will be the best pedagogical tool for teaching such an approach. Insofar as a system is something like a complex living morphology, I believe that aesthetic education will be the best way to apprehend its dynamics. Furthermore, the appreciation of the relative stability of a system, and of the instability induced by the action of a designer within a system also are the concern of aesthetics. As a matter of fact, I think

16 Hickling, "Beyond a Linear Iterative Process?", in B. Evans, et al., *Changing Design* (Chichester: John Wiley & Sons, 1982), 275–93.

17 The French word *problématique* is an important concept of Foucault's archeology. In design, it is the result of the complexification of a mere product-centered problem in terms of social, economic, symbolic, political, etc. issues.

18 This specific methodological question is discussed in the second half of my former essay, "A Quest for Credibility: Doctoral Education and Research at the University of Montreal," in R. Buchanan, et al., "Doctoral Education in Design, Proceedings of the Ohio Conference," Pittsburgh, PA, Carnegie Mellon University, 1999.

that Moholy-Nagy had sensed this issue when he designed his preliminary course in Chicago. Didn't he claim that this course was perfectly fitted for any professional curriculum, i.e., not only for designers, but also for lawyers, doctors, teachers, etc.? Furthermore, as we shall see shortly, such a basic design education will not only have an effect upon the designer's intelligence of complex systems (gnoseological aspect), but also upon the designer's professional responsibility when dealing with systems (ethical aspect).

Design Ethics and the Purpose of the Design Project

At the School of Design of the University of Montreal, we carried out a research project on the issue of design ethics and the responsibility of the designer (1989–92). This project, named "Prometheus Enlightened," was launched after observing that our professional code of ethics no longer was adapted to the contemporary conditions, and that a new code had become necessary. Our main conclusions were the following:

1 In order to be able to define professional responsibility (i.e., not only competence), a discussion on the **purpose** of design is necessary.
2 Priority should be given to the reform of design **education**.
3 There can be no responsible design without a responsible designer, i.e. education should be directed to the development of an **individualistic ethics**.[19]

Unless the third point, in particular, is considered, any general discussion about ethics, morals, ethical theory, deontic/utilitarist ethics, etc., becomes almost meaningless. This is why this section will be very short.

The general purpose of design has evolved within the Bauhaus lineage. Fig. 2 indicates the major themes within the three periods I have considered: "A new world," "A new 'man,'" and "A new culture." Notice that, in each case, this was considered as a goal to be attained with a technicist view, i.e., according to the modernist logical structure of the design process described above. In other words, somehow it was believed that if the necessary means, tools, actions, and decisions were put together, these goals could be attained. In the new perspective, however, the purpose of design must be considered as a horizon, as a guiding set of values, and as an axiological landscape to which one always must refer when taking a decision or evaluating a proposition within the design project, and not as an ideal goal to be reached in the more or less near future.

What could be an adequate purpose for the coming generations? Obviously, the environmental issue should be a central concern. But the current emphasis on the degradation of our biophysical environment tends to push another degradation into the background, that of the social and cultural (symbolic) environments,

19 A. Findeli, *Prométhée éclairé. Éthique, technique et responsabilité professionnelle en design* (Montréal, Éd: Informel, 1993).

i.e., of the human condition. Consequently, I suggest that design could not only contribute to a sustainable natural world, but would adopt as a purpose something such as: "A balanced humankind in a balanced world," therefore stressing anthropology and cosmology as the two polar complementaries around which the content of a design curriculum could be built up.

The epistemological / methodological shift suggested above has another important consequence on design responsibility. In effect, the systemic view implies that the making of an artifact, which usually is considered as the normal outcome of a design project, is no longer taken for granted. Within these complex systems, designers are expected to **act** rather than to **make.** In other words, making (poiesis) must be considered only a special case of acting (praxis), to the extent that even "not making" is still "acting." In philosophical terms, one would say that design pertains to practical, not to instrumental, reason; or else that the frame of the design project is ethics, not technology. In existentialist terms, this could sound as follows: design responsibility means that designers always should be conscious of the fact that, each time they engage themselves in a design project, they somehow recreate the world.

As to the question of individualistic ethics, the matter is almost too simple: some kind of moral education must be included in the design curriculum, so that the moral consciousness of every student is increased.[20]

The Vanishing Product

The issue of the dematerialization of our world has become a recurring leitmotiv in design, especially since the Centre Georges-Pompidou exhibition *Les Immatériaux* in 1985.[21] The logical outcomes of the above propositions also will point to the same end result, i.e., the vanishing of the product as the main target of design. The following four scenarios describe the way in which the product-centered attitude could be replaced by a new one if design is to survive and evolve according to the conditions of the new paradigm:

1 The shift toward a systems approach and complexification, i.e., from a "problem and solution" to a "state 1 and state 2 of the system" situation, pushes material artifacts to the background in favor of the actors within the system. This, in turn, yields to the end of the "product as work of art" paradigm in design, and of the design act as a heroic gesture; in short, the end of the fetishism of the artifact.

2 The systematic questioning of the design brief (the complexification of the problem into *problématique*) will invite designers to look for the "dark side" of the object. They become more interested in the human context yielding

20 This is, of course, a very sensitive issue not only in design, but in general education. As already suggested, I believe a well-thought basic design curriculum could be a good place for this. Our research tends to show that esthetic and moral dilemmas or decisions are structurally congruent. Therefore, esthetic education could contribute to moral literacy.

21 See also *Design Issues* special double issue "Designing the Immaterial Society," 4:1 and 2, 1988.
The kind of basic design exercises and assignments that would fulfill the task described here would be similar in principle to the one discussed in P. Hadot, *Philosophy as a Way of Life* (Oxford: Blackwell, 1999). Hadot opportunely reminds us that, in order to be adequately assimilated and understood, philosophy must be studied experientially, not intellectually as is the case today.

the brief than in the classical "product description" brief generally used in design and engineering.

3 We still live with a picture of design handed down by the nineteenth century, when the concept of this profession first appeared. Design was summoned to absorb the shock of industrialization, and to soften its devastating consequences upon the cultural web, in other words, to make industrialized products culturally—socially, economically, symbolically, and practically—acceptable. Aesthetics was then its privileged rhetorical tool, followed by ergonomics in the mid-twentieth century, and semiotics (i.e., aesthetics again) in the late-twentieth century. But its almost unique field of activity has remained the material product; manufactured by mechanical, electrical, and/or electronic industries. Our century has witnessed an ongoing, indeed accelerating, industrialization process, not so much in the manufacturing of products than in the production of all those so-called "services" which shape and condition our ways-of-life: education, health, leisure, food, birth and death, etc. No one would question the fact that services also are products in their own right. But where and who are the designers of these products, the analogous of our nineteenth-century product designers? Thousands of ill-designed products thus are waiting to be conceived and shaped by designers, so that they correspond, not only to the needs, but also to the aspirations, hopes, and life-projects of their users! Indeed, services are immaterial objects and complex systems, as anybody knows who has ever faced a hospital or school bureaucracy (and who hasn't?). I am convinced that the methodologies developed for the design of material products could be transferred to the world of immaterial services, provided adequate epistemological care is taken.

4 The fourth way one can predict the vanishing of the product is, of course, on ecological grounds. Nobody contests the fact that there are too many products in our environment, and many designers already are engaged in a more sustainable design attitude. Standards such as "Factor-10" or even "Factor-20"; and concepts including Ezio Manzini's "negaproducts" or Philippe Starck's "non-objects" are but some representative signs of, not only the possibility of, but the necessity for, products to vanish in the near future.

Where Do We Stand?

Although the purpose of this paper is to lay some foundations for a renewal of design education and research, it is still too early to draw conclusions. All I would like to do is to indicate some directions for further research and constructive work. Let me sum up the principal stages of the above discussion.

An archetypical model of a curriculum for design education has been described in the form of a three-part structure, art / science / technology, enclosed within a general purpose for design. In order to figure out what the content of these three components would be and how they should be articulated, it is necessary to establish an epistemological / methodological model for the design process or project. If we further accept the fact that the canonical, linear, causal, and instrumental model is no longer adequate to describe the complexity of the design process, we are invited to adopt a new model whose theoretical framework is inspired by systems science, complexity theory, and practical philosophy. In the new model, instead of science and technology, I would prefer perception and action, the first term referring to the concept of visual intelligence, and the second indicating that a technological act always is a moral act. As for the reflective relationship between perception and action, I consider it governed not by deductive logics, but by a logic based on aesthetics.

The second aspect at stake is the specific training necessary for perception, action, and their relationship to be carried out adequately and consistently by students. I believe that visual intelligence, ethical sensibility, and aesthetic intuition can be developed and strengthened through some kind of basic design education. However, instead of having this basic design taught in the first year as a preliminary course, as in the Bauhaus tradition, it would be taught in parallel with studio work through the entire course of study, from the first to last year. Moholy-Nagy used to say that design was not a profession, but an attitude. In the same vein, Pierre Hadot reminds us in his writings that ancient philosophy was not a speculative occupation like it is today, but a way of life, ("a mode of life, an act of living, a way of being"), and he describes the "spiritual exercises" which were designed to realize a transformation of one's vision of the world—that is what a paradigm shift is really about—and which involved all aspects of one's being: intellect, imagination, sensibility, and will. I suggest that we endeavor to construct our basic design in the form of a series of such "spiritual exercises," the nature and content of which would be adapted to our contemporary world and future challenges. Moholy-Nagy's pedagogical work at the New Bauhaus / School of Design / Institute of Design in Chicago would be a good starting point for such a difficult and demanding task.

This program may seem too ambitious and somewhat foreign to the design professions as we know them today. To the first objection, I reply that, if we don't want design to become or remain "a branch of product development, marketing communication, and technological fetishism," [22] i.e., if it is not to remain a **reactive** attitude, it will have to become **proactive**; in other words it will have to propose "new scenarios for the future" (Manzini). To the second objection, I reply that the profile of design professions need not—and should not—remain what it is today, otherwise these professions might disappear. It is, therefore, our responsibility to imagine the future profile of our professions, a task to which I have tried to contribute here.

22 H. Boekraad and J. Smiers, "The New Academy."

Past, Present, and Future in Design for Industry

John Heskett

A continual problem for design practitioners is in defining for non-practitioners just what it is they do. Designers may know what they mean by design, but their understanding often is based on experiential knowledge, which is not easily articulated or communicated. The problem is compounded by the fact that there is virtually no agreement in social terms of what design is—indeed, clients and audiences often have a very different understanding of design to that held by professionals.

This is hardly surprising if one considers the enormous confusion surrounding the word "design," with patterns of usage revealing very different meanings. To illustrate this at a basic level, a seemingly nonsensical sentence can be constructed, in which every use of the word "design" is perfectly grammatical:

Design is when designers design a design to produce a design.

The word "design" is used four times. The first usage is as a noun, connoting the field of design as a whole in a very general manner, as in the phrase: "Design is important to national economic competitiveness." The second usage is as a verb, meaning the action or thought involved in the act of designing. The third also is a noun; this time connoting a plan or intention. Finally, the fourth usage again is a noun, this time meaning the finished product. All the usages have very different meanings, yet even people professionally involved in design continually slip between them, seamlessly moving from one meaning to another without distinction.

A further level of the problem leading to confusion is the different professional subcategories of design, such as architectural design, engineering, computer, product, industrial, graphic, communication, information, interior design, and so on. Even this does not fully explore the complicating factors, since it doesn't address everyday appropriations of the term as in floral design, hair design, and funeral design!

Leaving aside the more trivial applications, how do we begin to make sense of this confusion, not only for ourselves in the design community, but also for the wider audiences we are committed to serving?

Much of the confusion has its origins in the past, in the diverse forms in which design has evolved at different times. Regrettably, studies in design history generally have failed to clarify

this complexity by being too focused on design in its more recent manifestations, and often being too justificatory in tone, subordinate to specific movements such as modernism; nostalgically advocating particular forms of practice, such as the crafts; or promoting the work of a particular country or tendency.

Although it is a truism that the past never completely repeats itself, history can be used as an essential tool in understanding our current situation. Moreover, it contains a fund of generic ideas about design practice that illustrates possibilities for understanding newly emerging technologies. In an age beset by change in radical and fundamental terms, these can be invaluable guides in coming to terms with the consequences of change. Indeed, because the nature and pace of change provide very few guidelines, it can be argued that history is the one source from which any certainty can be derived in facing the future.

To realize this possibility, however, involves shifting from an understanding of design as the particular set of skills or organization appropriate to modern history, or any other age, and defining it more in terms of a generic human capacity to shape and make the objects, communications, and systems that serve utilitarian needs and give symbolic meaning to life. In other words, seeking the connecting links and themes that underlie the proliferation and confusion. On this much more general, fundamental basis, understanding the stages through which design has evolved in the past can enhance our understanding of the current situation, illustrate a range of potential approaches that have general application beyond their historical specificity, and provide signposts as to how design might develop in the future. Considered in this light, moreover, the whole of human history opens up for consideration.

On a simple level, for example, a study of design in nomadic societies could explore the generic qualities of artifacts used in such societies based on such factors as lightness, portability, and flexibility in use—an example is the origins of the fabulous carpet design tradition of the lands of Central Asia.

In more complex terms, there is much to be learned from the use of tools in so-called "primitive" societies, which often were part of a very densely textured pattern of relationships. A detailed illustration is provided by the Yir Yoront, an Australian aboriginal tribe inhabiting the northernmost tip of Queensland. They lived by hunting, fishing, and gathering plants, but were distinguished by the use of polished stone axes, that played a role of central importance in the life of the tribe.

Writing on the role of these stone axes, anthropologist Lauriston Sharp explored their significance on multiple levels, starting with the processes of making the axes which constituted an important element in the relationship of Yir Yoront men with their natural environment. On another level, designated "conduct," the pattern of who could borrow whose axe was important in defining

the complex kinship pattern of the group, and so axes became important symbols of internal relationships. It also profoundly influenced external relationships, because the stone for the axes came from sources four hundred miles away, and trading patterns and ceremonial meetings at which the raw material was traded constituted yet another crucial element of the round of Yir Yoront life. Finally, Sharp discusses the cultural significance of axes; covering ideas, sentiments and values and their role in tribal myth. With the provision of steel axes by Christian missionaries, however, Yir Yoront society rapidly fell apart.[1]

The multilevel and multivalent function of stone axes in Yir Yoront society is mirrored in the function of many modern artifacts. Consider, for example, the role automobiles or computers have assumed, and are still assuming, in modern societies. Remove either, and the effect would be traumatic. Neither is speculation required to understand the profound effects of changes in technology in our age, for they are still rippling with often equally devastating speed and effect through many societies—for example, consider the patterns of change in modern China.

With the development of settled agricultural patterns in more favored regions of the planet, a new pattern emerged. Instead of being mobile, people began to live mostly in the locality where they were born, with their needs satisfied in that locality, by hand or simple machinery and tools, using local materials. Traditional concepts of form emerged that represented the accumulated experience of that place and, although varying in great detail through different localities, were highly standardized in any community. Thomas Smith describes the writings of an early nineteenth century observer of Japanese agriculture, Nagatsune, who noted the huge variety of forms in such as basic tools as the spade: "…these adaptations," commented Smith, "varied endlessly, with the result that, although the spade was used everywhere, for example, its size, design, and heft differed almost from village to village."[2] In such a situation, both maker and user both understood the highly specific adaptation of the tool to the needs of the locality, and worked in close contact. Therefore, tools, when made for a particular person, could be minutely adapted to that person's physical particularities and personal preferences. Traditional forms, although fixed in general principle were, in fact, highly adaptable to specific needs—a principle closely parallel to possibilities of modern flexible technology.

As towns proliferated in various parts of the world, guilds played significant role in urban communities, representing an early form of licensing of designers, being primarily concerned with maintaining standards of work and conduct. They could only work in an age characterized by stability, however, rather than change—which in the end destroyed them. In many countries the main instrument of their downfall was industrial manufacturing based on

1 Lauriston Sharp, "Steel Axes for Stone Age Australians," in Yehudi A. Cohen, ed., *Man in Adaptation: The Cultural Present* (Chicago: The Aldine Press, 1968), 85–9.

2 Thomas C. Smith, *Native Sources of Japanese Industrialization 1750–1920* (Berkeley: University of California Press, 1988), 181.

hand techniques, and on the basis of division of labor and production for wider markets. Examples of such industries were found in India around 900 BC, and became widespread in Europe in early medieval times. In such organizations, craftsmen lost control over design decisions, which increasingly became the preserve of entrepreneurs, the only people who knew the distant markets for which they were producing.

While design histories have placed heavy emphasis on the creation of forms, the manner in which they spread across time and space and have been adapted into everyday use, has received less attention. The monasteries that spread across Europe frequently have been depicted as institutions predominantly concerned with preserving European culture through the so-called "Dark Ages." Yet they also played a very powerful role in changing that culture by diffusing technologies and forms across the continent. The Cistercian order, founded in 1098, expanded to a chain of some 740 monasteries, and played a particularly important role. In the thirteenth and fourteenth centuries, they functioned as a distribution network for spreading new innovations, including improved agricultural methods and the water mill.[3] The latter, according to Jean Gimpel, were an early form of joint stock venture.[4] Ironically, the monasteries therefore were important contributors to the development of early forms of capitalism that not only undermined the guilds, but also the monasteries themselves.

The origins of national policy in the uses of design also have extensive roots. In the early 1600s, the French monarchy began attracting the finest craftsmen in Europe to Paris, to establish economic dominance in the luxury trades. The craftsmen were highly privileged, and since their capacity to satisfy demanding markets was crucial, education and practice had to be sustained at a high level.[5] Government power to stimulate developments in design can be substantial—the present-day "designer" in France, in a host of fashionable business sectors, can be traced to this tradition. Many governments in contemporary Asia are pursuing similar generic approaches to promoting design intended to achieve economic advantage for their country, a pattern which began in Japan, was followed by the four "tigers," Korea, Taiwan, Hong Kong, and Singapore, and is now being reinterpreted anew in the next wave of industrializing countries such as Malaysia.

Governments also have used design for symbolic purposes that provides forerunners to modern corporate identity programs. The use of visual forms was extensively applied to create an image of royal power in the reign of Louis XIV of France,[6] and was taken to a more systematic levels in the creation of a total visual image for the first Napoleonic Empire.[7]

Governments also can be negative instruments for restricting progress in design, however, by preventing ideas from being realized. In Imperial Rome, for example, the Emperor Tiberius "was

3 Arnulf Grübler, "Time for a Change: On the Patterns of Diffusion of Innovation," *Daedelus* 125 Summer (1996):119–20.

4 Jean Gimpel, *The Medieval Machine: The Industrial Revolution of the Middle Ages* (Orlando, FL: Holt Reinhart & Winston, 1978), 11–2.

5 Nikolaus Pevsner, "Design and Industry through the Ages" *Journal of the Royal Society of Arts* XCII (1949).

6 Peter Burke, *The Fabrication of Louis XIV* (New Haven: Yale University Press, 1992).

7 Ellis Geoffrey, *Napoleon* (London: Longman, 1997) 156–67.

alleged to have killed a man who invented an unbreakable sort of glass, because his discovery would have cheapened the value of imperially owned metals...."[8]

One of the most spectacular examples of the effect of government fickleness in promoting technology and design was in early fifteenth century China. From 1405, in the reign of the Ming Emperor, Zhu Di, a Chinese fleet of 317 ships crewed by more than 27,000 men, set sail from Nanjing on a voyage to reopen trade with India. The largest vessels were four-hundred foot long, nine-masted sailing junks that surpassed anything hitherto constructed in the world. Up to 1433, a total of seven such voyages were undertaken, as far as the Persian Gulf and the east coast of Africa. By the late 1430s, however, as a result of power struggles over the imperial succession, overseas ventures were rejected, and a new policy was introduced that viewed the land as the true heritage of China. The great fleets were dismantled and new construction was forbidden. It was a key moment in changing the balance of technological power between China and Europe.[9]

A similar course might have been adopted in England, had the power of the monarchy not been checked. In the sixteenth and seventeenth centuries, there were frequent efforts by the Tudor and Stuart monarchs to protect what they claimed was the social interest of the nation, although this term frequently was a cloak for protecting the economic interests of the crown, and its control over particular industries. The intervention purported to maintain stability in production processes and markets through a range of statutes directed at preventing the early stages of capital formation and the accumulation of profits—the seed-corn of capitalism. An example was an act passed in 1555 by Parliament aimed at preventing country weavers and clothmakers from possessing more than one or two looms. A more sweeping piece of legislation was the Statute of Artificers of 1563, giving Justices of the Peace power to fix wage rates and to enforce seven-year apprenticeships for craft workers in existing industries.

Christopher Hill cites specific attempts in the early seventeenth century to prevent innovations that threatened the interests of established craftsmen and their methods.

