DESIGN THINKING: WHAT IS THAT?

Jean-Pierre Protzen
Professor Emeritus
Department of Architecture
Cal Design Lab Lecture
Sept. 14, 2010

C. West Churchman was a philosopher and professor at the school of business administration—now the Haas School of business—here at Berkeley. One of his main interests was how we conduct business, make decisions, plan and design. To better understand the world in which we are living and acting he was deeply involved in practice. He was a consultant or active participant in a variety of enterprises, projects and government agencies: NASA, the Navy, City Planning, Architecture, Education, Business, and many more. These experiences led him to write:

> "In principle, we have the capability of organizing the societies of the world today to bring into existence well developed plans for solving the problems of poverty, health, education, war, human freedom and the development of new resources. If the human being has the capacity of doing all these things, why doesn't he do so?" (SA:4)

West's answer was that the ways we design, plan and make decisions were to blame, at least in part. He spent his career thinking about how we do it and how we could improve it. At one point he convinced NASA that it should spend some of its resources to work on society's problems, an effort that led to the creation of the UC Berkeley's Space Sciences Laboratory. As part of this lab, Churchman organized a seminar, which became known simply as "West's Seminar". This was an interdisciplinary seminar dedicated to design that ran for many years. The premises for this seminar were that design is a ubiquitous activity practiced by almost everybody, at least some of the time, and that there may be some generalizable observations to be made about how people go about it. To this effect, the seminar assembled people from across the campus and across the disciplines: Music, Engineering, Political Science, Public Health, Business Administration, Art, Education, Architecture, City and Regional Planning, and more. From the CED Joseph Esherick, Horst Rittel, Melvin Webber, and I were regular attendants

Thus, when I first heard about the intense new interest in Design Thinking I was all excited. Checking on Goggle, about a month ago, there were some 51 mio entries; earlier today there were over 60 mio. The urge to think about and improve the ways we go about design and planning has finally reached an internet-wide audience, at least so I thought. At a closer look, however, I was thoroughly disappointed. The subtitle of a recent book may tell you why: it reads, "Why D-T is the next competitive advantage". If that is what Design Thinking is about—it has *nothing* to do with Churchman's concerns.

It appears that D-T is just a new catchphrase, which, at best, is confusing and at worst, plain meaningless. A few definitions, if that is what they are, should illustrate my point:

> "Design Thinking is generally referred to as applying a designer's sensibility and methods to problem solving, no matter what the problem is."

> "Design thinking is a process which provides opportunities to businesses to develop products & services which will act as a solution to consumer in satisfying his/her need". So it is all about consumption!!!

> "Design Thinking is essentially a human-centered process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and concurrent business analysis …"

There are also some funny comments to be found:

> "They (design thinkers) tell others how to do things, but what do they actually do themselves? It's like saying "I am not a basketball player, I am a basketball thinker".

What, however, shocked me most, is that in none of the new books and blogs I have consulted are there any references to earlier works, not even to the book "Design Thinking", first published in 1987 by Peter Rowe, an urban designer and Harvard professor, who may actually have coined the phrase.

The confusion and ignorance of the new "Design Thinkers" is clearly reflected in the remark by Roger Martin, dean of the Rotman School of Management at the University of Toronto:

> "Design thinking, as a concept, has been slowly evolving and coalescing over the past decade."

This makes me wonder what Churchman, Rittel, Rowe and other faculty at Berkeley and elsewhere have been teaching and writing about over the last 60 years?

FROM DESIGN THINKING TO THINKING ABOUT DESIGN

To Peter Rowe "Design Thinking" meant reflection on the "situational logic and the decision making process of designers" and the "theoretical dimension that both account for and inform this kind of undertaking." That is much more in tune with what West's seminar was about. Thus, to avoid any further confusion I will switch my discussion from "Design Thinking" to "Thinking about Design".

Thinking about Design as a discipline, if older than a decade, is nevertheless a young discipline. The late Horst Rittel, a member of our architecture faculty, whose official title was professor of the Science of Design, once mused:

> "It is one of the mysteries of our civilization that the noble and prominent activity of design has found little scholarly attention until recently."

