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ILLINOIS INSTITUTE OF TECHNOLOGY

Societal Responsibilities. Growing the Role of Design

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Abstract

Global population growth and the problems it has induced—from resource depletion to global warming—are arguably the most serious threats ever to our civilization. As we confront them, new technologies just evolving will be awesome additions to the tools at our disposal. We may yet be able to escape from the worst ravages, perhaps even bring better quality of life to our descendents. The question is, will our political decision makers have the wisdom to avail themselves of the right tools at the right time? Will we be able to avoid the worst of projected disasters and make best use of the new technologies? Decision makers will need the best of creative thinking from the science community—and from a design community newly prepared to contribute. The evidence is clear that decision makers do not yet have the full range of advice they need. Advice that offers proactive, constructive options for action is not being heard or heeded. The design community must reposition itself to fill this void—and make it visibly apparent that it has done so. A revitalized, extended design capacity should be highly visible in regional centers of design activity—International Design Institutes.

Introduction

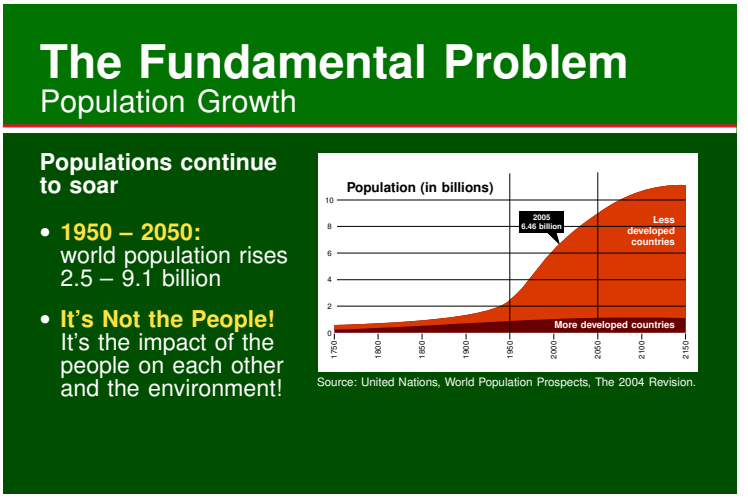

Figure 1 **The Fundamental Problem: Population Growth**

We can't say we didn't know. For the last twenty-five years we have been warned repeatedly about the environmental dangers building around us. For twenty five years before that, we were warned about the population explosion producing them.

In the 1980's, with the first comprehensive gatherings of data on global warming, tangible effects of population growth began to be firmly associated with the actions of industrial society. Meeting the demands of a growing population for material goods was a two-way street. The concept of a "better life" was beginning to look like a relative one—briefly better, relative to the past, but frighteningly better, relative to an uncertain future.

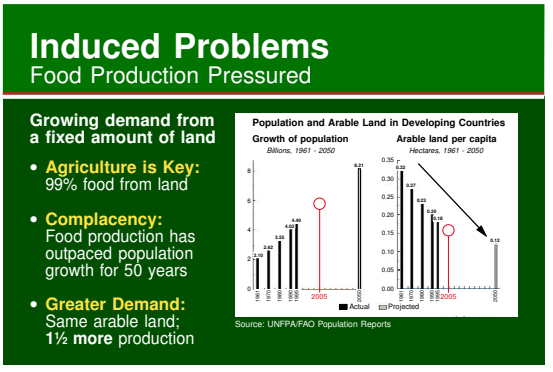

Figure 2 **Induced Problems: Food Production Pressured**

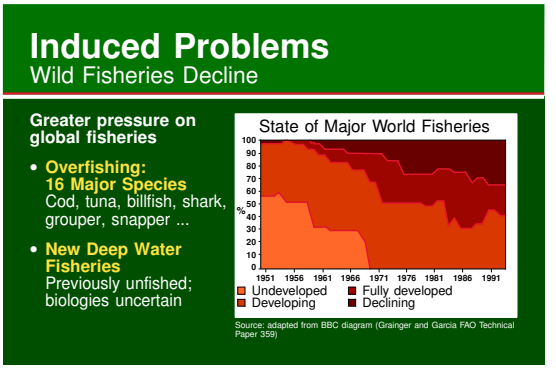

Figure 3 **Induced Problems: Wild Fisheries Decline**

Because we did not listen when we might have done something about it, we are now confronted with global warming as an observable fact. Like many other massive events, it took a long time to gain strength, and it will take longer to lose it. It is still in a strengthening pattern.