> In 1624, the government ordered the destruction of a needle-making machine, together with the needles which it had made. Nine years later, Charles I prohibited the casting of brass buckles. At best, government policy would have perpetuated a small-town economy in England. …But fortunately the government's power of enforcing its regulations was inadequate to its will.[10]

8 Michael Grant, *The World of Rome* (London: Weidenfeld & Nicolson, 1962), 75.

9 Louise Levathes, *When China Ruled the Seas: The Treasure Fleet of the Dragon Throne 1405–1433* (New York: Simon & Schuster, 1994).

10 Christopher Hill, *Reformation to Industrial Revolution: A Social and Economic History of Britain, 1530–1780* (London: Weidenfeld & Nicolson, 1967), 138.

A key factor was that Justices of the Peace, legal officials appointed by the Crown to execute its policies in localities, often were among the leading entrepreneurs of their districts.

In early patterns of industrialized craft production, draftsmen represent the significant stage of separating the conception or plan of a product from its making. Working to directions from an entrepreneur, or from pattern books that began to appear from the Renaissance onward, their numbers were rapidly growing before the Industrial Revolution of the late eighteenth century, and further accelerated as production for commercial markets increased. They were the design workhorses of the first industrial age. Much commercial work was in fact based on imitation, either of historical styles or of higher-level competitors, and draftsmen provided the necessary drawing skills for production specifications.

With the growth of capitalist industry and the expansion of markets, traditional forms clearly were inadequate means of satisfying new demands. It became increasingly necessary in product sectors, such as personal wear or household furnishings, to generate a flow of new ideas. Catering for varying tastes in markets meant adaptation to changing fashions. In this situation, the only people with adequate visual training were academic artists who began to provide manufacturers with concept sketches for furnishings, fittings, and decorations, to be translated into production drawings by draftsmen. The proliferation of forms that resulted increasingly meant a separation of decorative concerns from function.

The role of the industrial artist went through several stages of evolution in the nineteenth century, and was given renewed impetus at the Bauhaus in the 1920s, which emphasized the artist-designer as a creator of ideal prototypes for industrial production. Art, proliferated through industry, could, it was believed, substantially change life. However, the artist-designer as change-master of modern society has been theoretically idealized, but little realized in practice. Nevertheless, the impact of talented individuals cannot be underestimated, as in the contemporary role of the virtuoso designers of Milan, or the Frenchman, Philippe Starck. Moreover, many courses in design education are implicitly directed to producing such “star” designers, even though a tiny minority achieve such status.

Opposition to applying art to industry became highly vocal as the nineteenth century progressed. John Ruskin, William Morris and their followers in the Arts and Crafts Movement passionately argued a powerful critique of industrialization, but their solution idealized hand work and fell into nostalgia: a romanticized recreation of the medieval past. One of the results to which this idealization contributed was the growth of the antiques trade. The need to clearly identify the provenance of objects consequently has become a major focus of many design historical studies.

In Germany, however, the Arts and Crafts ideals of honest workmanship, truth to materials, and a sense of moral and cultural responsibility were not seen as incompatible with machine production. Instead, in the early years of this century, they were translated into a belief that design for industry could be both commercially successful and an appropriate expression of modern technological culture based on sound social and economic values. This belief has continued to be profoundly influential in the mainstream of design in German industry, and in other parts of Europe such as Scandinavia, for much of the present century, although, at present, it is being undermined by current changes in technology.

In the United States, new industrial technology and organization evolved in the late-nineteenth and early-twentieth centuries to again totally change existing design concepts and practices. Large enterprises on a scale previously unknown emerged, with ownership separated from management. Using techniques of mass production, and mass advertising, large businesses have fundamentally changed every aspect of life and culture in America, with significant influence across the globe, by a proliferation of innovative products.

The huge capital investment required to establish mass production facilities required long-term continuity of production to ensure adequate return on investment. Competition from other manufacturers with similar facilities, however, required constant change in the appearance of products to stimulate markets. Moreover, the mass advertising used to persuade consumers to buy products hinged upon visual imagery—far more people saw images before they saw the actual product.

Alfred P. Sloan, then president of General Motors, realized in 1924 that the mass production of automobiles did not necessarily mean the production of one model, but that new markets could be stimulated by a diversity of models based on common platforms. The outcome was the emergence of designers as stylists. The career of Harley Earl is the classic example. Appointed on a permanent basis by Sloan as head of GM's Art and Color Section in 1927, he reached the top level of corporate management, first as Vice-President for Styling, and later for Product Planning, with a styling staff that came to number 1,400 by the 1950s.

Many practitioners, however, developed far beyond a concern with superficial changes of form. After the Second World War, some began to encompass a very broad range of services, many of which were of more fundamental importance to the nature of a client's business. Even such an arch-exponent of styling as Raymond Loewy pointed out that declining American manufacturing quality disillusioned purchasers, who, after being attracted by the external design, found the product unsatisfactory in use. As an alternative, he advocated design as a high-level activity vital to the competitive future of corporations, and expressed apprehension at

the way so many American firms preferred designs that echoed competitors' products. Much of this awareness of change was generated by growing competition from overseas, as the U.S. market became a competitive arena for manufacturers from across the world. Large segments of American industry subsequently were decimated by imported products from countries such as Japan and Germany, that paid greater attention to production quality with a more holistic approach to design.

Some American designers, however, pioneered new approaches. Richard Latham demonstrated the effectiveness of the concept of strategic design planning in consultant work for several corporations, becoming a board member of Rosenthal, Bang & Olufsen and Lands' End. Jay Doblin, who began his career in Loewy's New York office, and later became Director of the Institute of Design at Illinois Institute of Technology, further evolved a range of methodologies to transform how major corporations can use design strategically in every aspect of their operations.

All these phases are part of the history of design and in innumerable ways still constitute living elements of it. It is important to stress that the evolution of one stage does not entirely replace what has gone before in some sequence of linear progression. Instead, new phases become layered on the old. The older phases may be changed or marginalized, but never entirely die out. The twentieth century, for example, already has witnessed several such changes in design: its transformation and diffusion in industry as a means of reconciling the nature of mass-production technology with the possibilities of mass consumption; its spread geographically as an integral form of practice across a constantly increasing range of countries; and the emergence of a capacity to function across a wide range of business needs at a strategic level in organizations.

Many designers around the world are perplexed by the changes currently confronting them. One of the greatest dangers, however, is an inability to understand that, in a world beset by change, design does not remain untouched. It is not simply a matter of computers replacing other tools, while basic concepts and procedures continue unaltered. As the European scribes found in the late fifteenth century when confronted by the printing press, or harness makers when confronted by the automobile, it does not matter how skilled anyone is, if that skill itself is becoming redundant. It would, therefore, be foolish to expect that similar changes will not happen again. All the indications are that we are faced by radical change on multiple levels. At one extreme, we are confronted by the evolution of "super mass production"—a new phase of mass production on a global scale. At the other end of the spectrum we have tailoring and customizing to meet the precise needs of users, with many other variations in between. The choice is that we can try to understand these developments, adapt to them, use them for seemingly beneficial purposes, or be consigned to a marginal position echoing loud

with complaints that things should not be like this. Should designers fail to adapt, new competencies will emerge to fill the gap left behind. The evidence of history is that design, as a basic human ability, is constantly required to adapt and redefine itself to meet the needs of its time. We should expect no less for our age.

Structured Planning in Design: Information-Age Tools for Product Development

Charles Owen

Keynote address to the Japanese Society for the Science of Design, Tsukuba, Japan; May 17, 1997.

Introduction

Thoughtful designers have long recognized that the attitudes, viewpoints, skills, and ways of working we call design have great value for industry and institutions. The problem always has been that design's best value has been obscured by lesser values more visible and accessible. The miracle is that, in spite of trivialization as styling and fashion, design has continued to be taught and practiced as the full conceptual process it is.

There is a difference today. Overseas competition has done what decades of reasoning could not; design is being recognized as a major strategy for competitive success. Businesses and business schools are making genuine efforts to learn more about design, and to incorporate more sophisticated design thinking into their operations. Less visibly, but with as much long-term impact, a variety of governmental organizations, institutions, and NGOs (non-governmental/non-commercial organizations) also are discovering the value of design thinking.

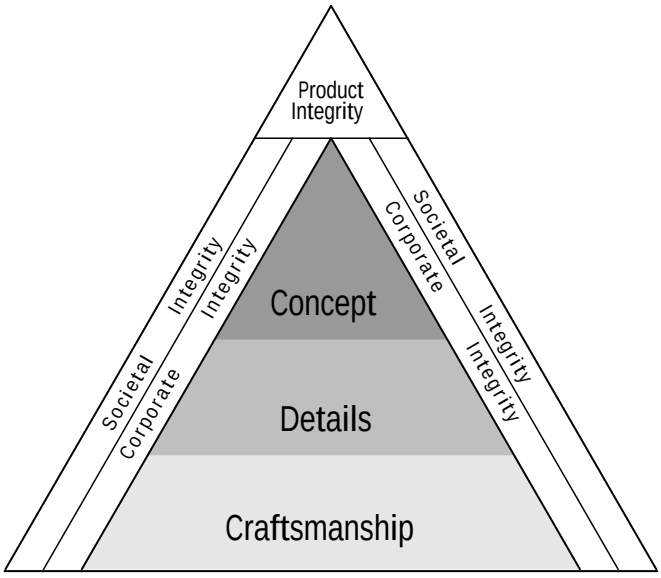
In universities around the world, design educators and design researchers now find themselves with new audiences and new opportunities for leadership. A major challenge for all is to find new means—theories, processes and organizational models—that can permanently infuse design's values and benefits throughout commercial, governmental, and non-governmental organizations.

A Design Strategy

To see the multiple values of design most clearly, design should be viewed through the lens of quality, now the universally-recognized requisite for success in business. Quality for products (and artifacts generally), is almost always associated with craftsmanship—how well the product is made. But there are more dimensions to quality, and they can be best appreciated through a consideration of design.

The relationships between design and quality are expressed in the quality pyramid model (fig. 1). The pyramid has a multilayered design core, with craftsmanship as the first of three layers. From the design perspective, quality as craftsmanship is achieved through attention to issues of engineering design and design for manufacturing.

Figure 1
The Quality Pyramid.



Details are at the second layer of the design core. Here, the role of design is to contribute to performance, human factors, and appearance. Design specialists (engineering designers, product designers, industrial designers, communication designers, and others) invent and refine features or details to make the product work better functionally, work better for people, and work better symbolically within social and cultural niches.

At the third layer, *concept*, design contributes most to making products competitive (including systems, institutions, and services). Concepts that are holistic and thoroughly thought through appeal to the potential buyer or user as qualitatively better (and worth more). Typically, products designed well as concepts distribute innovations throughout their features so systemically that they are difficult to copy by competitors.

Capping the quality pyramid is *product integrity*; under it, quality extends outward to corporate and societal recipients. Products that are conceived, designed, and produced with high quality bring praise to the companies or organizations that produce them. Product integrity confers corporate integrity; corporate integrity, in turn, adds luster to the society in which the company operates. There is a reason why postwar Japan, *as a nation*, became identified with quality in less than a generation.

Problems of Planning

To reap the benefits of the quality pyramid model, we must fundamentally rethink the process of new product development. In today's highly charged business environment, revolutionary changes frequently may be more appropriate than evolutionary changes—a prospect for which the conventional development process is ill-prepared.

Against the aspirations of the quality pyramid, conventional planning for new product development fails in two critical ways. In depth, it fails to find and understand the needs of most potential users. The focus too often is on the *customer* and / or *the end user.* This ignores the many other users who also have much to gain or lose from the product's design—those who sell, transport, maintain, repair and retire the product —to name just a few. Listening solely to buyers and operators leads to shallow understanding. Shallow understanding is unlikely to fuel the holistic, thorough thinking necessary for systematically conceived, breakthrough products.

In breadth, conventional planning routinely fails to conceive the most potent product. Development effort typically lingers little more than momentarily on the issue of what the product should be. The concept to be developed, far too often, already is determined before development begins! To use an outdoor metaphor, the expert development team is off at the sound of the starting gun to climb the mountain—but the mountain may be the wrong one. Just any mountain won't do. If the purpose of climbing the mountain is to get to the highest ground, then it is important to locate the highest mountain before beginning the climb. In today's world, it is as important to know *what to make* as it is to know *how to make it*.

Reforming the Development Process

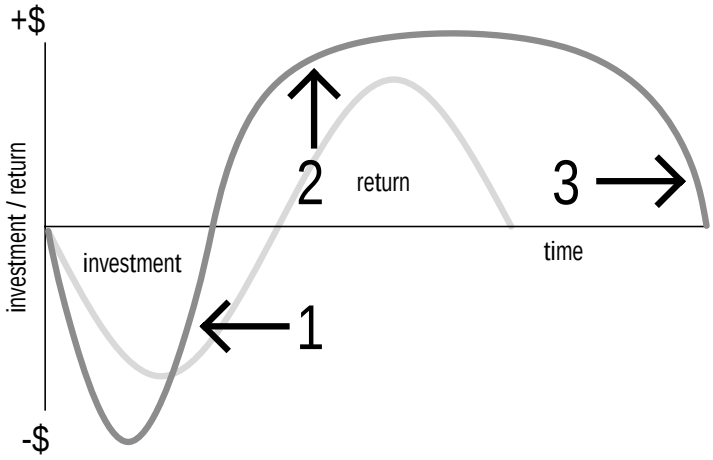
Overcoming these planning deficiencies is critical if the development process is to be able to produce products that meet the prospects of the quality pyramid model. As part of a reformation, processes for planning must be changed. How they should be changed requires a look at the development process in terms of design and its impact on a product's life span.

The Impact of Design

The business model is instructive. The costs a company incurs in developing a product can be nicely compared to the product's profitability by plotting investment and return over time. The form of an investment / return curve is loosely sinusoidal, as suggested by the light gray curve in the background of figure 2. The downward loop of the curve records the investment to develop the product. As the product goes to market, it begins to return value, and the upward loop of the curve records its financial return to the company over its life span.

Of course, a purely sinusoidal curve would be disastrous for a company because return over the product's life would only equal the investment. All companies work to reduce the size of the investment segment, both by shortening it in time and diminishing its dip. All companies also work to increase the size of the return segment, both by extending its height and lengthening it over time.

Figure 2
Improving the investment/return curve.



In today's marketplace, a design strategy can support these objectives in three ways.[1]

First, to shorten the length of the investment segment, the development process must be shortened. From simple physical prototypes for individual concepts, to computer-generated, close-to-real experiences, fast design prototyping can substantially shorten development time (arrow 1 in fig. 2) by close-coupling ideation and evaluation.

Second, to raise the return portion of the curve, the quality of the product must be improved. Human-centered design puts the focus for the design of details where it belongs—and where it is appreciated—on the users of the product. Products sell better if they are better designed for their users—all of them. This involves a deep appreciation of ergonomics and physiological, cognitive, social, and cultural human factors. The principles of human-centered design can be gathered here through Structured Planning to raise quality and, consequently, return on investment (arrow 2).

Finally, to lengthen the return portion of the curve, it must be difficult to develop competing products that can steal the product's success. Structured planning treats products and their supporting services as systems in which ideas are integrated systematically. Products conceived in this way are difficult to copy because their features are systemic. Elements of the design interact in interlocking components of hardware, software and service. Copying any one or a few individual components will not produce equivalent qualities (arrow 3).

Reforming the development process to implement a full design strategy requires all three of these individual strategies, but the major reform that must be made is an organizational one that affects how investment is deployed for *product finding*. Too often today, little or no attention is given to the *exploration* necessary for sound product concepts.

The development process must be changed from a one-step process, in which an already determined concept is turned into a

1 Patrick Whitney, unpublished speech, Motorola, Inc., Schaumburg, IL (February 10, 1994).

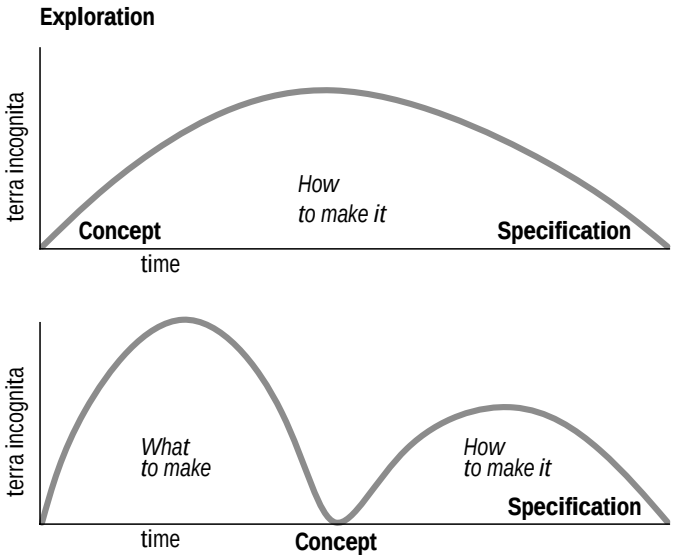


Figure 3
Above: 1-Step development *designing*
Below: 2-Step development *planning and designing*

specification, to a two-step process wherein a distinct development stage is devoted to exploration and determining the concept (fig. 3). The traditional process for which the issue is only "how to make it" must be reconstituted into two separate stages: *what to make* before *how to make it*. The product of the new planning stage of development is the concept; it becomes the "project statement" or "design brief" for the *designing* stage that follows.

The Development Environment

Simply stated, development is the process of producing an artifact or institution in response to an understanding of a problem or opportunity in context. Artisans do this routinely today; before the industrial revolution, it was the normal means of production. In essence, it is a direct form of "making" that moves between the realms of the analytic and the synthetic, without formal intermediate steps.

When systems of production reach a stage of sophistication at which designing and making are done by separate professionals, the development process gains another dimension. There is a distinction now between abstract and real, and the process of development moves to the abstract. Insights are drawn from context, converted at an abstract level to ideas and turned back to the real as specifications for artifacts or institutions.

The one-step development process is represented in this environment as a process of designing (fig. 4). The process begins with a concept, usually at least partially formed. Most often, the concept is an old one to be revised. Sometimes it is a preconceived new one, brought to attention by someone influential within the organization. Too often, it is simply a competitor's product—to be at least matched, and exceeded if possible.

Figure 4
One-step designing.

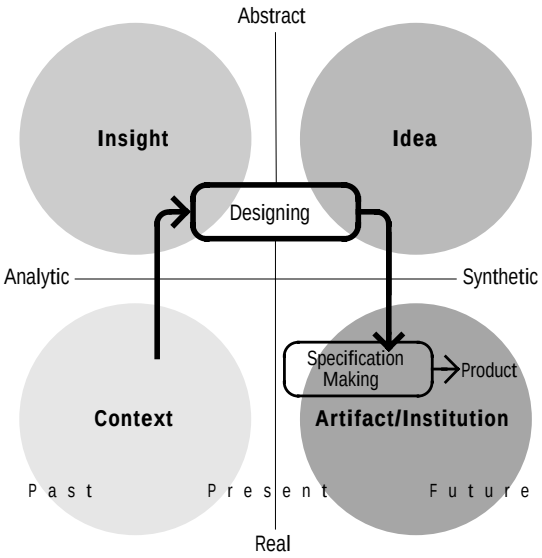
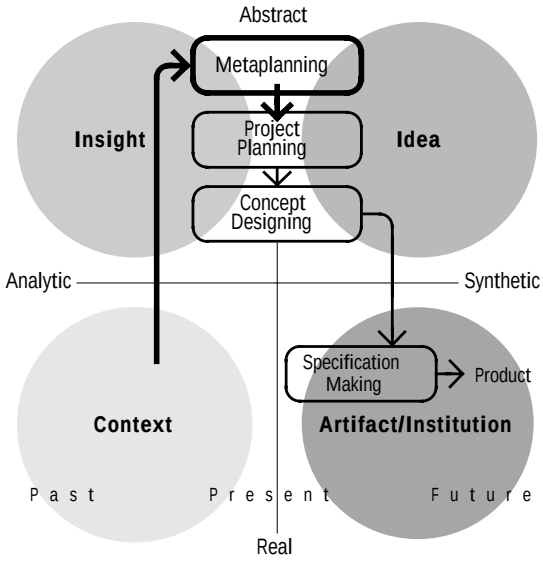


Figure 5
Three-step metaplanning+planning+designing.



The two-step development process, as a step toward reformation, adds a *planning* stage before the designing stage, formally separating the process of concept formation from the process of turning a concept into a specification. Planning is where "the right mountain" is discovered before the climb begins. Structured planning operates in this stage.

To optimize the planning and designing activities, a third stage should precede planning (fig. 5). *Metaplanning* in the three-step model is concerned with *planning the planning and designing processes*.[2] From the metaplanning level, product development projects are initiated by modeling context, identifying issues, establishing resources, selecting and modifying planning / designing methodology, and preparing a preliminary project statement.

2 Chi-Kang Peng "Metaplanning for Design Projects," Unpublished Master of Science in Design thesis, Illinois Institute of Technology, 1993.