He was comparing it to the attention given to epistemology, that is, the study of the human ability to know, to know that we know, and to know what we know to be true, a field that has preoccupied philosophers since the dawn of time. Part of the reason that our remarkable ability to invent and create, to act deliberately in anticipation of the future, has not received the same attention may be that the ability to design is often seen more as a gift, a talent that some people have and others do not, and not as an activity everyone can engage in. Even today, it is something that many designers rather not discuss, because they believe that the design activity eludes analysis, or that by analyzing it one destroys it. Others feel that the study of the design process has no practical application; that it is of academic interest only.

Most authors put the beginnings of the discipline, as we understand it today, in the 1940's, to WWII and Norbert Wiener's notion of Cybernetics. Some place it back to the late 1920's and to the Austrian biologist Ludwig von Bertalanffy's notion of open systems, while others go back even further to Frederick Taylor's "Principles of Scientific Management" of 1911.

Thinking about Design means asking such questions as what is design? How is design possible? What is the nature of design problems? How do designers reason? Is their reasoning different from other forms of reasoning? What kind of knowledge do designers use and how is that knowledge structured and acquired? What procedures do designers follow and what is the logic of these procedures? Can design be taught and if so how? And last but not least, how can design be improved?

Thinking about Design is a field to which the Berkeley faculty has made significant contributions. But before I give you a brief history of the field and Berkeley's contribution to it, I should answer the question "what is design?"

DESIGN WHAT IS?

Among architects perhaps the most famous definition is that of Le Corbusier:

> "Design is a long and patient search."

This is a bit mysterious since it does not tell us what the search is about. It could be about the paradise lost, extraterrestrial intelligence, the self, or many more things.

To Christopher Alexander, a Berkeley architecture faculty emeritus, design meant

> "Finding the right physical components of a physical structure".

I will come back to this definition a bit later.

Many other definitions have been advanced, here is a sample:

For Bruce Archer, an industrial designer, design is
"A goal directed activity"

Morris Asimov, an engineer, defined it as
"Decision making, in the face of uncertainty, with a high penalty for error"

For P. J. Booker, another engineer, design means
"Simulating what we want to make (or do) before we make (or do) it as many times as may be necessary to feel confident in the final result"

To J. B. Reswick, design is
"A creative activity—it involves bringing into being some thing new and useful that has not existed before."

One of my favorite, albeit also a bit obscure, definition is that of Christopher Jones, an industrial designer: design is
"The performing of a very complicated act of faith".

Elements of these definitions
As disparate as these definitions seem to be we can nevertheless extract from them a number of aspects:

Design is not a thing but an **activity.**
Design is **purposeful**,
Design is **creative**, **searching for something new**,

Design is **meeting expectations,**
Design involves **uncertainty and risk,**
Design involves **simulation**.

Rittel synthesized the definitions into

> "Design is as an activity, which aims at the production of a plan, which plan—if implemented—is intended to bring about a situation with specific desired characteristics without creating unforeseen and undesired side and after effects."

Implications of def.

Design so defined is a purposeful activity, which implies thinking before acting. The outcome of design is not a thing or an object, but a plan or a set of instructions, which in most cases are left to others to execute, if they get executed at all. Designers worry about the potential consequences of their planned actions. To anticipate the consequences, they vicariously manipulate the world in simulations and models, asking "what if" questions. Designers do not have any direct feedback from the real world until after their plans are implemented; they do not have the luxury of trial and error in the real world.

Design, so defined, covers a wide range of activities and is not limited to any particular profession. The lawmaker drafting a new law, the city planner devising strategies to manage urban growth, the engineer proposing actions to reduce traffic jams, the scientist conceiving an experiment, the manager contemplating a reorganization of his company; all are designing, but so is everybody else: we carry an agenda, plan our careers, establish college funds for the education of our children and make shopping lists. Everybody designs at least some of the time, nobody designs all the time.