In spite of world-wide awareness, population growth also is still in an accelerating phase. The population of the world is now 6.46 billion and rising[1]. Just 50 years ago it was 2.76 billion. Despite the fact that almost all developed nations are at replacement-level birth rates—or lower—world population is still on a steep incline because of high birth rates in developing countries (Figure 1). Before world populations begin to level off, we can expect to see the number rise to over 10 billion—barring catastrophic events.

Problems Induced by Population Growth

And catastrophic events are distinct possibilities, growing in probability every year, all because of population growth. A better life for a growing population means more energy to be produced and more resources to be processed. Without sustainability, this can only mean unchecked resource depletion and uncontrolled greenhouse gas emissions. Both will generate disasters at an accelerating rate.

• Food production for a growing population is an absolute requirement. In the last 50+ years, beginning with the green revolution that virtually saved India from starvation, the rise in food production has outstripped population growth. But arable land per capita continues to decrease—by 2050, it will have decreased over 62% since the 1960's—and productivity cannot increase indefinitely (Figure 2)[2].

• The oceans, once thought to be a limitless food source, are fast becoming a depleted resource. Stocks of wild finfish and shellfish are declining alarmingly (Figure 3)[3]. The fishing industry is turning more and more to deep-water species to replace them, often with little knowledge of the biology of the replacement species. The so-called "orange roughy" (Hoplostethus atlanticus, officially, once familiarly called the "Slimehead") is a case in point. It is now known that this fish, living in schools 1,000 meters deep, lives up to 150 years and does not become sexually mature until it is 25 years old[4] (the fish in your freezer may be older than your grandmother). Extensive initial fishing reduced stocks significantly, and although fisheries management has been implemented, without careful monitoring, this species could soon join the endangered ranks. The famed Monterey Bay Aquarium in California lists it among 16 major food species being overfished[5].

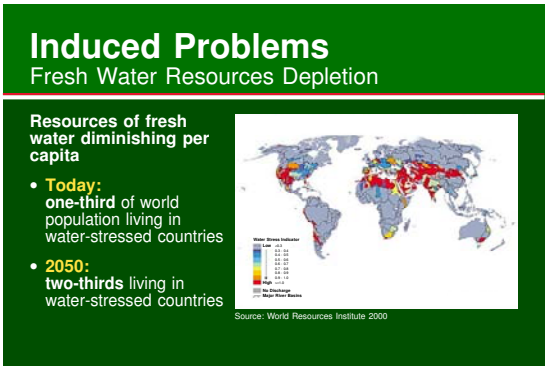

Figure 4 **Induced Problems: Fresh Water Resources Depletion**

• Already in many parts of the world, water supplies are reaching levels of insufficiency (Figure 4). Complicated by agricultural needs for irrigation and the needs of urban centers becoming megacities, the fresh water resources of our lakes, rivers and subsurface aquifers are subsiding. In 2003, 9,500 children were dying daily from insufficient or contaminated water supplies.