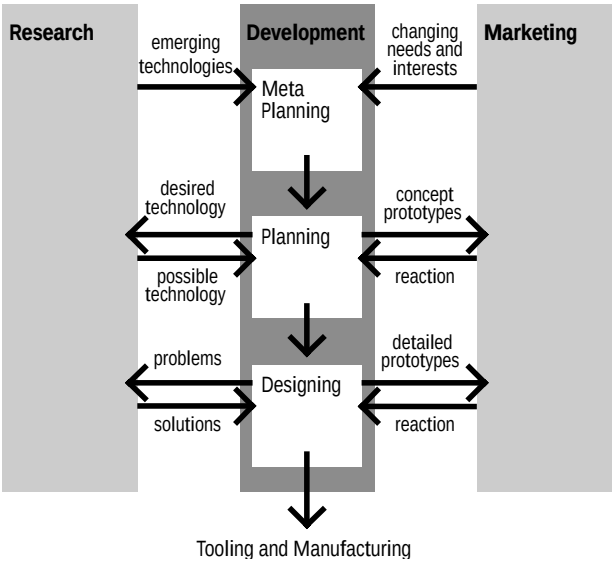


Figure 6
The business context: appropriate interactions at appropriate times.

Metaplanning is particularly important for the full-scale implementation of advanced-planning team operations. In the emerging new model for development, the processes for designing and planning will be as much a subject for development as the products they are used to develop. Those responsible for metaplanning will be closely associated with those responsible for the development of design processes. As better tools for planning and designing are developed or obtained, they will be custom-tailored through metaplanning to the goals of projects to be initiated.

The Business Context

In most conventional industries, the development function has strong links to research and marketing, as well as to manufacturing. Specific terms and descriptions differ among companies, but the general model places the concerns of research with problems the most distant in time, the concerns of manufacturing with more immediate problems; and those of marketing and development in the middle. The various forms of design and engineering expertise are intermingled with those of other relevant disciplines within these functional groupings.

Technological possibilities are investigated by research; user interests are most commonly championed by marketing. New projects are initiated with engineering consultation for do-ability, and there is little or no involvement of other design expertise. The two- and three-step models presented here reform these procedures by substantially augmenting the development process with design and other human-centered expertise at the front end of the process.

This has ramifications for the relationships between development and the other functional units. In figure 6, research, development, and marketing are shown as activities functioning in

parallel. The three stages of the development process are shown within development, because they are supported primarily from that functional unit. Depending on the stage of a project's progress, the relationships between it and research and marketing are different, evolving as ideas coalesce.

Before project initiation, the relationship between development and research (at the metaplanning level) is one of technology assessment. The question is, "What impending technologies within or outside the company should be explored for implementation in new products?" The relationship with marketing at this stage is similar: "What needs and interests are emerging in segments of society?" Neither of these questions elicit product proposals; rather, they launch processes of scouting, exploring, and trend spotting.

At the planning stage of development, the relationships change to direct associations between a planning team and the special expertise of the functional group. Planning teams need suggestions and confirmations of technologies from research as they propose ideas. They need criticism and field evaluations from marketing as they develop prototypical concepts.

When a project has reached the designing stage, relationships between development, research, and marketing are more traditional. Technological problems and solutions are handled by research (when they are not manufacturing related); detailed demonstrations and prototypes are field-tested by marketing. At this stage, the members of the planning team will have returned to their functional groups as champions of the project.

Structured Planning in the Development Process

Within the spectrum of the development process, structured planning provides tools for the planning stage of development. From its inception as a response to general inadequacies in the design process, it has evolved to offer specific remedies for deficiencies of planning. To meet the breadth problem, for instance, it advocates segmentation of the development process. The existence of planning as a concept development stage separate from designing grows out of this advocacy. To meet the depth problem, as another instance, it has, within its tool kit, a process of action analysis expressly designed to seek out all users of a product and to gain insight about their needs from their behavior.

The tools of structured planning, some computer-supported, can be custom-tailored to a project and can be used with other planning tools. In essence, structured planning supports planning and concept development in two major ways: (1) it provides a philosophy, framework, and formats for discovering what needs to be done—with insight for why; and (2) it organizes this information in the best way for planners and designers to use it.

In its most general formulation, it progresses through five phases.

Project Definition

The first phase of structured planning is concerned with project definition. Working with a preliminary project statement and an initial set of issues selected as relevant by the project initiators (metaplanning), a planning team works to investigate the issues, develop arguable positions, and, through discussion and follow-up research, converge upon positions that optimize project goals. The phase concludes with a set of documents (defining statements) that effectively define the project.

Action Analysis

In the second phase, a process called "action analysis" is used to uncover in detail what the product must do. The failure of conventional planning to seek out all users and to consider their problems in depth is addressed in this phase. Action analysis is a top-down analytic technique for establishing the functions that must be performed by the product and its users (considered as a system). The system, as it begins to emerge from the project definition phase, is analyzed progressively: first to establish the modes in which it will operate (e.g., *distribution, transport, use, storage, maintenance, repair, adaptation, retirement—or, in the specific example of a television production system: studio operations, field operations, pre-production, production, post-production, management, transportation, etc.*); second, to identify the major activities that will take place within each mode of operation (under *production*, for example: *recording, participating*, and *conducting*); and, finally, to specify the functions that the system or user will perform in each activity. These *functions* are the "criteria" under which the system must be planned. They usually number in the hundreds, and they record the needs of many users, not just buyers and operators.

In the process of uncovering functions, particular attention is paid to noticing problems and opportunities, potential or actual, that arise as the functions are performed. Insights are gained here into why things work or don't work well. These, along with ideas for what to do about it, are collected and written up in documents called *design factors.* Associated with the functions for which they were observed, they become a major resource for the synthesis phase of planning yet to come and for other development and manufacturing stages downstream in the project.

Design factors record the qualitative information most useful for planning and design. This is where the results of critical observations and research studies are crystallized and built into the information base as a part of the collective memory for the project. Essential during the project as the bases for ideas, they continue to have value through the life of the product (and its follow-on adap-

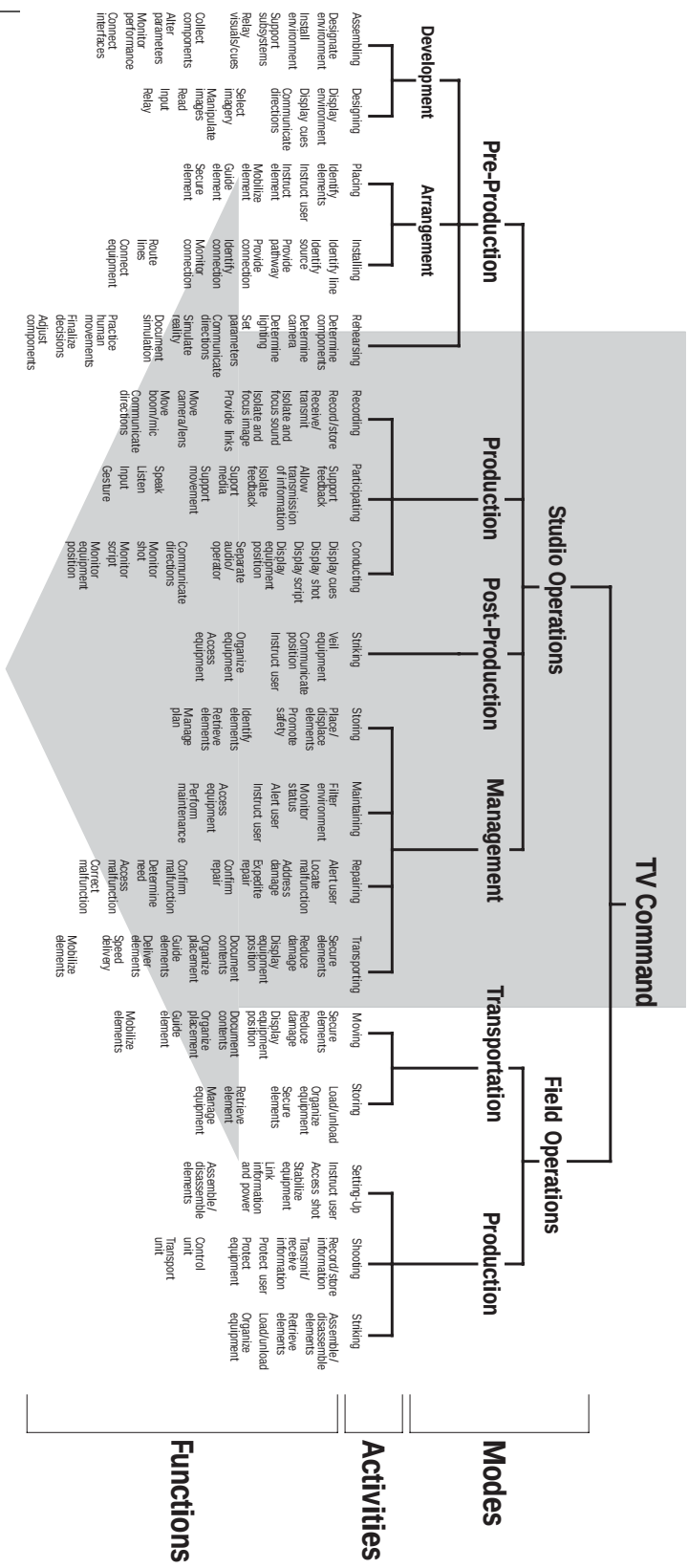
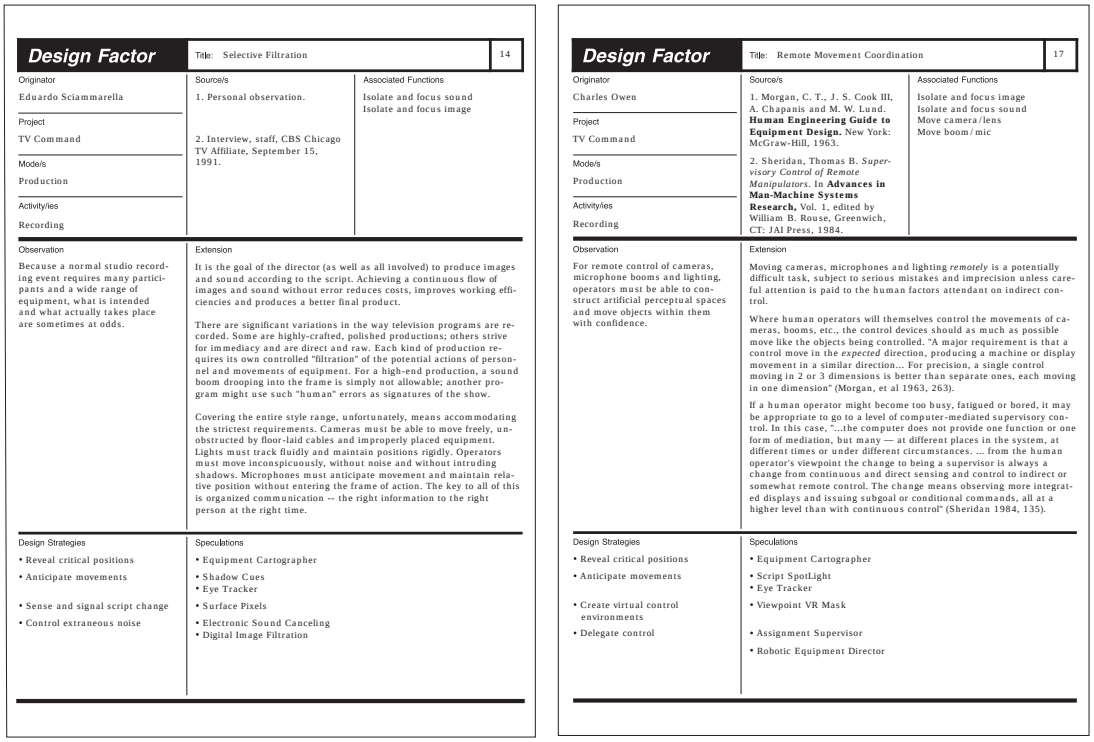


Figure 7
Action Analysis Top-down analysis of functionality for all users.



Design Factor Title: Selective Filtration 14

Originator: Eduardo Sciammarella
Project: TV Command
Mode/s: Production
Activity/ies: Recording

Source/s:
1. Personal observation.
2. Interview, staff, CBS Chicago TV Affiliate, September 15, 1991.

Associated Functions:
Isolate and focus sound
Isolate and focus image

Observation:
Because a normal studio recording event requires many participants and a wide range of equipment, what is intended and what actually takes place are sometimes at odds.

Extension:
It is the goal of the director (as well as all involved) to produce images and sound according to the script. Achieving a continuous flow of images and sound without error reduces costs, improves working efficiencies and produces a better final product.

There are significant variations in the way television programs are recorded. Some are highly-crafted, polished productions; others strive for immediacy and are direct and raw. Each kind of production requires its own controlled "filtration" of the potential actions of personnel and movements of equipment. For a high-end production, a sound boom drooping into the frame is simply not allowable; another program might use such "human" errors as signatures of the show.

Covering the entire style range, unfortunately, means accommodating the strictest requirements. Cameras must be able to move freely, unobstructed by floor-laid cables and improperly placed equipment. Lights must track fluidly and maintain positions rigidly. Operators must move inconspicuously, without noise and without intruding shadows. Microphones must anticipate movement and maintain relative position without entering the frame of action. The key to all of this is organized communication -- the right information to the right person at the right time.

Design Strategies:
- Reveal critical positions
- Anticipate movements
- Sense and signal script change
- Control extraneous noise

Speculations:
- Equipment Cartographer
- Shadow Cues
- Eye Tracker
- Surface Pixels
- Electronic Sound Canceling
- Digital Image Filtration

Design Factor Title: Remote Movement Coordination 17

Originator: Charles Owen
Project: TV Command
Mode/s: Production
Activity/ies: Recording

Source/s:
1. Morgan, C. T., J. S. Cook III, A. Chapanis and M. W. Lund. **Human Engineering Guide to Equipment Design.** New York: McGraw-Hill, 1963.
2. Sheridan, Thomas B. *Supervisory Control of Remote Manipulators.* In **Advances in Man-Machine Systems Research,** Vol. 1, edited by William B. Rouse, Greenwich, CT: JAI Press, 1984.

Associated Functions:
Isolate and focus image
Isolate and focus sound
Move camera/lens
Move boom/mic

Observation:
For remote control of cameras, microphone booms and lighting, operators must be able to construct artificial perceptual spaces and move objects within them with confidence.

Extension:
Moving cameras, microphones and lighting *remotely* is a potentially difficult task, subject to serious mistakes and imprecision unless careful attention is paid to the human factors attendant on indirect control.

Where human operators will themselves control the movements of cameras, booms, etc., the control devices should as much as possible move like the objects being controlled. "A major requirement is that a control move in the *expected* direction, producing a machine or display movement in a similar direction... For precision, a single control moving in 2 or 3 dimensions is better than separate ones, each moving in one dimension" (Morgan, et al 1963, 263).

If a human operator might become too busy, fatigued or bored, it may be appropriate to go to a level of computer-mediated supervisory control. In this case, "...the computer does not provide one function or one form of mediation, but many — at different places in the system, at different times or under different circumstances. ... from the human operator's viewpoint the change to being a supervisor is always a change from continuous and direct sensing and control to indirect or somewhat remote control. The change means observing more integrated displays and issuing subgoal or conditional commands, all at a higher level than with continuous control" (Sheridan 1984, 135).

Design Strategies:
- Reveal critical positions
- Anticipate movements
- Create virtual control environments
- Delegate control

Speculations:
- Equipment Cartographer
- Script SpotLight
- Eye Tracker
- Viewpoint VR Mask
- Assignment Supervisor
- Robotic Equipment Director

Figure 8
Sample Design Factors.

tations) as the underlying information upon which the design was based. With similar design factors from other projects, they define a major new form of corporate memory—a record of insights applicable to any project with similar aspects of function. Figure 8 shows two typical design factors, one (left) capturing a general insight; one (right) introducing ergonomic information critical to the kinds of control problems anticipated for the television production system project for which it was written.

The *Design Factor* document contains a number of entries. Most important, however, is information of two kinds: *information about the problem (or opportunity) detected*, and *information about what might be done about it*. The fact that problem and solution are both covered in the same document is not accidental. It is important, that when insights are recognized, ideas be sought for how to use them; and it is important that, when insight information is retrieved at a later date, the range of ideas expressed when the insight was gained be there for further reflection.

The "Observation" section is the first of two sections dealing with a problem/opportunity. An observation is a sentence in which an insight is recorded about a function. As much as possible, it distills the essence and summarizes behavior important to understanding what happens as the function is performed.

Associated with the observation section is an "Extension" section. In this section, explanatory material is included to extend or develop the information of the observation. No matter how thoughtfully worded, a summary observation is seldom able to

convey enough information to adequately develop an insight. The *whys* that are inevitably asked are addressed in the extension. Primary research may be introduced; background material may be discussed; examples may be cited; contributing phenomena other than those mentioned in the observation may be mentioned; side effects may be considered. After examining the extension section, a reader should understand the design factor, appreciate its value, and even anticipate how the insight might be used—the subject of the following "idea" sections.

"Design Strategies" is the first of two sections dealing with solution ideas. By definition, design strategies are generalized suggestions for how to use the information of the observation and its extension. For a format, they take an imperative verb phrase, carefully crafted to abstract a strategy without specifically describing a solution idea.

Specific ideas go into the "Speculations" section. Speculations are speculative solutions, so named to make it clear that they need not be used in the final overall concept. They are important for determining interaction among functions in the structuring phase of the process—and may actually be used in the overall solution—but, at the time they are written, they are immediate reactions to insight, capturing the creative thoughts of the moment. For a format, they take a noun phrase. Noun phrases express concepts well and are easy to remember—especially if they include colorful phraseology. A good name for a speculation combines an adjective and a noun in an evocative title. Such a title, once explained, is readily retained in memory, and a wealth of detail associated with the concept usually is recalled with it.

Other sections on the design factor form serve the needs of the knowledge base. The "Originator" section records the author of the Design Factor. "Associated Functions" tie the design factor to the functions for which it was written. A "Title" names the design factor for retrieval. Entries in "Source/s" follow standard footnote format, and extension entries contain footnote indicators where appropriate. If the information is from the originator's direct observation or personal experience, the source entry is "Personal observation."

Structuring

Phase three of structured planning is concerned with organizing the functional information for synthesis. The function structure produced by the top-down analysis of phase two is ideal for uncovering what has to be done; *but it is fatally flawed as a model for creating a new concept*.

Because it was created by establishing categories and filling them downward, the function Structure produced by action analysis inherently inhibits cross-category thinking. In the analysis of a housing system, for example, functions such as *sense fire* and *recog-*

nize intrusion would show up in separate categories—probably under Fire Protection and Security. For synthesis, this isolating form of organization is counterproductive. A better organization would be one in which functions are placed together on the basis of whether they *have potential for using components of the developing system in common*. In the housing example, an infrared heat sensor able to detect a developing fire might also be used to sense an intruder, suggesting that the two functions should be considered together when ideas are being developed. Cross-category thinking is stimulated by this form of organization, and the potential for holistic, multifunctional ideas is increased significantly—with all that means for products that are hard to copy.

In the structuring phase, structured Planning's computer programs work from the bottom up using the hundreds of ideas already generated to reorganize the functions into an *information structure*. This hierarchy of functions (with associated design factors) is especially well suited to the creative needs of the planning team. The reformed clusters cross former categories, and functions can appear in more than one cluster. The information structure naturally anticipates well-designed artifacts and institutions.

Synthesis

A number of techniques exist for expanding team creativity. Many of them can be used in this phase. Because of the attention given during the action analysis phase to collecting ideas as they occur, there are typically hundreds of ideas already available to the planning team. Because the structuring phase has organized the functions into an information structure optimized for design, there is a "road map" to follow while considering them.

One of the more useful synthesis tools is a bottom-up / top-down procedure that employs means / ends analysis and ends / means synthesis. Working from the bottom up, means / ends analysis helps the team to understand the new organization of functions through finding appropriate labels to describe the branches of the information structure. Working downward, ends / means synthesis helps the team to select, refine, modify, and invent ideas as the "means" to meet the needs inferred from the newly-labeled "end" branches. Always encouraging thoroughness and pointing the way to cross-functional innovation are the functions, with their associated design factor insights that terminate each branch of the structure.

Communication

Invariably, the result of the synthesis phase is a substantial number of innovative, highly interrelated ideas. To extract full advantage from this wealth of material, the ideas must be organized for optimal communication to those responsible for the next stage of devel-

opment. At the end of the planning stage, the product is still a concept; many details must be resolved creatively in the designing stage before it can be produced.

The concept is communicated as a plan made up of an overview and many system elements, each describing one or more ideas. The overview presents the major elements of the concept and their relationships. Each system element has a title and four information sections. First is a list of essential features—what the system element (whether a physical, procedural, or organizational idea) must have or do to achieve its value. These must be stated carefully to make sure that the essence of the planners' idea will be retained without overly constraining the freedom of the designers. Second is a thorough discussion of the idea with illustrations, calculations, examples, and any other support that may be useful. The purpose of this section is to present the idea as fully and clearly as possible. If the designers are unable to develop a better idea, they should be able to refine one from the information in this section. The third section lists related system elements that are closely associated in operation or purpose, providing a hypertext-like mapping among the ideas for a better understanding of the plan. Finally, the fourth section lists the functions fulfilled by the system element. This enables designers and decision makers to track ideas back to the activities and design factors describing the original problems, opportunities, and insights that inspired them.