Some people hold that designing and planning are two distinct activities: an architect designs, a traffic engineer plans. Rittel made no such distinction; in fact, he considered the terms to be synonymous, which is consistent with common usage, both current and historical.

ANTECEDENTS/BRIEF HISTORY

The impulse for studying the activity of design or planning, and to attempt to enhance design competence are the insights
1. that not all our design efforts are successful and that many have negative, if not outright disastrous, consequences—just think of the book "Great Planning Disasters" by Peter Hall, a one time CED faculty member— and
2. that many, if not most of the design problems we face lie far beyond the expertise of a single individual or profession.

During WWII and the Battle of Britain it was recognized that the defense problems faced by the allies were beyond the competence of any general. In response, teams of specialists from many disciplines were called upon to help solve the problems. These efforts later became known by such names as *operations research, systems engineering, systems analysis*, etc. After the war, this approach to design was soon co-opted into civilian live and applied to all kinds planning and management problems.

OPERATIONS RESEARCH

OR is meant "to find the best decisions relative to as large a portion of the total organization as possible". A solution that is best for the overall organization is an *optimal* solution, one that is best for a part of an organization is called *sub-optimal*. OR is trying to look at the effects of

decisions in one part of the organization on other parts of the organization and the organization as a whole. In other words OR takes a system's view of problem solving, "since 'system' implies an interconnected complex of functionally related components". In very simple terms, OR can be explained as:

A well-known example of this approach is the World Dynamics Model by an MIT team, which tried to predict what would happen to the world's resources with an ever-growing population. It modeled the interaction of five major variables, Population, Natural Resources, Capital Investment, Fraction of Capital Investment in Agriculture, and Pollution.

DESIGN AS DECOMPOSITION

In his book "Notes on the Synthesis of Form", Alexander proposed another approach, which he called "decomposition", a design strategy based on set theory. Remember his definition of design: "Finding the right physical components of a physical structure". He explained this by using the analogy of an orange. There are many ways of cutting up an orange but only one way that corresponds to the "natural" structure of the orange, that is, take it apart wedge by wedge. How then do you decompose the physical structure to be designed into the "right" components? What are the proper sets and subsets of a problem the designer should pay attention to? Alexander recommended that we make a list of all the requirements for the new structure, make a table or graph of their interaction and then sort out the most connected clusters, these clusters will provide the proper components or subsets and sets the designer will have to deal with.

Let me illustrate Alexander's method with an example from Le Corbusier. In designing the Unité d'habitation made a number of small sketches

DESIGN AS A STAGED PROCESS

In parallel, other models—called "staged-process models"—of the design process have been proposed.

One is by Morris Asimov, who was chair of engineering at UCLA. It proposes that the designer goes through a sequence of analysis—synthesis—evaluation—communication spiraling from the abstract to the concrete.

The other is by Bruce Archer, a mechanical engineer and professor of design research at the Royal College of Art, who also taught at the famous Hochschule für Gestaltung at Ulm. He proposed a very similar sequence.

Both these models derive from psychological studies in which researchers observed people solving puzzles, mathematical, chess and other such problems.

THE GENERAL PROBLEM SOLVER

If the above models were derived from observable behavior of designers, they fail to explain how designers proceed from, say, analysis to synthesis. Instead of looking at behavior, Allen Newell and Herbert Simon investigated the cognitive processes of the designer. They argued that the observable behavior could be explained in terms of mental operations that are akin to computer programs, hence the idea of problem solving as information processing.

So optimistic was Simon as to declare that a GPS—that is, a "General Problem-Solver" not a Global Positioning System—could be built by 1969!