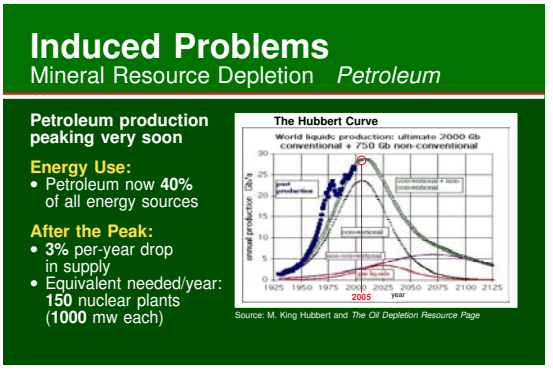

Figure 5 **Induced Problems: Petroleum Resource Depletion**

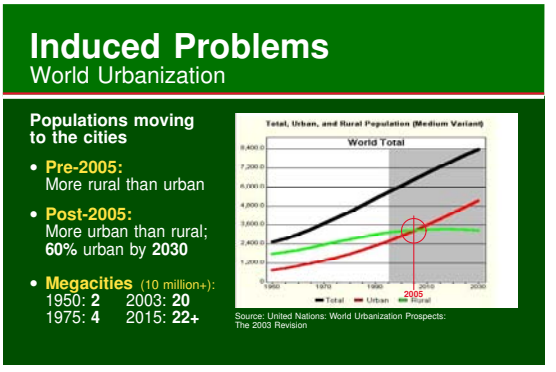

Figure 6 **Induced Problems: World Urbanization**

One-third of the world's population, by some experts' analysis, live in water-stressed countries now, with two-thirds of the world to share their dilemma by 2050[6].

• Mineral resources are approaching finite limits, exhausted in some locations, more difficult to extract in others. While supplies of some minerals are in no immediate danger, others are under severe pressure. Oil is a resource of vital concern, with production expected to peak in this decade or shortly thereafter (Figure 5). The Hubbert Curve, long-used as a predictive tool in the petroleum industry, when coupled with modern corrective tools, predicts that we are reaching worldwide peak production *now* and face a reduction in production of approximately 3% per year very soon[7]. Not only will that oil production have to be replaced as an energy source, additional energy sources will have to be found to keep pace with the population curve.

• In an interesting paradox, the countryside is becoming less—not more—inhabited as we add to the population. The people are moving from the country to the cities (Figure 6). As of this year, 2005, the world is more urban than rural for the first time[8]. In the next fifteen years 300 million rural Chinese will move to the cities[9]. In 1950, only two cities in the world, Tokyo and New York City, were over 10 million in size. By 1975 there were 4 such megacities, and by 2003, there were 20. By 2015 there will be at least 22[10]. In China alone there are between 100 and 160 cities with over 1 million inhabitants (America has 9, and Eastern and Western Europe together have 36)[11]. Cities are complex, sophisticated systems, but their managers will need all the skill they can command to deal with the great urban migration.

The effects of population growth are many, but the special one that brings its own collection of nightmares is global warming. The byproduct of societies trying by unsustainable means to meet the needs of their swelling populations, global warming brings with it a full range of environmental plagues.

• Climate and weather patterns are changing. Some regions are simply getting drier or wetter, but the greatest damage will come from sustained, severe droughts and intense, prolonged flooding (Figure 7). The problem is change: ecosystems confronted with wetter or drier conditions for periods far longer than the environment or its inhabitants are prepared.

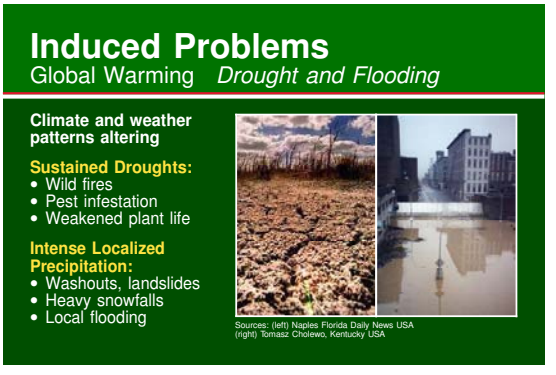

Figure 7 **Induced Problems: Global Warming - Drought & Flooding**

• Ocean levels are rising (Figure 8). Temperature rise under global warming is greatest at the poles, and polar melting is accelerating. Melting icebergs have little effect on rising water levels because the ice is already floating, but ice melting on land, such as in Greenland and Antarctica, will contribute to rising water levels, and the thermal expansion of water as it is heated a degree at a time will also contribute. The Intergovernmental Panel on Climate Change in its 2001 report, estimates a 45 cm (18 inch) mean rise by the end of the century with a low estimate of 9 cm (3.5 inches) and a high estimate of 88 cm