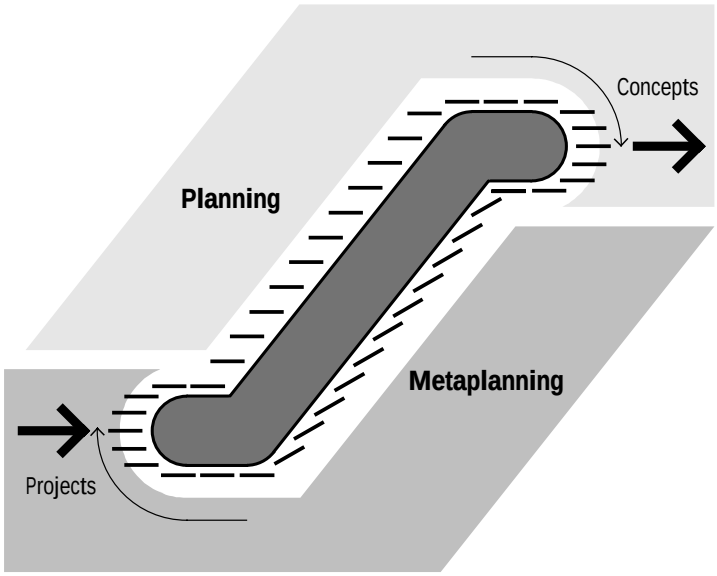
Escalator Delivery

Like it or not, the pace of new product introduction will not slacken. And serious competition will effectively curtail long product life spans. Although structured planning can significantly extend a product's life by fostering high levels of innovation and distributing design features systematically, all products are vulnerable over time. Companies with fast reaction strategies bring down competitors' products by reverse engineering them, and getting to market quickly with low-cost, patent-evasive alternatives made possible by minimal development costs.

The *design strategy* for development pits higher quality products that are more innovative and difficult to copy against the fast reaction strategy. *Escalator delivery* adds another dimension, to give the design strategy a one-two punch. Made possible by a reformed development process, escalator delivery (fig. 9), also is a strategy for fast delivery. It is not, however, a reaction strategy—it is a parallel development process.

At the heart of escalator delivery is the concept of advanced planning teams. Advanced planning teams are small teams of individuals assembled from relevant functional units, supported in their tasks by development, and guided by planners trained in structured planning team techniques. Borrowing from a naval analogy, mem-

Figure 9
Escalator delivery, Predictable delivery: reliable innovation.

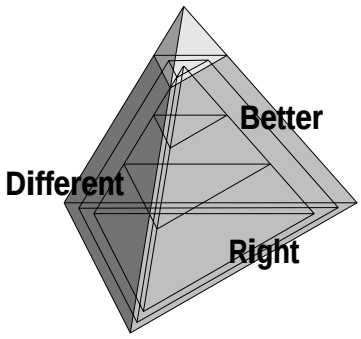


bers of a team are members of a task force. They are "on loan" from their regular type commands, to which they return when their task is completed.

While temporarily assigned to an advanced planning team, members are responsible for the development of a concept for a new product, system, or service to be produced. When their task is completed, they return to their functional units as champions of the project. They (and those that follow them to other teams) also bring back to their functional units new cross-discipline skills and a broader knowledge of their organization's resources, development capabilities, and philosophy.

Escalator delivery gets its name from the process by which advanced planning teams are assembled, charged, and deployed. Through the metaplanning process, planning projects are conceived and initiated continuously, drawing widely on the human resources of the organization's functional groups for the makeup of teams. Once begun, the process delivers new concepts at a predictable frequency. Given similar planning timetables, deliveries follow each other in the same frequency that projects were initiated, no matter how long the planning takes. The process resembles an escalator, with new concepts following behind each other at a predictable delivery rate. The effect is to have new concepts available just fast enough to defeat fast-reaction competitors. Just as the competition successfully brings its copy into the market, its target is obsolete, replaced by a new one more conceptually advanced.

Figure 10
The Quality Pyramid.
Better products through sound *design strategy.*



Conclusions

Design, fortified with appropriate tools, can contribute much more significantly upstream than downstream in the development process. International competition has proven this, and the recent worldwide recession heightened sensitivity considerably. Design now is recognized as the upstream resource most likely to keep organizations competitive under the new economic realities.

A design strategy contains elements to speed development, add value, and extend product life spans. To speed development, fast prototyping and escalator delivery contribute swift response to changing conditions: fast prototyping collapses both planning and designing time; and escalator delivery supplies innovative concepts predictably and reliably. Adding value requires getting the details right. Human-centered design, directed through structured planning ensures that the product is well designed for people and well conceived in the first place. Extended product life span is the natural result of the systemic approach of structured planning.

Evidence is becoming available that the value of the design strategy is being recognized. A recent issue of *Trendsetter Barometer*, a U.S. business newsletter, provides encouraging news: "Breakthrough" revolutionary products have created sales booms for companies that produced them.[3] Of the fastest-growing companies in the U.S., more than one third launched breakthrough products in 1995 and 1996. Collectively, the revenues of these companies soared 1,850 percent over the last five years. How did they achieve this success? First, by innovating revolutionary concepts: a majority applied new technology; forty-seven percent found new uses for existing technology. Second, by organizing themselves to implement a design strategy: the greatest number of successful ideas, thirty-three percent, came from team-oriented research and development processes; almost as many came from cross-functional teams or think tanks.

Reforming the development process enables the philosophy of product integrity embodied in the quality pyramid model, adding value for individual, institution, and society.

From design core to capstone and cladding, the quality pyramid links quality to design. Structured planning implements the model to produce concepts that are superior by design:

- *Different*—freshly imagined to match the best of new technology to emerging needs and interests,
- *Better*—thoroughly and systemically thought through for all users, and
- *Right*—sensitively positioned to meet environmental, personal, social, and cultural needs.

3 David Young, "'Breakthrough' Products, Services," *Chicago Tribune* Business Section (February 17, 1997): 3; compiled from Cooper's and Lybrand's (now PricewaterhouseCoopers) *Trendsetter Barometer*.

The strategy is straightforward; tools to implement it are available; and the road to reform beckons, urged by both competition and opportunity. The rewards will go to those who commit. But the commitment required is more heart than purse. Of all the resources necessary for business or institutional success, the least costly is design. A design strategy, implemented with information-age tools, is a blueprint *today* for success.

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The Transformation of Design

Bernd Meurer

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We experience the world we live in through action, and through action we change it. Change implies creation or design (the German word *Entwurf* connotes both) even at the level of our everyday actions. In the specialized understanding of designers, however, the concept of change usually is limited to the design of products and their manufacture; it is understood to mean product innovation, a process that, in light of the distinction our society makes between production and consumption, is considered completed when the finished product is made. This view of change, confined to the period in which the product is designed and produced, reduces the transformation of the lifeworld mostly to the creation of artifacts. Here, the "lifeworld" is viewed not so much as a process of civilization, but instead as a more or less (un)successful ensemble of physical and informational goods that are produced and consumed.

In this concept of design, the lifeworld primarily is conceived as a three-dimensional world. The temporal dimension is accorded a marginal role only. Even where the factor "time" has always been taken into account, for example with regard to issues of perception and use, the temporal dimension is subordinated to the static concept of the "finished" product, even in instances where the user interface functions as a dynamic information medium, or when air-conditioning, lights, and other equipment constitute sensitive systems that respond to the presence and absence, as well as the movements, of people and things.

The lifeworld, however, can be experienced only as a temporal process that takes place spatially. The lifeworld is something that happens: it occurs through action and it is modeled on action. The lifeworld is more than matter that has solidified as form, and in which time stands still. Its shape is defined through activity; action is its fulcrum.

By contrast, the way architecture and design grasp the environment is fixated on things. Without a doubt, this fixation on objects in the field of design is concerned with processes that take place over time. But, in this case, action usually is reduced to the object-related function of usability, and not considered as a process of change and design in itself. In practice, designers seldom break through the constraints placed on them by this mode of thought.

If we construe design as being oriented toward action, and regard action as something more than passive use, but as active intervention and creative change, then design will no longer just focus on the object as a form. Rather, designers primarily will be

concerned with how to develop and model processes: processes of interaction and change, in which objects nevertheless play an uncontested central role as a medium for action. Seen in this light, design relates to the entire physical and intellectual scope for interaction between people; between people, products, and the lifeworld; and between products, in other words, between machines.

Today, we must do more than merely refresh our awareness of these facts. Given the changes confronting our civilization, we must conceive them anew. Among the buzzwords for this process of change are globalization, economic structural change, increasing social inequality, ecological issues, changes in life and work habits, and the dissolution of traditional patterns of orientation, thought, and action. In addition to the things they actually stand for, these words suggest processes of change that neither proceed according to plan nor are completely random. Civilization changes beneath the surface of a wide variety of social, economic, scientific, and creative designs through a kind of systemic chaos, where everything relates to everything else and is in flux. This shows that design change—in other words, change that is understood in design as calculated transformation—inextricably involves uncalculated self-transformation.

Action implies grasping, doubting, negotiating, deciding, altering, and creating. Action is tied in with interests and, as such, it is characterized by ambivalence, a propensity for conflict and ambiguity. Action is a communicative process. It takes place through motion: through intellectual motion, the motion of people, and through the motion and reshaping of knowledge, substances, things, and data. Motion is a spatial process that takes place over time, although the temporal side to electronic data transfer eludes sensory perception. Given the differences in technologies and speeds, we distinguish between two kinds of motion: transport and communications; two concepts that were in no way separate until late in the nineteenth century.

The division of telecommunications from transport began as early as the age of smoke signals. However, it did not become firmly established until the Morse electric telegraph was introduced in the nineteenth century. In those days, the term “communications” still indicated any and all kinds of exchange; in other words, it included traffic and transportation systems, too. At the beginning of the nineteenth century, transport and telecommunications were still one and the same thing. Disregarding techniques such as semaphore, for example, information was transported the same way as goods and people. The interrelation of time and space still played a central role in passing on information.

In today’s telecommunications, spatial distance is hardly of any importance at all—at least on a terrestrial scale. Thanks to telecommunications, people who communicate with each other but are in separate locations are temporarily brought together. We can

move about via the network of virtual space without leaving our chairs. What we perceive as telereality, and where we are when we perceive it, are co-temporal. Space and time appear to part ways.

And yet within the sensory perception of telereality, space and time, as in reality itself, together create a space-time continuum. For example, the "Terravision" project by Art+Com in Berlin, albeit still in its infancy, is a virtual reproduction of the planet and potentially everything that happens on it, a real-time copy of the actual world. Via such systems, the individual, as a "user" with a "space-mouse," can enter the virtual space-time replica of the real world, and thereby attend a concert in Moscow or a scientific discussion in Cambridge, or watch the construction work on Potsdamer Platz in Berlin. Just as easily—and this is the other side of the coin—the user can flick through these worlds independently of their spatio-temporal context.

The expansion of the electronic network serves to transform the shape of communicative action and the possibilities for it. Buzzwords such as telework, telebanking, teleeducation, teleshopping, and telemedicine are examples of the extent to which traditional concepts of space and patterns for action have dissolved in everyday life. In the near future, we will have access to 15,000 television channels. The quantity of data available is growing, as are the data flows. Unlike the printed word, it seems as if there were no technical limits to the electronic storage and distribution of information. For quite some time now, the problem no longer is a lack of information, but rather a glut of it.

The moment when everyday life became "opaque" has long since arrived. Without orientation systems to guide us, we are lost. And not only in traffic, in the subway, or at the airport, but also—and especially—when it comes to digitized information processing. So-called "personal information management systems" are being provided to handle the flood of information; however, developing these management systems and processing information involves more than just making information available and clear. It is not enough to simply handle the technical aspects of the microprocessing network, which is growing by leaps and bounds. Rather, we also must understand the impact of this phenomenon on our civilization. Today, everyone who is logged onto the network can input or download any kind of information. A central issue here is whether or not people are capable of penetrating the information environment on their own initiative, dealing with information responsibly and competently.

By introducing microprocessors at all levels of our everyday lives, we have altered our understanding of use and the way in which we use things. Increasingly, "use" is changing from being a "hands-on activity" to teleintervention. The form of those products that we still handle directly, is conditioned by the hand or the human body, in addition to other factors, such as their function,

their technology, and how we perceive them. Teleintervention implies controlling processes via a medium instead of handling the objects directly. An increasing number of products can be equipped with features that respond to the user by implementing new technologies, from the fields of robotics, self-diagnosis, and image recognition, for example. Not only are these sensitive products capable of responding to external control impulses: they also are increasingly able to control and transform themselves. Objects and space become sensitive, interactive entities that respond on their own to brightness, color, temperature, moisture, movement, and sound, and thereby interact both with us and with each other. The intrusion of robots into everyday life—similar to developments in the media—potentially can exacerbate cultural poverty. This, although unintentionally, illustrates Nicholas Negroponte's description of the networked household, in which music follows us from room to room, lights turn on and off by themselves, and appliances communicate with each other in a fully-automated kitchen, drawing the car, the garage door, and the alarm system into a conversation in which the refrigerator tells the car that the milk is gone, and the latest stock market quotes are etched by heat into the toast at breakfast. Machines will learn to recognize individuals by their voices, gestures, and facial features, and literally learn to read their lips. Microchips also will find their way into clothing. In addition to clothing us, these "smart" garments also will function as IDs and appointment calendars. According to a study carried out by Creapole ESDI in Paris, they will, in effect, be "wearable computers" that receive, send, and process information. Furthermore, they will be able to change their color, texture, and breathability on their own. Clothing will become part of the network as a body shell. The social, cultural, and ecological problems unleashed by these developments reveal how necessary it is to rethink our concept of use and ease. The easier something is to use, the less we think about how we are using it and the "side effects" of such use. The more perfectly a product has been designed, the less we are tempted to consider any problems posed by it or its use.

As robots enter our everyday lives, design will be forced to confront the issue of processes, and how these processes take place. Products soon will have a self-transforming character, although their scope for doing so still is limited. They are acquiring the features of the machines that manufacture them. Thus, processes that were previously limited to production are finding their way into the domain of consumption. The production process is beginning to extend beyond what is normally associated with manufacturing, with no clear limits in sight. The old adage that production finds its completion in consumption takes on a whole new meaning here. Use and transformation interweave and affect one another in new ways.

Products are viewed as processes in ecology as well, but for different reasons. This applies both to the ecological cycle of a product, from its manufacture to its disposal, and to the product's function as a medium for action and economic commodity. The Wuppertal Institute for Climatology, Environment, and Energy draws up an ecological "balance sheet" for objects and processes by analyzing all the relevant equipment, raw materials, and products, and the converting, packaging, and transportation processes. Their investigation addresses all aspects of an object or a process as it emerges, during its existence, and after its disposal. This extends to tapping raw materials and energy, production, use, and maintenance, as well as all recycling, disposal, and decay processes. The materials flow that results from these processes is considered to be the decisive factor in determining to what extent a product burdens the environment. "Materials flow" here means the extraction, transport, and transformation of all substances that go into the manufacture and use of a product, as well as all subsequent processes.

The goal is to reduce materials flow and thereby lessen the damage to the environment. This can be achieved, on the one hand, by increasing material intensity in the product life cycle, in other words, by reducing the quantity of materials used while maintaining or enhancing performance. On the other hand, the hope is that, by applying service-oriented economic principles to our supply economy, with its emphasis on boosting unit sales, products will be used more intensively, thereby braking the upward trend in product quantities without sacrifices at the consumer end. Change seems to be occurring here. Not for ecological reasons, but mainly for economic reasons, service-oriented approaches are being developed in certain areas of the supply economy. In this context, a service orientation means uncoupling the use of certain products from their ownership. Rented apartments and rental cars are long-standing examples of this principle. In the transportation industry, for instance, "individual mobility" is being considered independently from private car ownership. This is conceived as a service that must be readily available as well as highly attractive for potential consumers. Car sharing and car-pooling are mere beginnings of this new concept of individual mobility as a service where products could be used more intensively. Ownership and use do not necessarily have to be one and the same. This is especially true of software. Products dissolve into services; processes come to the fore. Telecommunications forms the basis for service-oriented forms of the economy, with networking as the key factor.

In practice, interest in networked computer technology within the field of design primarily focuses on image generation; however, the radical changes that will prove decisive for the course taken by civilization are occurring on a completely different level, one that is not visual and appears far less spectacular on the outside. As the networking of computer, telephone and television tech-

nology continues to unfold with little fuss but great capital outlay, it is spawning a global arena for action that defines and incorporates individuals' actions on an economic and social level—and above all in the world of work—in a completely new way. Work, which it was possible to organize rationally in the mechanical era only in large working communities, increasingly is becoming part of the virtual network. When the work world finally is networked on a global scale, it will become a comprehensively integrated institution, not only for those on the network, but also for everyone else, provided they do not fall through the meshes. In this new, synthetic work world, every form of work that can be executed and transmitted via computer technology also potentially can be called up and carried out by anybody anywhere in the world, "just in time." Not only jobs, but also study places will no longer be tied down to central, collective workplaces.

The networking of work changes the social and spatial organization of work, and thus the social and spatial organization of the lifeworld. This presents completely new challenges for design. In organizational terms, work is being networked on various levels, one of which is called telework. In the European Union, there are, at present [1996], approximately 200,000 telework-stations. In the United States, this figure is already eight million. In Germany, according to an estimate by the National Association of German Industry (BDI), in just a few years there will be more than three million telework-stations. The traditional forms of work that are tied to common places, such as factories or offices, lose their significance. This affects human social behavior, the spatial organization of cities, and the typology of buildings, too. The traditional spatial division of cities into separate residential, work, consumer, educational, and resort areas has its roots in the principles of the industrial division of labor, and developed historically in that context. The tradition that has shaped urban space, in which people leave the residential areas in the morning to gather far away in commercial districts to work in a joint setting, and then return to their homes in the evenings, is barely 150 years old. It is a product of the principles of the industrial labor society, through which the cold wind of structural change has been blowing for a long time. In historical terms, the city divisions based on these principles certainly will not be the "ultimate" shape eventually taken by urban organization.

Work is becoming an endeavor that can be carried out independent of location. It is becoming literally mobile which, in turn, corresponds to the increasing demand for mobility in the job market. The local job market is becoming global. Not only are we able to transfer manufacturing to countries with lower wage levels; administrative, scientific, design, and cultural work also are moving on the information superhighway. Already, according to a statement made by the Institute for Economics and Society, highly qualified workers in low-wage countries such as India are writing computer

programs for multinational companies. Recently, there was a statement in the press that Mercedes-Benz is building a research and development center in India. Networked work means more than exchanging information at the speed of light—information that could just as easily be sent in printed form. The crucial difference is that, in networked work, computer-generated data and constructs are no longer processed separately in individual computers and then made accessible to everyone else. Instead, it is possible to develop them in a linked network of computers that supplement and enhance one another.

Take Otis, the American elevator company. This company owns production plants at twenty-four locations across the globe, and conducts research and development at fifteen facilities worldwide. At present, the work technology used by these development groups links them as part of a global computer network; they are then supposed to work together as a so-called "cosmopolitan development crew"—cooperation that takes place seamlessly across time zones. The research day is extended to a 24-hour workday. Shift work mutates into time zone work. Within these cosmopolitan work groups, the structures of real, local work communities are coupled with supra-local and virtual structures, and thus are less binding in social terms.

In networked work, the individual acts in real time both in network cyberspace and in real space, to which he or she remains physically tied, with everything that this implies. People speak mystically of bodies that vanish in cyberspace; yet, at the same time, the human body has never been given as much attention as a real entity as it has in our time. Even the fitness industry is booming.

The ever-expanding information networking also has an impact on the status of transportation. As machines aimed at saving time, means of transportation cannot keep pace with data transfer technologies. However, as machines for transporting people and goods, they are in no way losing importance. The Frauenhofer Institute for System Technology and Innovation Research maintains that the advent of telework will reduce professional and business traffic from thirty-four percent today to twenty-eight percent. However, there is no reason to suppose that, in this context, traffic growth will diminish. After all, it is modern telecommunications in the first place that allows people to go anywhere anytime. In addition, the new technologies also will make the workplace itself mobile. The information highway will in no way ease the burden on the real highway.

The meanings of space, time, motion, and speed are changing. Two apparently paradoxical observations summarize the present situation of the urban space. On the one hand, people are speculating that better and faster communications technology will make urban communal life superfluous, at least in communications. On the other hand, urban conglomerations are expanding at an alarm-

ing rate. When Paul Virilio says that the city no longer is necessary because people no longer require spatial proximity to each other to establish linguistic and visual contact, this merely specifies that, in purely technical terms, it would be possible to communicate without ever leaving our houses. However, we can hardly expect that communication will be reduced to this level through the development of telecommunications technologies.