The developments of these theories of design have been inspired by the successes of the sciences, in particular the natural sciences. Design was to be made into an objective, rational procedure, subject to the same rigorous standards of testing and verification as the sciences. The focus of these theories and methods is on problem solving, on how to get from here to there, with very little consideration for the problem to be solved or the goals to be reached. Both, problems and goals, are assumed to be given, much like in a chess problem: the initial positions of the pieces are clearly given and the goal, of course, is to checkmate the opponent. But in design that is obviously not so. As Donald Schön, the author of "The Reflective Practitioner" noted

> "In real-world practice, problems do not present themselves to practitioners as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling, and uncertain." (D.S.:40)

Horst Rittel put it more drastically: "formulating the problem *is* the problem". He asked us to consider e.g. homelessness: what is the problem? Is it because there is an inadequate housing supply or has it to do with lack of income. If the latter what determines the lack of income? Is it the shortcomings of the economy or is it the lack of cognitive and occupational skills? If the latter, then our solution would have to include the educational system: why does it not provide the appropriate training? Or does homelessness result from poor physical or mental health? If so our solution would have to include a redesign of our health services. Homelessness may also include issues of cultural deprivation, spatial dislocation, ego identity, lack of political and social skills—and so on. And of course the problem of homelessness might include all of the above.

Reflecting on the nature of design problems, Rittel highlighted several of their characteristics:

1. As seen above, analysis and synthesis are not separable, "the problem can't be defined until the solution has been found". Or every formulation of the problem hints at a solution.
2. Every problem can be seen as a symptom of another and problems cannot be separated into disciplines.
3. Unlike in chess, there are no stopping rules that tell us when we are done
4. Solutions are neither true nor false; they are either good or bad. What is good or bad is a matter of values and judgments.
5. There are no immediate, or ultimate tests to design problems. A solution may work at first just as planned only to prove to have deleterious consequences later. DDT ex.
6. Every problem is essentially unique; there are no classes of problems. No matter how similar two problems may look there is always a chance that there is a difference that matters more than all the similarities.
7. Every problem is a "one-shot" operation. Every implemented plan has consequences that cannot be undone. If she doesn't like a wall that has been set up, the architect can always sign a change order, but that has consequences: labor cost, demolition materials to be disposed, etc.
8. There are no grand phases (i.e. analysis-synthesis-evaluation) nor are there any agreed upon, specific procedures.

No wonder Horst Rittel called design problems "wicked", wicked in contrast to tame problems such as crossword puzzles! To cope with wicked problems, he argued, we need a different approach and he proposed a 2^d generation of design theories and methods as opposed to the 1st generation. He proposed some principles for the new approach:

1. If the 1st generation was aiming to make design a purely rationality process, the 2^d generation recognizes that the notion of rationality implies serious paradoxes and that therefore distinctions between systematic versus intuitive, and rational versus non-rational design are untenable.

2. If the 1st generation claimed objectivity, the 2d generation acknowledges that design involves value judgments at almost every step. When it comes to know what is best, there are no experts; there is a **Symmetry of Ignorance**.

3. When it gets to determine what is best, every body affected by the plan should have a chance to voice his/her view and be involved in the planning process.

4. For this planning g process to work, the process has to be made as transparent as possible.

5. For people to understand each others judgments, the judgments must be explicit and communicable, i.e. "objectified": A is said to have objectified his/her judgment to B, if B can make decisions on behalf of A and arrives at the same results as A, although B does not necessarily share A's basis of judgment.

6. If the design process of the 1st generation can be carried out in isolation, the design process of wicked problem solving must be understood as an argumentative process: a process of raising questions and issues to which correspond different positions, arguments and evidence in support of arguments

Andreas Faludi, professor of spatial policies at Delft University and one-time visiting professor here at Berkeley, offered a very similar picture, albeit in different terms and much simpler:

DONALD SCHÖN AND THE "REFLECTIVE PRACTITIONER".

It is a quirk of history that Rittel and Schön who so eloquently and so effectively dissected 1st Generation design theories and methods and were actively involved in elaborating a new basis for design, did not know of each other's work until several years after both had published their major work. Donald Schön, professor of urban studies and planning at MIT coined the term "Technical Rationality" for the 1st Generation of design theories and methods. In his book "The Reflective Practitioner" he took issue with technical rationality, which in its focus on problem solving overlooked or even ignored the issue of problem setting. He understood design as a reflective conversation with a situation, in which the designer frames and re-frames the problem, the process spirals through stages of **appreciation, action, and re-appreciation.** The unique and uncertain situation comes to be understood through the attempt to change it, and changed through the attempt to understand it.