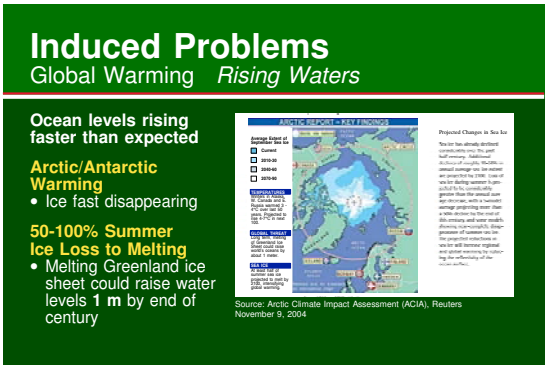

Figure 8 **Induced Problems: Global Warming - Rising Waters**

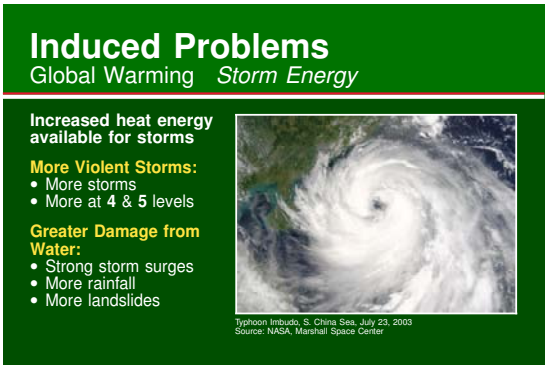

Figure 9 **Induced Problems: Global Warming - Storm Energy**

(35 inches)[12]. Many of the world's major cities are on ocean coasts or waterways close to the oceans.

• The increased heat energy created by global warming is feeding more violent storms (Figure 9). Storms over the water will increase in number and in violence. Storms over land, although less subject to the stimulation of ocean heat, will draw from the weather systems that build over the oceans and move readily onto land. All but the regions most remote from the coasts will be influenced. Category 4 and 5 levels can be expected increasingly for hurricanes, cyclones, typhoons and tornados.

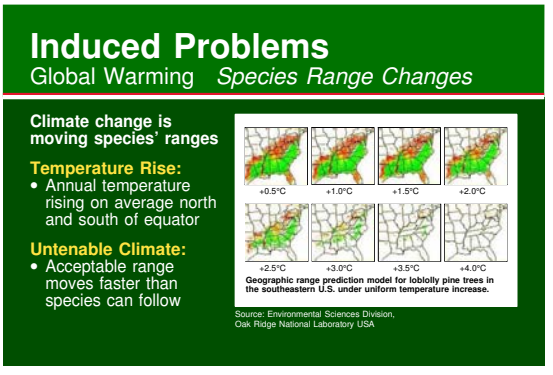

Figure 10 **Induced Problems: Global Warming - Range Changes**

• On a longer scale, climate changes are moving the zones in which species can live (Figure 10). Warmer winters, earlier springs and hotter summers are changing key environmental characteristics crucial for species' survival, even existence; and as ecological zones migrate northward (or southward in the southern hemisphere), they will do so at a pace too fast for plant species to follow. When species disappear, others dependent on them are also affected, and ecosystems disintegrate. Biodiversity will decrease and extinctions will take place.

Potential Solutions

So far, I have offered nothing but gloom and doom as the expectations for our immediate future. In truth, the outlook is not good, but hope dies slowly. Humankind is a remarkably tenacious and resourceful species, and it is possible that we may be able to extricate ourselves and the planet from the worst of the potential ravages. The very technological prowess that has brought us to our sorry state may be the means for recovery. Among highly promising knowledge-age technologies, three have major potential.

• Robots are no longer the dreams of science fiction. They are becoming a means of choice for delivery of services (Figure 11). Advances in robotics will enable us to conceive, refine and consign work as never before possible. Work requiring creativity, adaptivity, thoughtfulness and sensitivity will be the province of human workers; work requiring strength, scale, precision, repetitive perfection, continuous performance, or ability to withstand hostile environments will be performed by robots. Previously unattemptable efforts will become routine and humankind will truly move into the knowledge age.

• Biotechnology is the second emerging knowledge-age technology (Figure 12). As our knowledge of genetics and genomes improves, we will be able to work with life processes as well as we are able to work with electromechanical processes today. The potential for food production and disease eradication alone raise biotechnologies to priority research status.