The social structure is what is changing, together with the spatial organization of urban life and business. The virtual, global economic network—the "global city," as Saskia Sassen calls it—is being superimposed on real urban space. Unlike in earlier times, a city's economic importance no longer will be defined solely through its function as a regional hub for the exchange of goods and information; rather, the function it assumes in the international economic and financial network is becoming the crucial factor. Thus, a gap is emerging between a city's economic function in the international economic network, on the one hand, and the actions of the city dwellers in their local context, on the other, severing the connection between urban communal dwelling and economic action, which is what creates identity. This development has a correlation in the increasing social inequality within cities. In Germany, which certainly cannot be considered a poor country given its GNP, the bottom fifty percent of households possess only 2.5 percent of all monetary assets, whereas the top ten percent possess more than fifty percent. Alain Touraine refers to this phenomenon as the increasing presence of the Third World within the First World.

Along with the upheavals in the work world, the structures of social space also are changing. As work increasingly is a matter of microprocessors, the economic foundations for the social system that developed over the last one-hundred years, based on a form of gainful employment in which the employee is directly dependent on his / her employer, are being eroded. The social security systems of the old industrial society are unsustainable. New systems have to be invented. At the same time, communal forms of work in many fields are being replaced by workstations that are networked and not in the same physical location. As the form of collective work spawned by the industrial society vanishes, this society also loses its potential to engender communities. Customary orientation schemes, principles of behavior, and social safety nets no longer are effective. Something else arises to take their place. The question is still open, however, as to which new forms of community-oriented action could be developed on what basis, and how. On the one hand, this vacuum provides historical scope for developing new options. On the other, it provides the pretext for clinging to purportedly proven concepts with fundamentalist zeal.

With the mobilization of work (buzzword: telework) and the globalization of the economy (buzzword: separating economic processes from the workplace), the basis for the social organization

of our lifeworld is undergoing a transformation. Ways of life are changing, and so are the demands made of design. It would be more than daring to try to predict what will take their place. Instead, the crucial issue is to broaden the concept of design to accommodate new challenges, and to provide arguments that will free it up as a social, political, economic, and cultural scope of action.

Today, design must be construed as sustainable development. Sustainable development means more than environmental design with a focus on ecological aspects. According to the words of the Rio Earth Summit, "Sustainable development" claims to link "ecological sustainability" with "social equity" and "economic development." Design that intends to rise to meet this challenge is all-encompassing, tying in ecological and cultural aspects as well as spatial and temporal ones. The interdisciplinary approach, however, as it has been practiced to date, has been incapable of effectively combating the problems generated by dividing work into separate spheres of expertise. Instead of just adding disciplines to one another, there is a need to develop work principles that prove more effective to integrate them with one another. In doing so, specialist know-how will be irreplaceable. Design that is oriented toward sustainable development is a complex of activities that transcends typical images of professions. It can be neither conceived nor taught as a separate field. It must be developed by intersecting existing disciplines and individual areas, within the scope of projects and flexible groupings constituted and adapted specifically for the problem at hand. To achieve this, a new kind of institution must be established: facilities that are understood as an open, interactive field for design, science, and technology. Design must be understood as a networked activity, based on the model of specializing according to the given context. This does not mean that the various disciplines are to be done away with. Instead, the nature of specialized work must be changed by orienting it to specific problems rather than to traditional disciplinary areas. Of course, this presupposes disciplinary competence.

The question to be raised once again is what constitutes design, and which criteria will be used for identifying and questioning design issues? Design, science, and technology have to see themselves and each other as objects of creative reflection and intervention. This raises doubts as to whether or not design, science, and technology—areas of activity that, as history demonstrates, are capable of changing the lifeworld from the bottom up—are capable of transforming themselves. Thus, we must challenge the social organization of design, science and technology, a concept that is at odds with the established distinctions between spheres and disciplines, as well as their resources—particularly at universities.

The concept of superimposing various disciplines to address the problem or project in question could spawn a new hybrid category of design activity, which will emancipate itself from traditional

disciplinary concepts. It would be equally oriented toward research and practice, but in a novel way. Design that acts responsibly concerning the future—that is critical and analytical, that asks questions and develops alternatives, that discovers causes and contexts, and that develops new, comprehensive ways of identifying problems and forms of design action—demands that both scientific concepts and shaping concepts for change be developed so that each complements the other.

Design is impaired above all because many people, both designers and non-designers, see design as the creation of unquestionable answers. In this context, sociologist Ulrich Beck speaks of "the culture of certainty" and its fateful role. Undoubtedly, the search for absolutes is an age-old phenomenon. But certainty excludes doubt, and thereby turns into dogma. Doubt goes hand in hand with uncertainty. And doubting what exists, what one thinks, and what one does is the most important aspect of creative action. Doubt is a prerequisite for creativity. Design should be effective, but in its effectiveness it must also see itself as a self-created problem. It must acknowledge the fundamental doubtfulness of its own action, and create a public awareness of this. Design must be liberated from the one-dimensional mode of thought that focuses on solving tasks, and instead must be seen as the constant creation of new tasks.

Modernist Paradigms Never Die, They Just Fade Away

Dietmar R. Winkler

Limits to Knowledge = Limited Freedom
Unlimited Knowledge = Unlimited Freedom
Unlimited Knowledge + Unlimited Freedom = Utopia:
To do, or not to do; to think, or not to think.

Modernist principles of universality, oblivious of social contracts between members of macro and micro cultures, must give way to greater sensitivity and understanding of social concerns.

The Modernist Epoch

Each century begins, as each epoch must, with reference to the near or even distant past. Such acknowledgment is necessary to begin framing the culture-sustaining, reinvigorating, and metamorphosing concepts that achieve better futures.

This century, at its start, acknowledged the sum of good and bad human intentions, conservative and adventurous ideas, constructive and destructive inventions, and the ambitious social engineering and experimentation which became, in some instances, culture sustaining and, in others, pernicious. Human memory's natural short-sightedness and selfishness is aggravated by the territoriality of schools of thought, arrogant national chauvinism, disdainful religious beliefs, and the baneful nostalgia that always transforms the more simple past into a cure for the more complicated future.

The human heritage of previous thought and accomplishment is embedded in all present, from the philosophical to the religious to the political. The ideas, objects, and conventions flowing from it are both the culmination of cultural achievement as well as obstructions to identifying those obstacles to better futures.

The roots of all ideas reach far back into history. They become obscure over time, yet their impact and inferences are durable and at times, permanent. Francis Bacon, John Locke, David Hume, and their peers, thinkers, philosophers, historians, and statesmen, stand in the wings, concluding the Age of Enlightenment by ushering into existence Europe's major social revolutions. Martin Luther's emancipation of commoners, and Gutenberg's publishing venture and disseminating the resulting of knowledge, finally lead to the American social experiment and example-following declarations of

independence. The musings of the ancients, the influences of Descartes and Spinoza, and Kant's and Hegel's philosophical theses prepare Kierkegaard's existential vision which, in return, nurtures modernist ideologies.

At this point in time, modernism, trying to keep its nearly century-old cultural power and control, and not ready to give in and die, is slowly fading away. Naive social concerns and a misunderstanding of societal complexity make way for more sensitive approaches to solve the problems of the next epoch.

The Social Experiment

Consider the end of the nineteenth century: Europe begins to experience an extreme social transformation, provoked by further industrialization, the continuous migration from agriculture to manufacturing industries, the abandonment of countryside, and the growing congestion within metropolitan areas. What results is a tangled metamorphosis of the entire social hierarchy. Hierarchical controls, leveled through the formerly rigid class structure, are freed from the social straightjackets of church and court, thus enabling the expansion of ideological possibilities and choices. Common interlopers, taking advantage of the university and entrepreneurship through industry, usurp the power of traditional landowners and aristocrats. Nobility and military see their social position slip; they sometimes become less equal with aggressive industrialists and the new class of educated.

With eyes fixated on hierarchical survival, a blind spot of vulnerability emerges, with a pervasive vacuum of social irresponsibility. New political movements emerge, pressing the public to choose from among benign socialism, national socialism, fascism, autocratic communism, and totalitarian and militant Bolshevism.

Society builds the social contract on individual perceptions of what the quality of life is (or should be), and what a particular society guarantees all of its members. Designers must understand that most values, no matter how altruistic, are bound by certain realities. No member of society wants utopian expectations for the future. Each wishes them to be pursued and actually realized, sooner rather than later, and, it is hoped, in one's own lifetime (or at least that of their children).

Values are the means by which individuals, small groups, or entire cultures establish the measures for expectations of behavior and responsibilities. Valuation occurs when machinations of cultures are observed and framed into self-defining perceptions. All valuations are in states of constant deliberation and flow. Cultural validation is an interpersonal system of valuation reached through consensus. Value systems comprise past experiences and values selected by others and by cultural institutions. All valuation requires either acceptance or rejection of one thing over something else. Cultural comparison represents the first step in developing a

cross-cultural overview. And it is daunting to determine which cultural measure to apply—western, Judeo/Christian, Islamic, Buddhist, all, none, new ones?

Value is that place between existing conditions and a desired state. Individuals scan relevant information for fulfillment of expectations. They respond to outsiders' opinions, moods of presentation, and contexts for interpretation. A free society minimizes those risks inherent in having values that differ from others. But even a free society refers to outsiders as "crackpots." Individual perceptions joins with others' perceptions to compose a cultural frame for the social contract. Even with many shared values, the complexity of human interactions inevitably creates conflicts. Members of tightly-knit families do not always agree; the global view of intercultural values is even more loaded.

The Scientific Legacy

The accumulation and coexistence of ideologies—many ancient, many superseded, and many reinforced by religious interpretations and dogma—held the cultural perception of science in nearly schizophrenic strongholds. Even today, creationism competes directly with Darwin's thoughts on evolution. Throughout all epochs, cultures faced drastic metamorphoses, even with substantial intervals between the beginning of consciousness and the next intellectual intrusion. But each generation of change has accelerated in relationship to the efficiency of recording methods, and contemporary rates are stunning.

The concept of atomism (concepts of the smallest units), developed nearly 2,500 years ago and declaring indivisible, indestructible atoms as the basic components of the entire universe, reluctantly must cope with the new challenge of determinism and its subsequent challenge by concepts of relativity.

Determinism, as framed by Isaac Newton and his seventeenth and eighteenth century contemporaries and looking at the inevitable consequences of causes that are independent of human will, is somewhat easier for citizens to understand. It is easier to live in a deterministic world where cause and effect can be identified and measured. A deterministic world structure is easier for doling out praise or punishment. Einstein's world, with its continuous shifts of values, makes life more complex. When he insists that everything is dependent on its contextual relationship with something else, the citizen must abandon simplistic viewpoints and search for a wider range of possibilities. The citizen's sphere is further agitated by Heisenberg's concept of uncertainty, which allows for questions that expand the number of realistic and utopian possibilities. When quantum physics and mechanics enter the commoners' sphere of perception, the reaction is overwhelming.

The arts, literature, and music pick up the philosophical threads, and the world is provided with expositions of uncertainty

in which conjecture, prefiguration, foreshadowing, and forecasting play new, important roles, and where the prospect of miscalculation becomes part of an intellectually challenging discourse.

Through the Renaissance and continuing to the invention of photography, the scientist is both an observer and recorder of visual manifestations of phenomena. We find in DaVinci's drawings his scientific discoveries, and in Dürer's drawings and woodcuts, the exotic quality of foreign animals. In Kepler's and Copernicus's sculptural and mechanical models and drawings is the four-dimensional understanding of the universe, and in Galileo's water colors, the sensitively materialized surfaces of stellar systems. The diaries of Humbold and Lewis and Clark shed life on ancient cultures and new continents, while Audubon freezes the frantic world of birds. There is no rift between artist and scientist yet.

But at the turn of this century, there is clearly a deep schism between artist and scientist. While scientists consider the complex, the multicontextual, and the unanswerable questions of probabilities, the Modernists are exploring the opposite, specifically the reduction of the complex world to a simplified essence.

Existential Modernism

There probably is no trace of a direct connection between existentialism and modernism. However, existentialism is a principal energy of the times, and the turn of the century could not define itself without the introduction of new scientific, philosophical, and social ideas, giving rise to, and permission for, energetic experimentation.

Existentialism made it clear that life was, and is, Sisyphean in nature, absurd, man-made, and individually constructed. In the personal interpretation of a convoluted, nonsensical universe lies the individual's existence and the impetus for responsible personally-directed action. The paradox of knowledge that simultaneously is and is not of importance, fidelity, and value lies in the belief that everything knowable exists already. What is known seems to vacillate between transparency and semi-transparency, and opaqueness. Even that which is in sight, completely formed or only partially discernible, we cannot understand because of the blurred vision of language, and its lack of appropriate metaphors. We are deterred by customs and taboos, the human shortness of memory, and the sluggishness of one-generation minds.

Humans live in the middle of nature, ceaselessly communicating with her, yet remain strangers, while she betrays none of her secrets. The observer can only speak of the world and nature in relationship to what he observes and then constructs into meaning. He may anticipate, foreshadow, muse, and invent; but he can be sure of anything only through verification, which he must do over and over and over again. To reconcile the wish to have things behave in specific, deterministic ways with the dynamic reality of nature's

complexity defines the struggle between the simpleminded human ego and nature's ecological metamorphosis.

Life is chaotic in that knowledge metamorphoses with the revelation of something new. Thus, all taxonomies are spurious, awaiting reorder. And all measures of aesthetics are deceptive, awaiting another elitist's redefinition, because all measures of aesthetics serve to express the power of a self-appointed ruling class.

In the territoriality of disciplines, the lines are clearly drawn. Science denies spirit (art), and spirit denies matter (science) as a product of spirit. Cognition battles intuition, while the world awaits the unification of matter and spirit. Meanwhile, the whole person is both cognitive object-maker and dreamer, diligent information-processor and imaginative misinterpreter. The world of the intellect is territorial; the genuine, significant discovery must do battle with tradition, dogma, and ideological barrier—culture admits nothing easily.

One person's ideological expansion is the other's shrinking intellectual territory. Only time verifies the worth of ideas. Soft thinking is usurped by hard, uncompromising reasoning. Statements of fact and knowledge are accepted only after scrutiny and value certification by the cultural "gatekeepers," usually ill-equipped and unwilling to accept new ideas. Only independence can create knowledge, satisfying personal curiosity, and sharing it in discourse. For a social system to maintain vibrance, all members must be literate. Those privileged to receive the quality education that the school catalogue dares to promise must excel in their cultural literacy and aspire to build the foundation of culture.

Interestingly, while modernism preserves for itself the right to think and do freely, it invents dogma for its followers and the slogans that make the missionary process efficient. Only the true individual could not be confined by their naive truisms: small is or is not beautiful, form does or does not follow function, design does or does not make order, and does or does not make meaning.

The truly independent individual must be Sisyphus, condemned forever to roll the burden of knowledge uphill, only to find it again in the "not-knowing" position. Albert Camus considered Sisyphus content in his absurd role, understanding that none of human actions matters. Each person, individually, must translate the rockpile of life into a world of personal order, meaning, and aesthetic quality. Therefore, the fulfillment in life lies only in the utopian dream.

Utopia is the perfect place, the impractical, the altruistic, and the idealistic concept for intellectual reform. Utopia does not allow boredom to assail the senses. Unattainable, utopia is hope, hope for a better future. It provides choice between despair and exhilaration, and provides the impetus for innovation, exploration, and discovery.

The human struggle to be recognized, to achieve status and rank high socially; and to control vast physical, emotional, and ideological territories; pits man's biology against his mythology. In the desire to leave behind fingerprints, modernists gave the world many concepts—many of them constructive, but most of them contorted and destructive of culture. In the drive for self-actualization, modernists insured against self-ruination, but they could not conceive of the possibility of individuals reaching beyond that which modernism would allow. In implementing their plans, they forgot for whom the world was to be designed. They forgot that, above all, they must preserve the rights of citizens to evolve, to mature, to understand, and to refine their individual understanding.

There seems to have been a very pivotal point in the nineteenth century, when the sense of individual independence and emancipation is further focused through existentialism. Not knowing, or not understanding, is pitted against the self-imposed responsibility of struggling to understand—countering not doing with doing, placing healing in opposition to hurting, setting building against destroying, and hoping against despairing.

Kierkegaard's existentialism condemned each person to freedom and responsibility, and to a dual life of cosmic loneliness and cosmic belonging. Existentialism revels in its belief that the universe lacks specific purpose, as well as permanent, predetermined values; since the human self has no permanence, man can then free himself from biological constraints and become a free spirit, assigning an independent intellectual quality and a moral conduct to his life. Believing that thinking turns the soul into spirit, and that each action must respond to soberly deliberated judgment, the keystones for the dreams, responsibilities, and realities of modernist institutions were in place.

The intellectual quality of existential modernist knowledge vacillated between understanding itself as the most precious possession and, simultaneously, the most pernicious illusion. It neither freed nor enslaved us. Its confinement of perception, language, conventions, and customs on one side was offset by the freedom to investigate all altruisms of life, turning Chauvinism into internationalism, selfishness into compassion, and dishonor into honor. The roots of the design profession were imbued with qualities through which society would snatch freedom from the jaws of human despair.

The modernist vision begins this century in spite of the existential belief in the universe's lack of specific purpose or clear meaning. Modernism charges its individual members with making the journey into the void of life meaningful, placing life's concepts of essence—personality, spirit, individualism, and value—directly behind the immediate action of the moment, and making action and existence the machine of life.

Unfortunately, modernists were quickly mired. While the climate was right, the intellectual preparation for the ideological journey into freedom lacked depth and quality. Down deep, modernists were elitists. They believed in their superiority, but not in emancipating the public. Modernist institutions such as the Bauhaus enjoyed the symbolic status which the close relationship with the industrial and corporate worlds fostered. Its legacy is both further intertwined with the industrial complex and further adrift from understanding people's culture and behavior.

A search through the curricular documentation will reveal that form and color languages were efficiently linked to practical concerns, and the effectiveness of form concepts rationally explained. But it is immediately clear that these modernists were disconnected from the social and cultural value system. This intellectual vacuousness and serious deficiency in understanding behavioral, social, and cultural issues is uniformly integrated into most design programs.

Modernists missed the point. Design functions best when it facilitates communication and when it reconciles those social, cultural conflicts that stem from competing social, political, and economic contexts. To design well means to understand the complex human interactions, especially the human ecology of value discrimination which locates and identifies individuals and defines their behavior. Sound design solutions emerge from the context of human conditions; they cannot evolve without direct reference to user and culture.

The Bauhaus provides a good model for analysis because of its respect and reverence among design practitioners and educators. Many a curriculum plan has, at its base, a significant portion of the original Bauhaus model, and many a professional's early success was based on Bauhaus rhetoric. The missionary eagerness of the Bauhaus also meant, unfortunately, that its intellectual vacuousness was transplanted. By aligning itself with craft and technical education and guilds, it severed its future from intellectual possibilities. Although design education is not doomed to a second seat forever, it must struggle against its anti-intellectual history and adopt a better definition of the new function of design.

The modernist missionary zeal carried its ideologies from Central Europe to dramatically different cultures. It never occurred to modernists that design for cultures in which the individual is guilty until proven innocent cannot function in the same fashion as design for cultures in which the opposite is true. The American Constitution, for example, promises and suggests (in principle at least) vertical or horizontal movement, according to choice and unrestricted by social strata. Modernist viewpoints prove themselves uncomfortable within that framework. They are destructive to indigenous cultures, and chip away at what is the obvious necessity of choice in democratic societies. By imposing uniform solutions

for diverse audiences, modernists revealed their disdain for the citizenry. It is interesting to see Jan Tschichold's prediction come true. He had charged modernists with playing into the hands of the totalitarians and autocrats. Looking at the design culture, it is obvious that modernism best supported the military-like industrial complex.

The New Responsibilities

Designers are at a crossroad. They either can continue to support ideas and ideals from a different century—continue to make objects and images—or they can take a different road to building cultures.

The builders of culture assume responsibilities that go beyond self-serving gain, notoriety, and self-adulation. They assume the mission of becoming well-educated. They must see the world as a web of stimuli, generated not by a singular ego, however brilliant, but by all disciplines, each contributing to the knowledge of the diversity and complexity of human nature. Authors, researchers, scientists, philosophers, sociologists, and behaviorists—all humans are observers of a same universe in a same epoch, even if their contexts for viewing differ. As they muse aloud about their perceptions, they influence each other. As they articulate their views of the world—never completely right or wrong—they negotiate what they see through the values of their time, verifying fact through discourse and challenge. Somewhere in the middle, between the many perspectives, members of the culture form their own opinions, based on their reading of the information at hand.

Creativity, inventiveness, and discovery can be measured only through the metaphors of language. Inventions can be refined only through the simultaneous refinement of language. Language helps ideas evolve through a vast, complex system of metaphors.