Both, Simon and Alexander, had their own responses to the critique of the technical rationality.

SIMONS' SATISFICING

Simon acknowledged in his "The Sciences of the Artificial" that there are limits to our rationality, that it is "bounded" and that therefore we could not reach for the "optimal solution" but had to be content with "satisficing" solutions. He also recognized that design problems are ill-structured, but ill-structuredness for him was not in the nature of design problem as wickedness is. Problems are ill-structured because the designer cannot imagine all possible options and solutions. Simon's critique of objective rationality is not an objection to a rationalistic approach, but to the assumption of *full* knowledge.

THE PATTERN LANGUAGE

Alexander, on the other hand, repudiated his earlier work and proposed an altogether different approach; one that I called the substantive approach (in contrast to procedural). Rather than specify how to go about solving a problem you give a catalog of problems with their standard solutions.
This approach is not unlike building codes or any other regulation. Building codes and regulations are a way of society to safeguard itself from the worst failings of designers. Had

architects and planners always considered the handicapped in their designs—after all they have been around for ever—there would never have been a need for handicapped access codes!

Many newer works echo the earlier critiques of Technical Rationality and propose similar new approaches. Others, apparently unaware of the earlier work have come to similar conclusions. For example, Frank Fischer and John Forester, the editors of *THE ARGUMENTATIVE TURN IN POLICY ANALYSIS AND PLANNING* (1993) write in the introduction that their book "explores practically and politically a simple but profound insight: Policy analysis and planning are practical processes of argumentation."! Didn't Rittel say so 20 years earlier?

Harold Nelson, a Berkeley architecture graduate, and Erik Stolterman in their book *THE DESIGN WAY* (2003) argue that in this ever more complex world our design traditions are failing us. Thus what they present in their book is what they believe to be "a broad and deep understanding of design, and designing, as a tradition of inquiry and action. They do it by taking a look at the *foundations*, the *fundamentals* and the *metaphysics* of design.

Klaus Krippendorff, a former student of Rittel's and author of *THE SEMANTIC TURN* (2006) argues "that *humans do not respond to the physical properties of things*—i.e. to their form, structure and function—*but to their individual and cultural meanings*." Based on this assumption, Krippendorff outlines the tenets of what he calls a science *for* design. His science *for* design differs paradigmatically from the natural sciences; it is human-centered and is meant to directly assist designers in their daily practice.

Nigel Cross, now an emeritus at The Open University in Milton Keynes and author of *DESIGNERLY WAYS OF KNOWING* (2006) has been involved in design research and education since the nineteen-sixties. This book "traces the development of his personal research programme" in the discipline and thus parallels much of the development of the field.

WHERE TO GO FROM HERE?

To conclude I'd like to make a few suggestions for "where do we go from here?" The first one is a focus on

Analyzing the sociological debates of the nineties, Ulrich Beck, a prominent German sociologist and author of the "Risk Society", noted that all authors, whatever differences they may have, "agree that the decades ahead we will confront profound contradictions and perplexing paradoxes; and experience hope embedded in despair". (WRS:1)

To Beck "[t]he concept of 'world risk society' … draws the attention to the limited controllability of the dangers we have created for ourselves." He blames the dangers to a large part on our specialization of knowledge and practice:

> "the higher the degree of specialization the wider the number and the scope of incalculable side effects of our scientific-technological actions. (RG:295)

A less dramatic, yet similar logic led to the creation of the CED. As Dean Bill Wurster wrote:

> "In simpler times it was enough to be adept at one's own profession but in these complicated times it becomes necessary to be not only the master of one profession but

also to have a real perception of other disciplines in order to know how these may be integrated with one's own to produce a harmonious result."

Over the years that I have been a member of the CED faculty some of us have made attempts to take this logic to its conclusion and to create a single, college-wide undergraduate degree, a BA in Environmental Design, which would expose all students to all three disciplines before they embrace a specialization. The battles have been fierce, but to no avail. Each department, architecture in particular, kept withdrawing into and defending its own territory.