• Most compelling and potentially far-reaching of the knowledge-age technologies is molecular nanotechnology (Figure 13). Based on the premise that materials, products and systems can be manufactured from the atomic level up,

Figure 11 **Opportunity: Robotics**

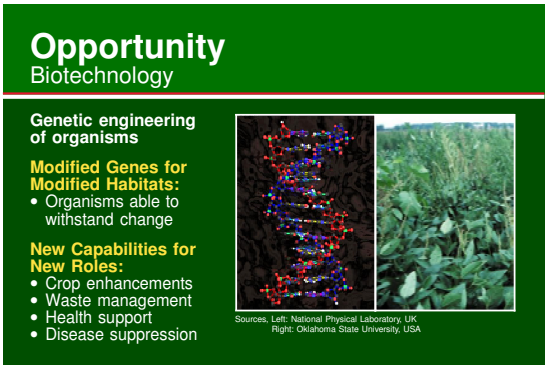

Figure 12 **Opportunity: Biotechnology**

this technology has emerged from a deeply insightful reflection by Nobel-Prize winning physicist Richard Feynman in a 1959 talk, "There's Plenty of Room at the Bottom"[13]. Accepted as a research challenge by K. Eric Drexler at MIT.[14], the concept has already lead to commercial results; and the promise of products such as super computers smaller than a human blood cell and materials able to morph to meet changing needs no longer seems fanciful. Production processes for nanotechnology are even more unconventional and unprecedented; the impact of the nanotechnological revolution will almost certainly eclipse that of the industrial revolution. Most important, nanotechnology applications may see use in controlling—or even reversing—global warming.

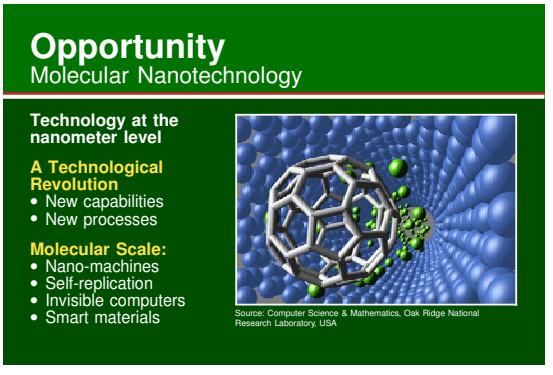

Figure 13 **Opportunity: Molecular Nanotechnology**

The scale of both problems and opportunities is sobering—and those enumerated here are by no means all. A host of other potentially disastrous events are being induced by our growing numbers (Figure 14). Attacks with weapons of mass destruction are concerns of deadly seriousness now demanding constant, expensive awareness. The certainties of cold war have transmogrified into uncertain shadow wars involving unseen

Figure 14 **Problems/Opportunities: The Social Context**

enemies with fluid allegiances. Catastrophic national political collapses compete with regional economic miracles. Medical science races to blunt threats of incipient pandemics while announcing daily breakthroughs in decoding genomic information that could transform the life sciences. Everywhere, the scale explodes. China is the metaphor: colossal change at almost frightening speed. Societal-level enhancements to quality of life are tantalizingly near—if they aren't crushed under looming society-wide disasters.

The problem is that our abilities to plan, decide and act aren't at the same scaled-up capacity. Problems and opportunities at scales so dramatic beg serious thought about the decisions that must be made, the decision processes to be used, and the preparation of advisors to the decision makers.

Some Insights about the Quality of Advice

Decision makers faced with decisions involving forces not wholly understandable or predictable need wisdom and vision. At the scale of the problems and opportunities facing us today, no