The task of building and supporting cultures begins by defining a world which supports an autonomous individual in reciprocity, maintaining and sharing the environment. Each individual has in mind the specifics of a social contract.

The Social Contract

The social contract is an unwritten birthright, a tacit pact between individuals and their society. It exists mostly in fragments, and is dispersed throughout the entire quilt of a culture's ethos, guiding its members' behavior. These fragments reside in language; comprise mythologies, taboos, and values; and restrict or encourage personal behavior and customs. They serve to express those values and aspirations that signify the best of an individual's culture.

This contract guarantees the most basic components of social, cultural, and physical survival: enough food to thwart famine; shelter against the elements and against intrusion or harm by others; a sense of belonging to a family or clan, not feeling marginalized or segregated; and qualities such as self-esteem, social standing, and the right and opportunity to express opinions and

make choices. These guarantees are linked to anticipations and expectations, which are responded to through personal behavior. When the expectations are unmet, the social contract has been broken and contentment becomes fear or paranoia.

Individual sovereignty is the key to the culture in the social system of the next millennium. Designers must understand the ramifications of supporting members under this umbrella. Autonomy, with the right and opportunity to decide, begets principles of social equality and respect for all individuals of the group. The democracy that emanates from this principle selects its government, and elected representatives execute it.

Democracy, however, promises only the potential for achieving quantities of high quality. It guarantees only that the voice of the majority is heard. Therefore, freedom for one does not translate automatically into the freedom of another—and the contentment of an entire society is not a sure thing.

An integrated world society cannot be expeditiously fabricated: the variables in any one human ecology are much too complex, let alone in a large number of competing human ecologies. The concept of an integrated society is an utopian ideal, too easily lending itself to simplistic solutions and propagandist rhetoric.

The reality is that groups generally meet with one another solely to satisfy common needs and reap common benefits. Because they seldom have identical historical, religious, and cultural backgrounds, cultures rarely meet as equals. While biology, sociology, and anthropology suggest that human equality is a natural impossibility, it nevertheless poses an ideal that the design community can accept as a decided, necessary possibility. Designers own the tools and processes that can reduce the inequalities by communicating and celebrating the differences between cultures.

Each perceptual personal frame anticipates certain results. The qualities of interaction with the social and natural environments shape anticipations. Both personal and societal values are in a continuous metamorphosis. Great injustices separate the individual's frame of value from that of the social group. When the expectations of social conduct are no longer met, the social system cannot survive, and the social contract indeed has been breached.

Value Introduction and Modification

To attain sustainable futures, designers must understand the difficulties of changing the behavior that is bound to, and relates to, traditional values. With the earth's resources diminishing; with the imminent doubling of population; and with the plagues of famine, pollution, and waste, a major new field in design will be the modification of traditional values and behavior, and the introduction of new ones.

All values are utopian, withstanding clear definition. They represent the tangible and intangible: turf, territory, ideas, dreams,

and emotions. Mediating the constant shifts in merit is disconcerting and consumes too much energy. Mediation declares either that things are appropriate or are not operating in unison; it signals change in worth or merit in physical things, ambitions, and emotions.

Finally, values describe the quality of life. Values define its iterations through language and its system of symbols. Values are the foundation for contracts between individuals and their social institutions. In dynamic value transactions, expectations are transformed into realities that function. The social contract between the individual and the group is organized, and the conventions that emerge are frozen (for the moment). Both the individual and the group understand the ideal configuration of anything of value, and when the fragments of the ideal do not materialize, the transaction is not satisfactory.

Ideal conditions are the gauge for measuring up. Valuation is multi-contextual, mega-contextual, and overlapping. It is a competition of aggressively intertwining contexts, requiring intellectual and emotional compromises from everyone because concern, insight, humility, and empathy are easily subverted or fall victim to misunderstanding and self-deception.

Evaluation of the quality of life means constant self-examination and adjustment. Territoriality is the world's most rudimentary standard of measuring the value of something, and unfortunately is ruthless in its competitiveness. In a sense, this gauge preserves, hardens, or softens the borders of emotional and ideological terrains, forcing relationships into hierarchies of greater and lesser degrees of importance, and provides social and political recognition for individuals within the power and control structure. The social contract is built on individual perceptions of what is, or should be, a quality of life, and what is perceived as a societal guaranty, birthright, and entitlement for all of its members.

Developing Sustainable Futures

Modernists used themselves as an example. They rarely encountered a cross-section of their own social group, and were quick to make all kinds of unfortunate cultural assumptions. Today's studies of futures have shifted from naive, simplistic assumptions and impositions from one successful culture on another, to careful, thorough, balanced viewpoints to guide individuals and groups in constructing the essential qualities of life, work, satisfaction, contentment, and aspirations.

Such care requires deep knowledge—not knowledge isolated in one domain, but interdisciplinary and cross-cultural knowledge that is shared and sharpened through maintenance and criticism. The thoroughness requires the synthesis of behavioral, social, anthropological, and historical wisdom lodged in the specific culture for which a future is to be evolved.

Granted, futures can only be prospects, possibilities, or probabilities. Therefore, the process of future planning must allow for alterations to the routes and directions of the metamorphosis in progress.

Being able to identify and frame the problem no longer is enough. Fixation on what does not work is an obstacle. What obstructs good solutions must give way to a clear focus on the solution—not merely as a stopgap measure, but as a process that is constantly revaluated and improving.

Most problems are ancient ones, configured by the ancient values embedded in the language that describes them. They are part of the behavior that the value system sets into motion by a social group usually sharing a certain value-laden language. Each value creates constraints or directives for the solution. Each value must be analyzed and is a critical component leading to a strong, supportive solution. Each value expression engenders a high and low measure of emotional response. Each fosters or hinders the envisioning of a solution.

It is important for designers to weigh their own value systems, ethics, and motives before beginning to change someone else's. The same ethical questions a journalist asks before embarking on a story can guide designers: why, for what purpose, who wins, who loses, etc.? Not all missions are honorable. Not all missions benefit those for whom they are intended.

From Modernist Universality to Empowerment of the Individual

The modernist's Esperanto—artificial, simplistic, and culturally uncouth—isolated values from one segment of culture to impose them, missionary style, on global cultures. In simplifying, the complexity of cultures was lost; in standardization, human freedoms of expression were blunted and choice was stunted.

Language truly reflects the values of a culture. It is impossible to convey something lyrical and fine through a limited vocabulary or an artificial language, one that is divorced from cultural memory, history, and tradition. It is clear that vital members of a living culture gradually will adopt some foreign values, but that occurs through osmosis rather than imposition. In the interdiction of foreign values, after missionaries infiltrate the native cultures, the outer cloak of religion hides original beliefs, rituals, and customs. When Marxism wanes, Czarist Russia comes back into focus. The roots of culture are deep and hardy.

The beginning of this century stressed universality. In contrast, the beginning of the next must address the problems created by an assortment of diversity. Instead of the single measure, the new futurists will have to address the plurality and differences in approaches and visions. They must enable each culture, no matter how removed from the mainstream, to define its goals and ambitions. It is clear that each future must find ways to support the indi-

vidual as a whole person, providing physical well-being in terms of nutrition and health services; mental well-being in terms of elimination of social and cultural threats; and emotional well-being in terms of having territorial space and status within the culture.

On the one hand, members of the western and European cultures must realize that they must stop consuming so much of the world's resources, given their smaller number. On the other hand, those cultures with explosive population must find ethical, acceptable ways to stem further exploitation of resources. Each cultural group must recognize that a decline of the quality of life in one area impacts the rest, even if negative effects are not readily apparent. For a healthy world culture, the whole must support each smaller segment through educational and economic programs, and social and physical welfare initiatives. Early Marxism, communism, socialism, and Internationalism thought that the most worthy of values could be transferred from one culture to another. But history shows that human societies evolve slowly, adopting new ideologies only if they have some relationship to the cultural ethos.

Human Autonomy and Technology

Human progress distinguishes between the human use of technology that frees people to live independent lives, and any invention that shackles humans to technology, making them dependent and machine-like. The true humanist always is glad to be bonded to and part of nature. The technocrat—whose pride deceived him about the efficacy of machines—justifies the conquest and degeneration of nature. As man cannot cut himself lose from his human traditions, neither can he sever his link with nature. For in conquering nature, he will ultimately only defeat himself. The human must be the center of any system, especially a mechanized one, for only then can there be some vibrancy, allowing for introspection, perfectibility, and life producing.

The greatest fear of the powerful always has been the independence and autonomy of others. The road to equality is littered with failed experiments. But because independence and autonomy are critical to a better future, one must address dehumanization, injustice, oppression, and exploitation.

How then does one sustain futures? The contemporary futurists post the outlines of an interesting debate which must occupy the imagination of the design community for many years to come. Opposite of the modernists, who revelled in simplification, they delve into complexification. They dare frame a post-colonial, post-European, post-military-controlled, and post-imperialistic civilization. The problems of complexification make them construct their plan on the best of ideals for the modern man.

They seek viable alternatives to the controls and influences of the traditional power-institutions of state, business, and industry. They are redefining economics not according to the "bottom-line"

value system, but by linking it to ethical and spiritual bases for responsible and accountable decision making. They are responding to the value embedded in the quality of life as the only value worth seeking. They embrace cultural diversity, along with modern and indigenous wisdom, aiming to create new institutions that enable citizens to live autonomous lives.

Now is the opportunity for designers to respond to modernism's ubiquitous blind spots. Resurrecting ancient, inventing new, and redefining stagnant social contracts; preserving the frameworks of individually-determined qualities of life; and empowering microcultures will not necessarily make the power of modernism die immediately, but slowly fade away. The designer of the twenty-first century, as builder of culture, will have to find delicate answers for sensitive social conditions: What kind of culture is envisioned? For whom is it? Who participates? Who builds it? What quality of life is relevant at this moment and should it be relevant to other cultures? Is it sustainable? Is it worth pursuing? Who benefits? Who is left out?

Children of the Moving Present: The Ecology of Culture and the Search for Causes in Design

Richard Buchanan

However we may define the word science in some philsophical or epistemological system, it is clear that it begins with the use of previous observations for the prediction of the future. In this sense the spirit as well as the performance of science must have existed in the reasonable behavior of man, even as he was embarking on his career of creating, constructing, and developing culture.[1]

Bronislaw Malinowski

When what is coming, whatever is coming, at length arrives, we surely will describe it (what else, unless we are to self-deconstruct and retreat into attitudes, can we do?) as further chapters in continuing narratives—extensions, connections, clarifications, and reconsiderations of half-told tales, still half-told.[2]

Clifford Geertz

Introduction

I enjoy speculating about the future as much as anyone does. In the early drafts of this essay I succumbed to the temptation of rethinking design for the future and worked with enthusiasm to sketch a future of design that expressed my personal thoughts on the direction in which the field is moving. The central theme was human interaction. I tried to explain how we might use this concept in the future for a new perspective on the creation of products that support human experience—products that are analog and physical as well as digital and virtual. I like to think that the sketch was reasonable and contained some credible ideas about how design could unfold in the future. However, the more I reflected on the problem of speculating about the future, the less satisfied I became. So, I decided to put those pages away for another occasion and write a different kind of essay. What led me to this was a growing recognition that the real subject of such discussion is not the future at all, but the present. No matter how carefully and honestly crafted, our visions of the future are veiled statements about what we believe is important today. Discussion about the future is really discussion about current policy, and our stories about the future are intended to shape current attitudes and influence actions that we want to see taken now. They are part of the drama of the moving present.

1 Bronislaw Malinowski, *A Scientific Theory of Culture and Other Essays* (Chapel Hill: University of North Carolina Press, 1965), 8.

2 Clifford Geertz, *After the Fact: Two Countries, Four Decades, One Anthropologist* (Cambridge: Harvard University Press, 1996), 166.

Rethinking Design for the Present

Stories about the future are useful for developing the field of design, since so much of design thinking is directed toward what is new and possible in products that serve human beings. However, such stories easily become a seductive exercise in propaganda or apologetics when they promote a new personal vision that we hope will be shared by others or defend an old vision that we do not want to see abandoned. The storyteller always has a subtle political or intellectual perspective, and the emotional trappings of the story, manifested around the vague but fascinating spectacle of the future, usually leave both the writer and the reader with too little room for detached reflection and true deliberation. They leave us, if anything, less able to think about the future—let alone the past or present—with an open mind.

Fascination with the future is one reason that the field of design often appears to lurch from one fad to another, with too little cumulative memory and knowledge to show for it. This explains why design education, caught in the middle between the need to stay abreast of trends and fashions and the responsibility to contribute to a developing body of design knowledge that informs design practice yet is detached from immediate political and economic interests, struggles to find a proper balance between professional preparation and research. It is no wonder that the Greek philosophers regarded futurology as divination and augury, suitable for soothsayers, fortunetellers, and prophets. Speculating about the future is at once too easy and too difficult for an ordinary, sensible person.[3] It is too easy because anyone may claim authority regarding the shape of things to come and ride off on a hobbyhorse of conjecture, presenting claims about the future as if they were facts waiting to hatch. It is too difficult because no one can honestly claim to understand all of the factors that shape the present, let alone anticipate the problems that will emerge in a month, a year, or ten years to refocus human energy and action.

Instead of adding another story to fill the sails of design, I would like to take this opportunity to consider the boat and particularly its keel and rudder. I would like to rethink design for the present, with special attention on what I have come to call the ecology of culture.[4] By this term I mean more than either "ecology" or "culture" considered separately. We are familiar with the concept of ecology: the relationships between living organisms and their natural environment. We are equally familiar with the commonplace understanding of the concept of culture: the ideas, beliefs, customs, skills, arts, and sciences of a given people in a given historical period. But we are less inclined or intellectually prepared to take seriously the diversity and interrelationships of the beliefs with which we live in the objective present. We tend to dismiss the way human beings have formed their beliefs in response to the natural and human environment. One sign of this is the tendency to rele-

3 Faith Popcorn and Lys Marigold, *Clicking: 16 Trends to Future Fit Your Life, Your Work, and Your Business* (New York: HarperCollins, 1996).

4 Richard Buchanan, "The Ecology of Culture: Pluralism and Circumstantial Metaphysics," in *Pluralism in Theory and Practice: Richard McKeon and American Philosophy*, ed. by E. Garver and R. Buchanan (Nashville: Vanderbilt University Press, 2000), 135–62.

gate the study of such matters to a branch of science such as psychology or anthropology, where the formation of diverse beliefs is reduced to subconscious mechanisms and explained away from its philosophical significance. Instead of regarding the ecology of culture as the essential reality of our social lives—the place where collective life processes allow our individual thoughts, actions, and passions to mingle with those of others—we often see differences of belief as a sign of error in others.

It is true that human beings are prone to error—sometimes massive and tragic error—but the differences of belief that we observe around us cannot be explained entirely as errors. There is substance in the differences among reasonable men and women, and this is a problem for inquiry that requires serious attention if we aspire to something more than a partisan vision of design. Remarking on Dewey's willingness to consider new and different ideas, Whitehead expresses an attitude that may serve the design community particularly well at a moment of intellectual expansion and educational consolidation.

> Dewey has never been appalled by the novelty of an idea. But it is characteristic of all established schools of thought to throw themselves into self-defensive attitudes. Refutation has its legitimate place in philosophic discussions: it should never form the final chapter. Human beliefs constitute the evidence as to human experience of the nature of things. Every belief is to be approached with respectful inquiry. The final chapter of philosophy consists in the search for the unexpressed presuppositions which underlie the beliefs of every finite human intellect. In this way philosophy makes its slow advance by the introduction of new ideas, widening vision and adjusting clashes.[5]

Whitehead's observation has many implications for the future of a field such as design. Culture is a pluralistic environment of communication and experience. It is an environment of surpassing complexity and potential conflict, where people express alternative beliefs about the world at large, seeking to order the world in verbal and non-verbal language, in things studied and made, in ideas considered and expressed, and in actions taken or avoided. These expressions result in all of the human-made products of science, politics, and art that surround and influence our lives, significantly shaping and reshaping relationships among human beings. To understand this environment requires more from us than mere tolerance, which in its simple form is little more than benign neglect of the views of others. It requires sophisticated reflection and a desire to learn from the explorations and discoveries of others. Despite the various meanings and criteria of "objectivity" which are asserted and defended by human beings in order to defend them-

5 Alfred North Whitehead, "John Dewey and His Influence," *The Philosophy of John Dewey*, ed. P.A. Schilpp *The Library of Living Philosophers*, Vol. I (Evanston, Northwestern University, 1939), 487.

selves and criticize the views of their opponents, diversity itself is one of the most persistent, objective facts of cultural life.

While an individual's personal beliefs often make it difficult to accept the ecology of culture as a significant fact, the difficulty is magnified in the collective enterprise of a discipline. This is particularly true in a young discipline that is based on professional practice and subject to the limitations of what is practically attainable in the day-to-day struggle for existence amid complex problems and competing colleagues. In such a discipline, philosophic assumptions operate powerfully but are seldom articulated clearly or in productive relationship with alternative assumptions—in effect, ignoring the ecology of culture of which they are only a part. When philosophy is consciously discovered in a young discipline it is often merely another weapon in a battle for the dominance of a partisan view rather than a productive tool for collective inquiry. The idea that philosophy is or can be detached from political struggle is both a naive view held by a beginner and a very sophisticated view held by someone who is well experienced in the history of intellectual disputes in many fields and disciplines. Philosophy is both involved in and detached from politics, as we gradually learn through painful experience.

Nevertheless, philosophic assumptions, held consciously or unconsciously, shape design practice in ways that professional designers rarely have time to consider. Furthermore, such assumptions shape our understanding of the nature of history, criticism, and theory in design studies and determine our understanding of the relationships among them. For this reason, it is important to reflect upon our individual and collective assumptions about design before moving on to speculate about the future. We are likely to find that whatever is coming, when it finally arrives, will continue the pluralism of half-told tales with which we live today, moderated only partly by the tempering influence that comes from new scientific understanding.

Strategic Planning and Scenario Building

To talk about design for the future is to talk about strategic planning for a field that is now only partly formed and in need of long-term vision. However, the enterprise is complicated by two sharply contrasting approaches that have shaped the practices of strategic planning in the twentieth century. These approaches compete in our efforts to consider the future of design. One is represented in the scientific perspective of Bronislaw Malinowski. It involves using previous observations of social, economic, scientific, and technological trends to predict the new circumstances that we will face in the future. The other is represented in the narrative perspective of Clifford Geertz. It involves telling stories that continue the pluralism of half-told tales with which we live today, playing out the

dramatic conflict of beliefs among designers, manufacturers, and the human beings that design seeks to serve.

Both approaches are grounded in the reality of human culture and represent important ways that human beings think about the world. Their shared humanism explains why they have converged in the work of scenario building, which seeks to give dramatic life to strategic plans by extending previous observations into predictions about the future. We should remember, however, that scenario building is not a new genre of storytelling that was recently invented by clever contemporaries. It is an ancient rhetorical form, employed for its vivid simplicity in bringing ideas, desires, and fears into the discussion of human affairs in order to clarify and support possible courses of action. The first masters of scenario building in Western culture—if we leave aside the prophetic tradition of the Old Testament—were the rhetoricians of Greece and Rome. They identified three species of scenario building and provided the forms and models that continue to guide contemporary practice in subtle ways. First, we talk about *what has happened,* using the literary form of history to describe and explain actual events. Second, we talk about *what could have happened,* using the literary form of drama to portray conflict, express character, and demonstrate the probabilities and necessities that shape human action. Third, we talk about *what could never happen,* using the literary form of fantasy to probe ideas and ideals as well as loves, desires, fears, hatreds, and perversions in impossible settings that nonetheless give insight into human reality.

All of these forms are present in the contemporary industry of futurology that floods popular culture and political discourse. They are the stock-in-trade of the enterprise of strategic planning that seeks to influence the course of public and private organizations. Indeed, contemporary strategic planning tends to incorporate all three forms in a single whole. The planner begins with a history of his or her subject, moves to the identification of a dramatic issue of conflict and uncertainty, and concludes with alternative pathways of action, tracing out the possible consequences in fantasies of the future.[6] However, what is often missing in strategic planning—and what often brings strategic planning and futurology to no useful result—is a clear understanding of the complexity of beliefs in the present and the role of the present in shaping future courses of action. What is missing is a significant vision of the present and how that vision extends into the future.[7]

Ironically, the concept of history gives insight into the role of the present as it may bear on our speculations about the future. This is evident in the ambiguity of the word "history," which in English and many other languages refers both to *what happened* in the past and to our *accounts* of what happened. Whatever is known and understood about the past comes from our accounts of what happened. A serious historical account—something more than a

6 Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* (New York: Doubleday, 1991). "Suspension of disbelief" is as close as Schwartz comes to calling his scenarios of the future fantasies.