Today the subject matter of interdisciplinary design has become a hot issue. Just the other day it came to my attention that interdisciplinary/trans-disciplinary practice and education will be *the* topic of next year's *Teachers Seminar* of the Association of Collegiate Schools of Architecture. And here on campus we have the Townsend Center for Humanities' course thread on Human-Centered Design, which "connects a rich offering of courses to the core question of design"; there is the Berkeley Institute of Design, which "fosters a new and deeply interdisciplinary approach to design for the 21st century." And now we have the Cal Design Lab. With all these efforts it may be time to resurrect the idea of an interdisciplinary degree in design, but this time one that goes beyond the College. I suggest that we develop and propose a campus-wide transdisciplinary degree program in design.

ARGUMENTATION

As seen before, Rittel's notion that design is argumentation has taken hold of a wider audience. Indeed thinking about design has lead to an "Argumentative Turn"; that is the recognition that argumentation and debates are, if not design itself, essential to design. To support argumentation, make it as transparent as possible and to keep track of it Rittel proposed IBIS, an Issue-Based Information System.

A paper version of IBIS has successfully been used by the equivalent of the EPA in the German government. Various people have since developed and applied electronic versions to assist and support debates and collaborative design in many different settings. Yet, a lot more work needs to be done to make deliberative design fully functional. A quick look at the U.S. Senate should be enough to show that people do not always argue in good faith and obstruct any possible consensus. As Churchman noted:

> "We simply have no technology of any adequate sort that can guarantee peaceful discussion of issues when a … crisis occurs. Instead we must always face the reality that negotiations will break down and deadly conflict result." (CoR:51)

To say that we don't have a technology to encourage and enforce reasoned and civilized argumentation, does not mean that such a technology cannot be invented and developed. There is a considerable literature on the study of conflict, conflict management, and conflict resolution to draw upon. And right here, in the CED, with CRP professor Judith Innes' work on consensus building we have the beginnings of such a research agenda upon which we can build.

INCOMPLETE DESIGN AND DESIGN FOR INCOMPLETENESS

A couple of weeks ago I came upon an article, the title of which reads "Incomplete Design and Design for Incompleteness"[1]. It talks about how open-ended design strategies as pursued by, say, the Linux operating system or Wikipedia are much better adapted to our rapidly changing world—the "Liquid Modernity" as Zygmunt Bauman puts it—than design strategies that aim at completeness. It reminded me of the early days of my career when collaborating with Konrad Wachsmann I was involved in the design of modular construction systems that could be changed

---

[1] Garud, Raghu et al., Organization Studies, Vo. 29, no. 3:351-371, March 2008

and reconfigured as the uses and needs for a building changed. But this article also struck another chord with me: it reminded me of a provocative article by Churchman: "The Case against Planning: the Beloved Community". There he wrote

> "… We are so used to thinking in terms of goals and attainment that it's like imagining the fourth dimension to think otherwise. We want to seek the contributions [of citizens] to planning that will maximize the chances of attaining our goals. Hence we rank the contributions in importance, and use cost-benefit analysis to see which are the ones we really need. But we've got means and ends twisted about. The so-called goals (profit, pleasure, learning, etc.) are really the means, the means whereby people can contribute to life's plans. It is **contribution** which is the goal, because contribution is the full expression of each one's individuality. We create problems and attempt to solve them *in order to* contribute." (DMT 12,3/4:

He went on to give an example of what such a future would look like if it were applied to a university:

> "We see at once that the distinction between student, faculty and administration disappears; everyone is all three in his contribution. The students teach and administer, the faculty learn and administer, the administration learns (fantastic!) and teaches. Furthermore, there are no representative bodies, no academic senate, no student association, no administrative committees. Every one has equal rank (call them all full professors or empty professors, depending on the time of the day, after or before a meal). And the old-fashioned university goal of "learning and adding to knowledge" becomes instead the means by which the whole educational system can attain maximal contribution from each member. Thus 'learning' is a marvelous human invention of a set of problems, which produces real individual contribution to the planning and deciding of a social system."