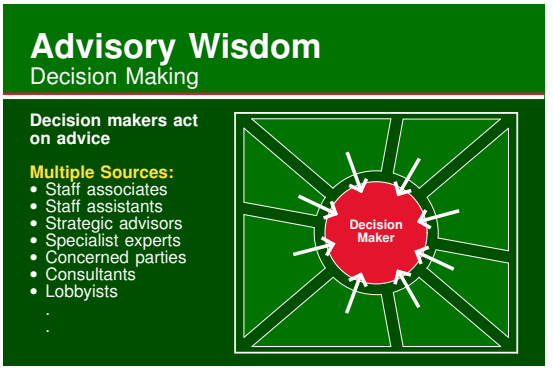

Figure 15 **Advisory Wisdom: Decision Making**

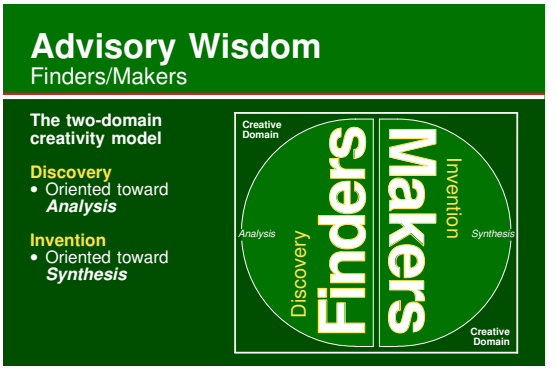

Figure 16 **Advisory Wisdom: Finders/Makers**

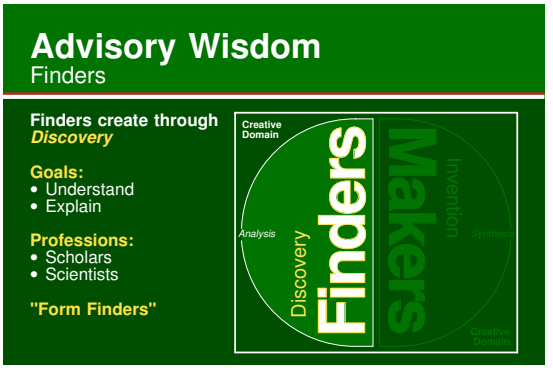

Figure 17 **Advisory Wisdom: Finders**

Figure 18 **Advisory Wisdom: Makers**

single individual can be expected to comprehend all that is required to make these kinds of decisions. Teams of advisors, consultants, experts and assistants will be necessary, and decisions, by necessity, will have to be filtered through extensive discussion and interaction (Figure 15).

As important as a wealth of diverse background knowledge will be for this staff of experts, the attitude, process—*way of thinking*—that they bring will be equally important. Wisdom must be reinforced with creativity, and creativity needs to be multidimensional. More than ever, it will be important to have creative advisors and have them from a diversity of backgrounds.

Attitudinally, creative people tend to fit one of two models (Figure 16).

Those following the first model, "finders", exhibit their creativity through discovery (Figure 17). *Finders* are driven to understand and to find new explanations for phenomena not well understood. In real-life professions, they usually become scientists or scholars and are responsible in the last several centuries for our great progress in understanding the natural world.

Those who fit the second model, "makers", are equally creative, but demonstrate their creativity through invention (Figure 18). *Makers* are driven to synthesize what they know in new constructions, new arrangements, compositions and concepts that are tangible, fresh expressions of what is known. They become architects, engineers, artists—*designers*—and are responsible for the built environment we live in.

Surprisingly, neither of these two major reservoirs of creative wisdom is being used effectively at the highest decision-making levels, perhaps because, historically, they haven't been so necessary.

In the not-so-distant past, politicians could make major errors of judgment without earth-shaking consequences. With little more than local repercussions, decision-making politicians often set policies that benefited the chosen at the expense of everyone else. The difference today is that regional, national—even local—decisions may now have ramifications felt around the world. Uninformed decision-making simply is no longer tolerable. Scientific advice must be integrated thoughtfully with the full range of advice given. And design advice must be similarly sought and incorporated (Figure 19). On the one hand, problems must be understood with the greatest insight; on the other, alternative actions

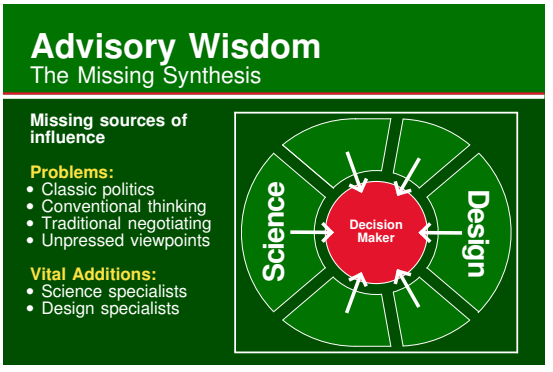

Figure 19 **Advisory Wisdom: The Missing Synthesis**

must be framed from the boldest exploration of ideas.