7 See Henry Mintzberg, *The Rise and Fall of Strategic Planning: Reconceiving Roles for Planning, Plans, and Planners* (New York: The Free Press, 1994), 209–10. Mintzberg regards "vision" as a kind of strategy formation, but he shrewdly distinguishes "vision" and "learning"—as elements or approaches to strategy formation—from formal planning. "[A]n overemphasis on planning—in fact, a belief that strategies can be created through formal procedures—tends to drive out the other two [vision and learning]. And with the disappearance of the visionary approach goes vision itself, as broad, integrated strategic perspectives get reduced to narrow, decomposed strategic positions."

bare chronicle of events—requires four elements. It requires the discovery and selection of data, the interpretation of facts in accord with some hypothesis, the fashioning of a narrative sequence with methodological integrity, and a principle of organization that relates the facts in a pattern of significance. In short, a serious historical account requires both data and a conceptual framework. The conceptual framework is anchored in the moving present, formed in the changing circumstances of a cultural environment that is filled with conflicting visions and assumptions.

Writing about the place of history in education, John Dewey observes the powerful influence of the present on our efforts to understand the past.

> But an individual can live only in the present. The present is not just something which comes after the past; much less something produced by it. It is what life is in leaving the past behind it. The study of past *products* will not help us understand the present, because the present is not due to the products, but to the life of which they were the products. A knowledge of the past and its heritage is of great significance when it enters into the present, but not otherwise. And the mistake of making the records and remains of the past the main material of education is that it cuts the vital connection of present and past, and tends to make the past a rival of the present and the present a more or less futile imitation of the past.[8]

Dewey's view of history provoked a strong response and criticism from some historians at the time it was published, and the debate over subjective and objective histories continues to the present.[9] On one side, many historians argue that their accounts are objective and influenced only in minor ways by present concerns. On the other side, many historians argue that their histories are simply narratives that properly support a particular intellectual or political agenda. However, Dewey's view does not support either side of this debate, and it would be a mistake to suggest that he would be entirely satisfied with either the old objective or the new subjective histories. Dewey reminds us of the subtler meaning of "present concerns," and this is the value of his position for contemporary approaches to history. While it is true that many historians seek a knowledge of the past that is valuable for its own sake—detached from immediate political or intellectual prejudices—it is also true that our knowledge of the past is shaped by the same philosophical issues and assumptions as claims of knowledge in any other field. All histories have a philosophical foundation in the beliefs of the historian, including the historian who denies the relevance of philosophy to his or her work, for this denial itself represents a recognizable philosophical position. To be either objective or subjective in historical accounts does not eliminate the need for careful examination of the

8 John Dewey, *Democracy and Education* (New York: The Free Press, 1966), 75. For the most complete discussion of his views on the nature of history, see John Dewey, *Logic: The Theory of Inquiry* (New York: Holt, 1938), 230–244.

9 For the immediate response to Dewey, see Hans Meyerhoff, *The Philosophy of History in Our Time* (New York: Anchor, 1959), 161ff. This book includes a sharp response from Arthur O. Lovejoy, "Present Standpoints and Past History," as well as other essays. Most recently, Simon Schama, apparently missing the point of Dewey's argument, seems to regard Dewey as the source of catastrophe in the public school curriculum of the United States, where a "social studies curriculum" has—in Schama's view—eliminated instruction in history. See Simon Schama, "Visualizing History," *Harper's Magazine*, February 2000, 34–38. In a superficial style, Schama writes, "Although we instinctively flinch at the indignity inflicted on the old girl, Clio needs a kick-start to get her up and running again in the noisy, unseemly world of digital knowledge." (*Harper's*, 38.)

historian's assumptions. This should make us cautious and thoughtful in assessing the present as an environment for interpreting the past—and even more cautious in speculating about the future. The conceptual frameworks that influence historical accounts also influence speculation about the future. In this respect, history and futurology share a subtle affinity. They are both children of the moving present.

Speculation about the future is firmly rooted in the present, shaped by the problems, values, and beliefs that have current favor in the mind of an individual or in the fashions of society. And, like history, speculation about the future can create rivals to the present that distract and weaken our understanding and appreciation of the dynamics of the culture in which we live. It can homogenize the present, turning it into a pale anticipation of an imagined future, whether utopian, apocalyptic, or something in the middle. The present becomes a mere cipher or token in the game of contemporary politics, where competing values and principles too often struggle for dominance rather than collective insight. To suggest otherwise is to work in ignorance or to work surreptitiously toward an ideological agenda that serves partisan intellectual or political purposes. Yet, speculation about the future can also strengthen the moving present if, following Dewey's suggestion about history, it enters the present and sustains a vital connection between the present and the future. That connection lies in meaning and in the search for meaningful direction in our lives.

The search for meaningful direction in the moving present is an important factor in the rise of history, criticism, and theory in all fields of inquiry, including design. We search in the past, present, or future for suggestions about the *direction* in which we are moving. The temporal focus is important for distinguishing the three modes of inquiry that constitute design studies: history is the investigation and interpretation of what has been; criticism is the assessment and appreciation of what is; and theory is research into and speculation about the assumptions and possibilities that bear on what might be. Of course, the relationship among these three modes of inquiry is ambiguous and problematic. This is evident in the tension that we sometimes find among design history, design theory, and empirical research as well as in the tension we sometimes find between all three of these kinds of inquiry and professional design practice. But ongoing dispute about their relationship does nothing to refute our understanding that history, criticism, and theory are intimately connected in seeking the direction of the field. They draw on and support each other in the accomplishment of their separate tasks.

However, merely seeking direction in the moving present is not enough to sustain inquiry. We seek *meaningful* direction, and meaning comes from a different source than history, criticism, and theory. It comes from what we might call the omnipresent, which is where we stand as we contemplate the changes that take place

around us. Meaning depends on what we are, what we hold to be true and valuable, and what we face as challenges. Of course, there are many ways to characterize what is meaningful in our lives—whether meaning comes from within, from without, or from interactions with our surroundings. But whatever its origin, meaning is found in its most refined, articulate, and intelligible form in the philosophical assumptions that stand behind and ground our beliefs. It is found in our assumptions about the nature of the world, whether those assumptions are held by professional philosophers or by that much larger group of thoughtful individuals who seek to relate their personal experiences to contexts larger than the immediate consequences of their actions. If we want to understand design in the past, present, or future, it is valuable to begin with a study of the ecology of culture. Indeed, our ability to reconstruct design in the future may depend for its creativity on an understanding of the fertile matrix of contrasting ideas and experiences that constitute the ecology of culture in the moving present.

Laboratories of the Mind

Despite the diversity of design in the twentieth century, there is an intelligible pattern in our different ways of thinking about design. The pattern is based on generative principles that recur in the design community and do not disappear over time, despite changes of language and focus that are sometimes gradual and continuous, sometimes revolutionary and discontinuous. In other circumstances we may study the concrete expression of these generative principles in the specific work of designers and scholars of design. But our goal is a philosophical investigation of design, so we will focus on the recurring principles themselves, to the extent that they may be disentangled from particular expression. The value of this should become evident. By investigating the generative principles of design thinking and design discourse, we may hope to reach a better understanding of the fundamental causes that have shaped design in the past and present and that will continue to shape it in the future.

The problem of cause is important in design studies. It looms as the unspoken touchstone of research and speculation about the nature of design. Some designers and scholars of design believe that design must be explained by a single cause that operates directly or through multiple pathways of indirect influence. This is evident in the diversity of descriptive definitions of design that tend to identify a single cause of design and, each in its own way, set the direction for inquiry. The idea that there is a single cause of design is intriguing, and it deserves careful consideration. However, the ecology of design culture, with its diversity of assumptions, suggests either that the single cause has yet to be clearly and convincingly identified or that there are several causes operating independently or existing in subtle concert. This is one issue that our present inquiry may help to illuminate.

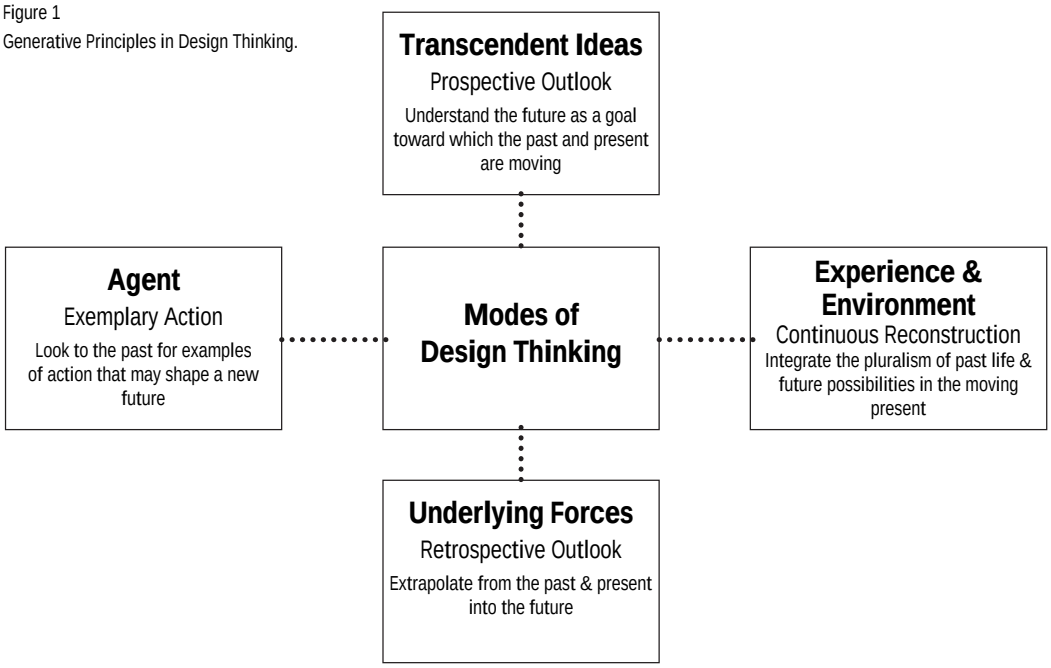
There is a second issue that is equally significant for a philosophical understanding of design. The ongoing exploration of design in theory and practice reveals changing conceptions of the subject matter, methods, and principles of design. We may ignore these changing conceptions only at the peril of misunderstanding design as a cultural phenomenon and as a part of the ongoing process of cultural life as it adapts to new circumstances. Perhaps different conceptions of the *what*, *how* and *why* of design do not trouble some people. The practicing designer, for example, seldom has enough time to reflect on such a problem and the ambiguities and difficulties that follow for design practice. But in design theory and research, as well as in design history and criticism, such differences are not so easily neglected, since they identify points of controversy and dispute that have significant consequences in theory and practice. By identifying the generative principles that recur in design discourse—and in design thinking and design practice in general—we may begin to explain how different conceptions of subject matter, method, and principle arise. We may even find a way for collective inquiry to make productive use of such differences to advance the understanding of design. This is the recurring hope of anyone who recognizes the radical (i.e. principled) pluralism that is inherent in the ecology of culture.

The generative principles of design thinking are not doctrines in themselves. They are not categories in a systematic logic of design. Rather, they are master topics or placements—places of reflection where immediate impressions and the elements of nascent experience may be temporarily located for exploration, speculation, and innovative insight.[10] They are the laboratories of the mind where the work of forming conceptions and doctrines takes place. The nature of such "places" is fascinating and difficult to understand, yet they are intellectual tools with a long formal tradition in Western culture and a long informal tradition in Eastern cultures. Philosophers who have explored such places say that they are, in a sense, empty vessels—as they must be if they are to be the source of new ideas rather than simply a repetition of old ideas. Yet, these philosophers also say that the places have persistent contours of suggestive meaning—as they must if they are to guide creative thought.[11] This is a paradox, and the mere paradox signals how important "places" are for innovation in design or any other field. What the paradox further suggests is that we are always reduced to description when we attempt to characterize the generative principles. Their real power lies in use. The power lies in what we can do with them in inquiry. Nonetheless, it is important to characterize the generative principles—"places" or *topics*—as tools of inquiry in design, for out of the topics that we employ in the laboratories of the mind come the specific *hypotheses, themes,* and *theses* that form the backbone of design thinking.

10 Richard Buchanan, "Wicked Problems in Design Thinking," in *The Idea of Design*, ed. by Victor Margolin and Richard Buchanan (Cambridge: MIT Press, 1995), 3–20.

11 E. g., Chaim Perelman and L. Olbrechts-Tyteca, *The New Rhetoric: A Treatise on Argumentation* (Notre Dame: University of Notre Dame Press, 1969), 83–5. Richard McKeon, "Creativity and the Commonplace," *Philosophy and Rhetoric*, 6:199–210. Kenneth Burke, *A Grammar of Motives* (New York: Meridian, 1962), xxi. Ernesto Grassi, *Rhetoric as Philosophy: The Humanist Tradition* (University Park: Pennsylvania State University Press, 1980), 43–6.

Figure 1
Generative Principles in Design Thinking.



Generative Principles in the Ecology of Design Culture

The generative principles of design thinking for a hundred years have emphasized *experience and expression* as the fundamental concern. There is no reason to believe that this deep concern will change in the near future, though it is wise to remember that such concerns do change over time. For example, the generative principles of the nineteenth century emphasized faculties of the mind such as *reason and imagination,* and those of the seventeenth and eighteenth centuries emphasized metaphysical distinctions between *art and nature.* Earlier concerns have left subtle vestiges in our language for talking about design, but design as we know it today has developed around issues of experience and expression, and the generative principles we employ reflect this. They focus attention either on the *processes* or the *conditions* of designing as an expressive and experienced human activity. The generative principles or places of design thinking may be summarized in a diagram that indicates how each principle orients the relationship of past, present, and future.

A. Phenomenal Processes

The phenomenal processes of design are, as the name suggests, the "perceived and experienced" activities that have consequences for the environment in which human beings live in the present. The fundamental assumption shared by those who emphasize the phenomenal processes of designing is that design is best understood by our experience of it, not by recourse to conditions that we do not

directly experience. However, such understanding may be sought in two opposing directions that account for two significant bodies of work in the design community. It may be sought either in the *experience and environment* of action or in the *agent* who performs an action.

1

The first generative principle comes from the experience and environment of action. It offers a way of thinking about design that focuses on the problems that human beings encounter in their environment. We interact unconsciously with our surroundings until we encounter a difficulty that cannot be easily removed. The difficulty forces us to think, and in the process of thinking we form hypotheses about our circumstances. A hypothesis is nothing more than a conception of the circumstances and environment within which we live and work. The hypothesis provides a basis for action, and in the process of action we begin to form conscious experience of where we have been, where we are, and where we are going.

Of course, it is easy to distort the balance of experience and environment that is the core of this generative principle. For example, we may give greater emphasis to experience and, thereby, focus attention on the personal perspective of the designer. Similarly, we may give greater emphasis to the environment and, thereby, focus attention on the surrounding natural or spiritual conditions that some people believe are decisive in explaining the nature of design and human experience. However, this is precisely where the generative principle of experience and environment becomes most evident. It seeks to identify and integrate multiple causes of design rather than reducing design to a single cause.

In this way of thinking, design is shaped by many factors, any one of which may be isolated to become the basis of a hypothesis. For example, when material conditions are given primacy, natural forces and processes logically provide the mechanism for interpreting the world. When forms are given primacy and detached from their concrete existence in experience, transcendent universals logically provide the guide for explaining phenomena. Or, finally, when agency is given primacy, the personal vision of the designer is the logical key to meaning. But the *interrelation* of factors is the essential reality of the environment, and the interrelation is a matrix of *agency*, *form*, *matter*, and *purpose*. Therefore, alternative hypotheses and conceptions, drawn together by common problems in the environment, continually supplement each other in the collective effort of human beings to understand and act in the world.

This is how a discipline such as design is formed: by the collective effort of many people working over a period of time to solve common problems in alternative ways. The effort gradually reveals the essential nature of the discipline and its relation to the natural and cultural environment. The cultural environment is

constantly changing, but not because it is a meaningless flux. It changes because our understanding changes and because we act on our evolving conceptions of the nature of the circumstances in which we live. Design is a problem-finding and problem-solving activity, based on different conceptions of our circumstances. The products of design become part of our cultural environment, with consequences for how we lead our lives.

This circumstantial, environmental principle is neither retrospective nor prospective with regard to how we think about the future. Planning for the future is best understood, in Dewey's phrase, as the *continuous reconstruction of experience.* It is based on the intellectual and moral character of human beings and on the problems that they encounter and resolve, with each resolution giving rise, in turn, to new problems that require further attention. Anchored in the present, the study of design begins with the common problems that human beings encounter in their environment. The goal is to understand the nature of the problems that people face and how they have subsequently tried to solve those problems in ways that are suited to their particular natural, cultural, and historical circumstances. For this purpose, the investigator pays special attention to the hypotheses that people have formed to address those problems.

The study of design has an important historical component when history contributes to understanding the problems we face in the present. Each problem or area of problems—scientific, artistic, political or social—has its own history, and the histories are often interconnected. What we learn from history is used to further explore the problems of the present, often leading to new hypotheses or conceptions that may be further tested in action. Indeed, what we learn from history may also be used to rethink old disciplines or to formulate new disciplines—for example, new disciplines such as design and design studies—that are better suited to the problems human beings face today or that they anticipate for the future. This is the continuous reconstruction of experience, guided neither by the past nor by the future but by the alternatives that we conceive in the circumstances of the present. Just as the histories of various problems are often interconnected, disciplines are also interconnected and interdependent. The development of design today and in the future will be both the ongoing formation of a distinct discipline and a deeper exploration of the relationships among that discipline and others in the natural sciences, the social sciences, and the arts and humanities.

2

The second generative principle comes from the agent who performs an action. Design is shaped by the actions that human beings take in creating and projecting meaning into the world. Our first action in life is the effort to perceive the world around us. At first, we have only confused perceptions of psychic and physical

phenomena, but as we find differences among our perceptions, we begin to interpret and give meaning to ourselves and to the external phenomena that we experience. However, meaning does not lie in the phenomena that we interpret. It lies in our act of interpretation, shaped by the perspective or frame of reference from which we perceive the world. This approach is often associated with the work of individual artists who regard creation as a matter of self expression or a search for personal meaning that may be shared through communication. However, the projection of meaning into the flux of existence is no more than the creation of models that may be tested, refined, or overturned in an ongoing effort to make sense of existence, satisfying our felt needs and desires. From this perspective, a simplistic distinction between art and science is not adequate. The models that constitute science are some of the most powerful and influential efforts to make sense of phenomena.

The extension of artistic and scientific models in technology has reshaped and influenced social life in revolutionary ways. If our interpretation of perceptions happens to match the course of phenomena, all we can say is that we have created a powerful experience, formed a useful model, or invented a law, not that we have discovered the ultimate conditions of nature and reality. Our interpretations are only models, created by individuals and projected for others to follow or overturn. Indeed, they are designed. And design—the creation and projection of meaning, whether in science, art, or politics—is the distinguishing attribute of human beings. To paraphrase Herbert Simon, the proper study of mankind is the study of design, whether as an emergent science of predictive modeling or as a body of practices and skills for creating the artificial world. The move from professional design practice—the skillful work of graphic and industrial designers as well as engineers—to a design science is, in this way of thinking, measured by our ability to create models of creativity. The science of design, if it ever emerges with analytical rigor and teachable doctrine, will be a science of the artificial or human-made. It will not be a natural science or reducible to the natural sciences—though it will doubtless make use of those sciences.

This existential, operational approach is *exemplary* in its key features. It looks to successful examples of design practice in the past or present for models that may guide future ventures in designing. Examples may be found among individual designers or among organizations and institutions that are bent to the will of individuals. History is an account of alternative *visions* of design in society and the formation of *skills* used by the designer to project a vision and, at the same time, satisfy human needs and desires. It finds a succession of worlds created by individuals who possess imagination and initiative. The path to the future lies in planning the extension of a vision into new circumstances in order to achieve desired ends. However, there is a randomness in the play of external phen-

omena which easily overturns the intentions of all people, making prediction—better known in the contemporary world as strategic planning—one of the most seductive and least reliable skills that the designer or any other entrepreneurial leader may possess.

The study of design begins with what people say and do about design, rather than with problems that are encountered in the essential matrix of the environment. The goal is to understand what people perceive, what are their individual perspectives or frames of reference, and what are the meanings that follow from their different points of view. Both literally and metaphorically, vision is the key feature of design. Literally, it represents the most vital of our senses. Metaphorically, it is the perspective or frame of reference from which we project meaning. However, if our perception of psychic or physical phenomena changes, our metaphoric vision, too, may change, along with what we say and do about design. This accounts for the continual change that we see in design throughout history. Changes in all of the arts and sciences, as well as in social life, affect the perceptions of the designer and lead to new perspectives, new ways of designing, new intentions, and new products.