Applied to planning and design, this is reminiscent of the participatory planning movement and the paradigm of collaborative design. If we truly accept that all design problems are wicked, then the involvement and contribution in the design process by all those affected is an obvious consequence. Yet, as it is we do not have the appropriate infrastructure to support and facilitate the "maximal contribution". Our educational, political and professional institutions and organizations are not ready for this concept. What changes would it take to make it possible? Churchman's vision may be utopian, but as Rittel put it:

> "… because we cannot anticipate all the consequences of our plans, every plan, every treatment of a wicked problem is a venture, if not an adventure. Therefore, let us share the risk, let us try to find accomplices who are willing to embark on the problem with us. For one person it is too risky, but maybe if we join our forces we may take the risk and live with the uncertainty and embark upon the venture.

PLANNING FOR THE UNEXPECTED

Another pertinent observation by Churchman leads me to another subject matter: Planning for the Unexpected:

> "But because we can never make sure that a given set of plans or aspirations will come to fruition, we need something else besides. We need to set down the explicit steps we are willing to take and capable of taking when the plans fail. This is perhaps one of the most neglected aspects of … design and planning." (SA:8)

I think that Churchman hit on an important, but very tricky issue. What he is saying is that we should always have a plan B. But how do we know that plan B will not fail? Should we then not also have a plan C, and so forth?

In his book "Planning for the Unplanned …" Aseem Inam, who had studied the recovery of Los Angeles and Mexico City after earthquakes came to the conclusion that the best bet in a crisis lies in the institutional bureaucracy and its standardized routines. Although institutional routines can be rigid and limiting, they are the result of experience and as such, simplify response to novel situations. Using established procedures, institutions can take the shocking into the realm of the familiar and utilize knowledge and resources in highly responsive ways. There might be some truth to Inam's observation, yet we are also familiar with the failure of institutional bureaucracies. Remember FEMA's "helluva job" after Katrina!

Earthquakes may be unplanned, but they are not unexpected and so we can prepare for them. The real question is how do we plan for the unexpected, if that can be done at all?

It is a fact that designers in most, if no all cases, have to make on the spot adjustments or changes to their plans during design as well as during and after implementation because of unexpected events and consequences: e.g. the client changes her mind, the plan runs into public protest—Islamic Center in N.Y.—somebody makes a mistake, things don't work as anticipated—the gas pedals of Toyota—things cost a lot more—bay bridge, and so forth. This observation led a student of mine, Jeffrey Chan, to investigate the role of improvisation in design. Improvisation is, of course, the antithesis of planning, but if it is an inevitable ingredient of planning, is there a way to account for it in design and planning theory? What is improvisation? How does it work? Is it just another form of Charles Lindblom's "The Science of Muddling Through"? How do we justify it? In his dissertation he raised these and other questions, not all of which he could answer. Yet, his dissertation has the merit of having established a discourse, a discourse that is worth pursuing.

ETHICS

And finally and most importantly is the topic of ethics. To quote Churchman one last time:

> "Probably the most startling feature of the twentieth century culture is the fact that we have developed such elaborate ways of doing things and at the same time have developed no way of justifying any of the things we do". (P&OD:1)

This observation is no less true today than it was fifty years ago. If we take Churchman's remarks seriously, we should shift our focus from the question of how best to design to the question of what to design and what *not* design. Should we, as some scientists proposed, inject reflecting particles into the stratosphere to reduce global warming? Should we tamper with the human genome to get a more "perfect" human being? Behind such questions lie serious ethical questions, questions of what is right and what is wrong. Should we draw lines on what to design and what *not* to design, and if so where should we draw the lines? These questions have no easy answers; different schools of ethics may lead to different recommendations. Yet, the questions are important and decision will have to be made. To make informed decisions designers and planner will need to have a thorough understanding of the field of ethics, its many schools of thought and their application to practice. In the CED we should follow the example of the Haas School of Business and institute a mandatory ethics course for all students.