While sharply contrasting, the two phenomenal approaches to designing share a common interest in the experience of design in immediate circumstances. Since all that one can be sure of in life comes from what one experiences, both approaches view speculation about timeless ontic conditions with reserve and skepticism, well aware that theories always undergo change in the human community, based on new perceptions, new experiences, and new facts. However, those who investigate the phenomenal processes of designing do not discount the contributions that the ontic ways of thinking have made to design in the past or present, since speculation informs design practice in concrete ways. Indeed, philosophy, in one of its forms, is the *theory of deliberately conducted practice.* Such a concept of philosophy is central to Dewey, who argues: "Philosophy [is] a form of thinking, which, like all thinking, finds its origin in what is uncertain in the subject matter of experience, which aims to locate the nature of the perplexity and to frame hypotheses for its clearing up to be tested in action." [12] Such thinking does not replace the intuitive and creative work of designers, but it does promise to inform design practice with clearer reasons for current practice as well as new concepts and new possibilities for future practice. Philosophical investigation of the different conceptions of design and designing may affect design practice as well as our understanding of the ecology of design culture.

B. Ontic Conditions

The ontic conditions of design are, as the name suggests, the "real and ultimate" conditions that determine the nature of design in human experience, whether in the past, present, or future. However, those who reflect on design seek such conditions in two opposing

12 John Dewey, *Democracy and Education*, 331.

directions. They are sought either in *material reality and underlying natural forces* or in *transcendent ideas and spiritual or cultural ideals.* Both are well represented among designers in the twentieth century.

3

The third generative principle comes from underlying natural forces and material reality. Design is shaped by the necessities and contingencies that are inherent in the movements of nature and psychological and social life, including the contingencies of taste and preferences for aesthetic pleasure. Design depends on the accumulation of knowledge in the physical, psychological, and social sciences, but it also depends on emotive aspects of life which are not easily reduced to scientific knowledge. In this way of thinking, some argue that design is or can become a science, if we discover the fundamental natural processes or movements that underlie the practice of design and the trajectory of products in social and cultural life. The paradigm of design is engineering, since engineering is closest to the natural conditions that are the "real and ultimate" conditions of human life. But engineers, possessing only limited knowledge of nature due to the slow advance of the physical and biological sciences, must also work with other types of designers who have better appreciation for, if not complete scientific understanding of, the emotional and aesthetic needs of human beings. The rise of "human engineering" and cognitive psychology were important events in the development of design, since they promised to reveal the natural laws and natural movements underlying the workings of the human mind and body. The efforts are still underway, with some important results. However, there is still much that is not known about the contingencies of human experience, aspects that may forever remain irrational and unpredictable. The search continues for rules and laws in branches of the social sciences and even the humanities, in areas such as semiotics and the visual arts, where design may discover a firmer foundation for its creative work in meeting the needs of human beings.

This natural, empirical approach is retrospective in its essential features. It looks to the conditions that have shaped the past and seeks to project the trends of fundamental forces and movements into the future—recognizing, of course, that the future is not determined by a simple calculus of forces, since there are many contingencies and accidental influences that no one can predict. In general, we may say that this way of thinking seeks to accommodate the future to the forces that have shaped the past. In turn, it also recognizes that human history is a record of the slow development of our understanding of those forces. Therefore, any consideration of the future of design must include discussion of the possible advances of scientific knowledge as well as advances in technology and the trends of social and cultural life. In the best of circumstances, design

builds on the past in an advance of scientific knowledge and social expression.

4

The fourth generative principle comes from transcendent ideas and spiritual or cultural ideals. Design is shaped by ideas and ideals that transcend the necessities and contingencies of physical or material nature and the limitations of individual, personal experience. Indeed, many scientists regard their investigation of material nature as an attempt to discover deeper truths about the rational structure of the universe that are only partly revealed in scientific knowledge of the regularities and necessities of physical or natural movements. They believe in a divinity, or at least in a pervasive and interconnected rationality, as the "real and ultimate" condition of human experience. In this way of thinking, the effort to discover a scientific or quantitative basis of design is not misguided, but it provides only a partial understanding of the nature of design, since it ignores ethical considerations or reduces ethics to quaint manners and mores studied in one of the social sciences. In this idealist way of thinking—reminiscent of Platonism in the ancient world and associated with Jewish and Christian beliefs in the traditions of Western culture and with Buddhist thinking in the traditions of Eastern culture—design seeks to satisfy the immediate needs of human beings in a world driven by conflict and pragmatic interests, but it also seeks to elevate human beings to a higher ethical and aesthetic vision. This vision is sometimes religious and theological, sometimes philosophical, and sometimes cultural, but it is always oriented toward an ideal of beauty, truth, or justice that transcends and permeates the world of human experience, giving structure to meaning and values.[13] Design is a spiritual and visionary art that seeks to penetrate the confusion of daily life and express fundamental values or truths about the place of human beings in the spiritual order of the universe. Products must be more than functional, usable, or pleasurable. They must be appropriate in supporting the spiritual life of individuals and groups within the rational and ethical structure of the universe.

This idealist way of thinking is *prospective* in its essential features. If the former approach focuses on material conditions as a beginning, this approach focuses on ideal conditions as an end. It uses the cultural products of the past as inspiration for a continuing quest toward an ideal goal, which is often best revealed through art, philosophy, and religion. Design participates in the spirit of its time and helps to create the myths that characterize a period of history, but it looks beyond, always moving in its best expressions toward a timeless goal. In Plato's phrase, time is the moving image of eternity, and it is eternity that we seek in timeless principles and values. Advances in science are important, but they are not the fundamental determinate of the shape of design in the future nor of our un-

13 For an example of this approach to design, see George Nelson, "Design as Communication," in *Problems of Design* (New York: Whitney, 1966).

derstanding of the timeless. For this, we must look beyond science to a deeper wisdom about what it means to be human in spirit and in aspiration. The arguments of science are supplemented by myths, whose structures and themes express truths and values in all periods of human activity, whether in the past, present, or future. Design participates in the unfolding of myths, and myths often tell true stories about the ascent or descent of human beings—or their cyclical rise and fall—in the natural and spiritual order of the universe.

While sharply contrasting, the two ontic ways of thinking about design share an interest in understanding the conditions upon which design depends for its work and accomplishments. It is not surprising that they place design in a larger context than the immediate environment of professional practice, turning toward science or toward art, philosophy, and religion for understanding. Furthermore, since the conditions of design lie, in a sense, outside of time in the unchanging laws of nature or in timeless truths, both ways of thinking view the moving present with reserve and detachment, well aware of its limitations in the broad scheme of things.

Strategies of Design Thinking and the Search for Causes

The generative principles that we have identified are seldom found in pure expression in the work of scholars or designers. Most often they are combined in what Kenneth Burke would call "ratios" and "stratagems" of inquiry.[14] For example, one may explore the relationship (ratio) of *agent and cultural ideals* in order to investigate how personal values are expressions of collective cultural values. Or, one may explore the ratio of *agent to underlying forces and processes* in order to investigate cognitive processes of decision making in design practice. Indeed, there is no limit to the strategies of design thinking that come from the changing ratios of the generative principles, and it would be a project in itself to demonstrate the diversity of ideas and methods that emerge in design thinking from such strategies of combination and synthesis. For the present, I merely want to suggest that the search for causes in design takes place today, and will take place in the future, in the locations marked off by the four generative principles that we have discussed. Some will find the cause of design in the action of the individual designer. Others will find the cause in underlying natural and social forces or in transcendent ideas and cultural ideals. And there will be others who resist the reduction of design to a single cause and look, instead, to the pluralism of the ecology of culture, seeking the integration of multiple causes that are revealed in our interactions with each other and with our environment. The challenge for design thinking is to achieve a vision of design that embraces the complexity of causation in theory, practice, and education. To meet this challenge we will have to follow Whitehead's suggestion, widening the vision of design by investigating more carefully the presuppositions that underlie our beliefs. We are all children of the moving present.

14 Burke, *Grammar*, xvii.

Conclusion

Those who study and practice in the field of design recognize that the activity of designing is an important part of human culture and that its full potential in theory and practice has not been fully realized. Yet, there is no clear intellectual strategy for understanding the complexity and diversity of design in the present. The design community is divided into many schools of theory and practice, and thoughtful members of the design community are struggling to find the common core of our enterprise. Rethinking design for the future will simply perpetuate our confusion about design today unless we rethink design for the present. Rethinking design should be an inquiry into the nature of design as we understand it today, and a reflection on what may follow from its continued exploration in many directions. This is a task that requires the support of philosophy as we pursue the continuous reconstruction of design in theory as well as in practice and education.

On Displacement, Blind Immediacy, and the Fallacy of Misplaced Concreteness: Review of Design (plus) Research Conference, Politecnico di Milano, May, 2000.

Keith Russell

Thoughtful men exchange greetings by posing questions to one another. [1]

Towards a Research Culture

Sometimes, beginnings *are* beginnings. In his opening lecture, Tomás Maldonado pointed to the current shift in direction of industrial design and the displacement of "what really happens today in the practice of design," brought about through the international increase in Ph.D. studies in design. Such studies, he declared: "Leave less and less room…for a design without research, without theory, immersed in the blind immediacy of the market and fashion." Ever present at the conference, current Ph.D. candidates made their difference obvious as they delivered papers, questioned from the floor, and established connections based on issues central to their work. Whatever the status of design plus research before Milano, it was successfully displaced by the engagement of these new members of the design research community.

Beyond such new difference, the old differences remain to be addressed. Theory and practice will have it out with each other at every opportunity. Acknowledging the ease with which such polarities maintain themselves, Maldonado reminded the conference of deeper philosophical concerns that often are disguised in the politics of battle. While recognizing the "concreteness of making and doing," according to Maldonado, design must reject "pseudo-concreteness, the rhetorical pretext of concreteness." As design researchers, we must guard against "what was once called 'the fallacy of misplaced concreteness.'" Redetermining the concrete, and redetermining the status of the concrete, requires that design be redetermined; questioning the nature of human and the human of nature must take its place in the discourse of design along with the already recognized concerns of making. Within this expanded rhetoric, no object will suffice as an answer and no action will equal conclusion.

Having raised such strong issues from the start, the opening lecture by Maldonado ensured that what followed was guided by a

1 M. Heidegger in John Salis, ed., *Radical Phenomenology: Essays in Honor of Martin Heidegger* (Atlantic Highlands, NJ: Humanities Press, 1978), 3.

Figure 1
Tomás Maldanado

spirit of inquiry equal to Heidegger's challenge to ground our meetings, as thoughtful people, in the posing of questions. First, one Ph.D. candidate, and then yet another Ph.D. candidate, ensured there were no corners to hide from inquiry; the reverie of past triumphs was always about to be broken by a challenge to justify long-held views. On all sides, blind immediacy and the rhetorical pretext of preagreed concreteness stood as ugly figures admonishing those who would stay, uninspecting, in the fragrant garden that was the Milano conference.

While the concrete and immediate particularity of the conference has its place, the rapid decay of short-term memory implies that the conference papers will quickly assert themselves as the record of events. Reviewing the conference allows that, from this one person's perspective, elements of the sensorium may be transcribed and recorded, even if rearranged as a kind of map. Indeed, the concept of mapping arose in many presentations as a concept of what might properly be the current business of a conference reflecting on research and design. As pointed out by Silvia Pizzocaro[2] in her introduction to the conference proceedings, participants (more than 150) "from more than twenty countries met at the campus of the Politecnico di Milano to establish a ground for…debate, aspiring to offer not a series of status reports but the basis for a shared focus toward a culture of research in industrial design." The objective was a "*milieu* of expression."

Presentations and open question times, coffee and lunch, dinner and 1:00 AM gelato outside the Hotel Wagner: these moments, held in common with a group of design researchers, established a fundamental culture. Here we were, arguing over the day's events, even into the new morning.

Four Perspectives on Research

Beyond a common experience, grounding the Milan milieu, for this reviewer, was a sense of design knowledge inscribed in the architecture of Milan. Wandering the streets, half lost on purpose, required many escapes to the underground. Arising again to the Italian sunlight, from green line or red line or yellow line, four buildings, among the many, served as sign posts. These sign posts became crucial in my own cognitive mapping of the conference as that thing taking place in time and space in Milan in May.

First, the Castello Sforzesco, built in 1450 by Duke Francesco Sforza stands out in memory for its externalizing of power. The visual dominance, in the central courtyard, is an optical puzzle produced, as a piece of design, by holding the horizontal eye in tension with the vertical eye. The vertical finally overpowers; the tower takes visual control as something arising outside that will not be included. It exceeds the human through the human body and the dominant sense of sight. (Not surprisingly, inside is housed the ugly Pietà Rondanini, by Michelangelo, that says so much about the

2 Silvia Pizzocaro, Amilton Arruda, and Dijon De Moraes, eds., *Design Plus Research: Proceedings of the Politecnico di Milano Conference, May 18–20, 2000* (Milano: Politecnico di Milano, 2000).

bodily slide to death in the arms of life.) The Castle is experienced as the donation of a power from outside and above. Its model of design talks to the epistemological concerns of designing: we are what we design and what we design gives us back our own sense of ourselves. Is this inscription of design knowledge about the "Theory-Centered Approach"? Is it theory that seeks to control through baffling horizontals and bewildering verticals? Is it theory that pretends to assert what is unavoidable in design? Is it theory that would establish a castle?

Second, the Duomo Cathedral, begun in 1386 under the Visconti Dukedom, stands as a forerunner for the World Wide Web as it seeks to out-display even its own story. Thumbnail after thumbnail begs to be clicked on with the promise of revealing another anecdote in the travail of man and his god. Here, power is invested in a concretion that appears to be that of a coral reef: more and more is added on each turn of the head. Indeed, this model of accretion is the very source of the building.

Hundreds of years in the making, the Cathedral and its continuous building have become the source of the vernacular expression "*la fabrica del dom*." According to Aldo Rossi,[3] for the Milanese:

> …every major undertaking is likened to the "*fabrica del dom*." There will be states of advancement and guarantees of continuity, however, the result always will be provisional. Not provisional in a sadly ephemeral, but in an eternally provisional way, since the result is constantly in progress.

Beneath the altar, I can see something very simple if also pretending to be mysterious: men, bedizened, chanting as of old, in a chamber made for chanting, while outside their recess, the voluptuous colors of window after window open the eye to paradox rather than paradise. Here, power is the secret of excess by addition. The body has been wrapped in a sensory bandage of its own knowledge; exceeding myself, I become lost and comforted in my loss. Here, design is experienced as the grand narrative of all mankind. Is this the "User-Centered Approach," where users are used up in their reexpression as servants of utility? Because we can do better, or add, we do? Here we become servants of our own myth of design? In practice and use, we drown?

Third, the Galleria Vittorio Emanuele II or Salon of Milan, by architect Giuseppe Piermarini (1865), just seems to stand there offering nothing more than itself and the occasional cheap thrill of an arch, a dome, and a glimpse of the possibilities of human space. What a nice place to shop, though this is not what I do. Here, power is sublimated and made into a companion of the self; it is reformed as something of my own making; as something I have already secretly desired. It is a numbing and a pacifying, a kind of Alessi prototype for a dumb toy to dumb away my time in transitions

3 Aldo Rosi, circa 1989, "Milanese construction" in Luca Basso Peressut and Ilaria Valente, eds., *Milano Architetture per la città* 1980–1990 (Rozzano, Milano: Editoriale Domus): 71–77.

from arch to dome and back again. Here, power is my power over myself to overpower myself in my own pleasure. Here, I am experienced as space. Is this "the Education-Centered Approach," where we were taught how and where to have it, and then taught to forget that we are taught as we remember, as if for the first time, what it is to have it? "Educate" means "to draw out" as in "making a path for the drawn out to follow." This building seems to model my being drawn, towards being drawn as if that were a good and an end in itself. Just where am I going in all this learning? Along with Heracleitus,[4] we might agree that the "learning of many things teacheth not understanding, else would it have taught Hesoid and Pythagoras, and again Xenophanes and Hekataios" (frag. 16). Another arch, another dome, and we are wise?

Fourth, Stazione Centrale, by architect Ulisse Stacchini (1931), offers to translate time into a medium for my own transformation. It promises I will be taken on a train to a destination that must be the future, because all the signs are pointing away from here to there. At this station, design is experienced as the agent and goddess of time. By adding up histories, the interior skull offers an inverted bone cup of time. Is this the "Innovation-Centered Approach," where we find ourselves as novel participants in novel events speeding towards our own supplementation, augmentation, and realization as destroyers of the old world and creators of the new? Are we to get on board and rush to the horizon panting? Novated, renovated and innovated, we design, in denial of limit, our own ceremony of limitation denied. If only it were not so brash.

Community of Concern

Such is the poetry of buildings from this one vantage. Reading the conference papers (more than five-hundred pages), I am using these buildings to help organize the poles of thought, the tribal concerns, the design issues, and the designer concerns that were voiced and displayed during the conference. Here, the imaginary city of recollected-participants defeats my efforts to make a common sense. On day one, the conference buzz word was "intervention." On day two, it shifted to "provocation." By day three, we were into *ciao.*

In their final statement, the conference team; Ezio Manzini, Tomás Maldonado, Victor Margolin, and Silvia Pizzocaro; attempted to draw together the threads of the conference:

> Inside the larger network of designers, researchers, producers, and users, the design research community constitutes a network of individuals and institutions. This network connects individuals and creates a platform of interaction to encourage continuing dialogue among researchers who operate in different ways and in different domains. What this community has in common is a commitment to building a design research culture, which can contribute to a deeper understanding of design itself.

4 Heracleitus in John Burnet, *Early Greek Philosophy* (London: Adam & Charles Black, 4th ed., 1930).

Prior to the conference, and recorded in his paper in the proceedings, Victor Margolin[5] outlined the intention of the conference:

> What is most important is to understand that a research culture cannot be designed from the top down by legislating aims and methods for everyone. It has to grow from the bottom up, through extensive discussion and debate. Until now, design researchers have lacked the forum for a broad engagement with multiple strands of research. If we can create such a forum, we can begin to mature as a research community. We will not only produce higher quality practitioners and educational programs, but we'll also introduce design research more effectively into the wider field of research on human culture, and the achievement of personal and collective well-being.

How do things grow from the bottom up? The Milan conference was very catholic in its offerings. It was very broad in its approaches. It was clearly formulated in an effort to involve as many distinct areas of design concern as possible. Special sessions aimed to draw attention to the large range of existing design communities including journals, previous, related design conferences and subsequent, related design conferences. The diversity of approaches underlined differences. For example, fully referred journals and journals based on personal discretion and cultural discernment would seem at odds unless we accept that both approaches offer needed and valid kinds of support for design research.

At the edges of these special sessions, one could perceive the ghosts of past contests. Were these ghosts put to rest? From the vantage point of the many new design researchers who found their way to Milan, the ghosts were very vague and the new connections very apparent. Enough time and enough new Ph.D. candidates would seem to have allowed the tribes to sit together from a common commitment: an Althing *was* formed.

How was this possible? How is it that research communities can be formed? Beyond the blatant features that make conferences wrong, what else was going on? There must be something beyond blind immersion in the accepted mode of yet another PowerPoint display; something beyond yet another diagram pointing arrows from box to box, as if concepts are interrelated magically through arrows rather than words; something beyond feature sets that parade as adequate descriptions of anything other than themselves; something beyond yet another demonstration of a design object as if such objects embody, like fine art objects, their own concreteness; something beyond yet another picture as a resolved thought.

By looking into the world of ancient Greek science, we can look into the origins of a community of concern that radically altered the world through its particular ability to originate and sustain a peculiarly diverse discourse. Such questions of origin now face design research.

5 Victor Margolin, "Building a Design Research Community" in Silvia Pizzocaro, Amilton Arruda, and Dijon De Moraes, eds., *Design Plus Research: Proceedings of the Politecnico di Milano Conference, May 18–20, 2000* (Milano: Politecnico di Milano).

> Thales established a basis for this structure [a particular structure that organizes theoretical knowledge] by making the transition from unprovable statements on issues that were impossible to observe, to responsible ones. This transition was made with the anticipation of critical discussion and in hope of attaining respect and glory, having once satisfied the demand for proof. Thus, we relate the event directly to the structure of human relations. Of course, the thesis that the new forms of knowledge had their roots in the character of Greek political and social life has been expressed many times. However, such assertions tend to postulate a leap from one form of human activity to another that differs greatly. Some underestimate the difference between the agora or court debates and scientific discussion, others regard the theories of the first philosophers as the direct projection of political changes. But when I say that proof comes from the demand for proof, this is already speaking in terms of behavior and interrelations. When I say that the method of consistent reasoning about the nature was discovered by Thales in anticipation of a critical discussion, we see that a particular form of interpersonal relations, a particular form of human interaction, is impressed into the very logic of theoretical inquiry.[6]

Consistent reasoning in "anticipation of a critical discussion" is what typified the Milan conference. After three days of intense debate, it became apparent that there was a shared understanding of, and engagement with, "a particular form of human interaction." Crucial to this understanding was an agreed absence of gurus, an agreed openness to the most innocent and fundamental of questions, and an agreed willingness to inform the discourse of missing and / or repressed perspectives.

6 Dimitri V. Panchenko, "Thales and the Origin of Theoretical Reasoning," (trans. by Anton Struchkov) in *Configurations* 1.3 (1993): 387–414; also available at URLhttp://muse.jhu.edu/journals/configurations/v001/1.3panchenko.html.