Not Using Good Advice

Global warming is a good example of ill-advised decision making (Figure 20). First catapulted to public attention in the 1980's, global warming has been treated as a political football by governments around the world, particularly in the developed world. A rational decision-making process would be expected to seek expert opinion on an issue as potentially dangerous as global warming. The principal experts would be scientists and, indeed, scientists did begin to speak out in the mid 1980's. As is the scientific way, opinions were given on both sides of the question. Some thought the evidence confirmed humankind's impact on changing climate; some thought that observed phenomena were natural and part of very complex but normal climatic cycles. The result was that governmental leaders listened to those who supported their personal views.

Those scientists who argued for the reality of man-induced global warming advised the cessation of practices producing greenhouse gases, most notably carbon dioxide. Even though scientists on this side of the argument continued to increase in proportion to what is now an overwhelming majority, their advice has continued to be ignored. For the politician in a country like the United States, the economic implications of capping or reducing carbon dioxide emissions have been unrelentingly negative and, therefore, the decision has been to "study the problem further".

The problem, of course, is that there may not be time for further study. Global warming is an environmental problem on a scale beyond rapid human intervention. The display of potentially disastrous small-problem thinking that it has induced is demonstration enough of the need for new processes of policy making.

Two factors stand out. First, the best scientific advice was not taken (Figure 21). True, scientists disagreed, but that is an important part of the scientific method. Skepticism is necessary to support deep inquiry and confirmation of hypotheses. But because the science community was not of a single mind, its advice was manipulated to support politically desirable policy. Had governmental leadership sought informed consensus, it could have obtained it.

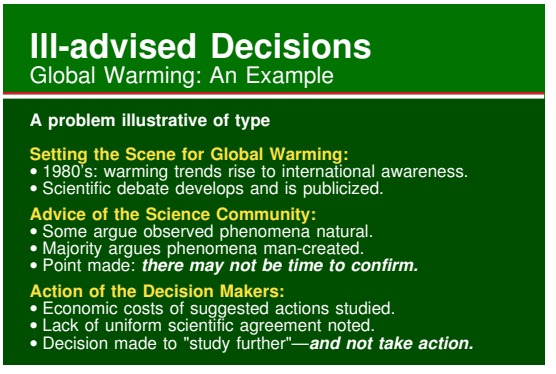

Figure 20 **Ill-advised Decisions: Global Warming**

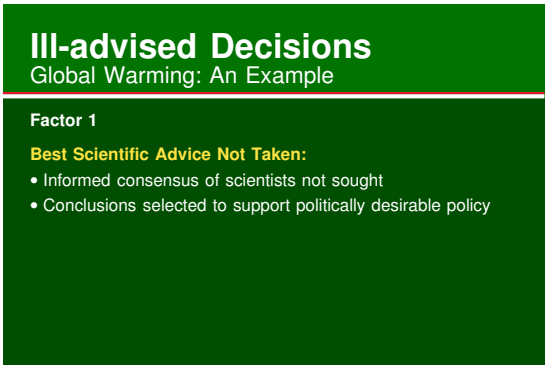

Figure 21 **Ill-advised Decisions: Global Warming Factor 1**

Second, scientists offered only one-dimensional recommendations (Figure 22). Where offending practices were recognized as contributing to the production of greenhouse gases, scientists advised stopping those practices—stop cutting down the rain forests, stop making automobiles that burn hydrocarbons, stop generating electricity with coal, gas and oil-fired power plants, etc. A natural product of the "finders" way of thinking, the negation model of problem solving—discover the cause of a problem and remove

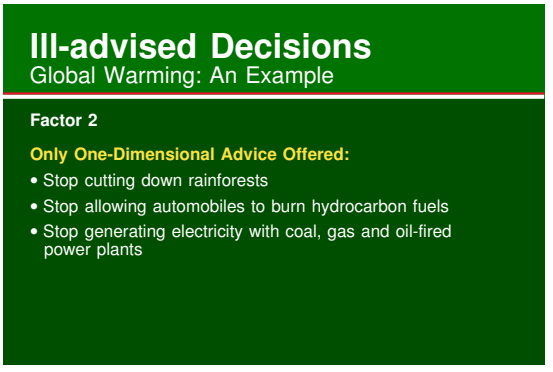

Figure 22 **Ill-advised Decisions: Global Warming - Factor 2**

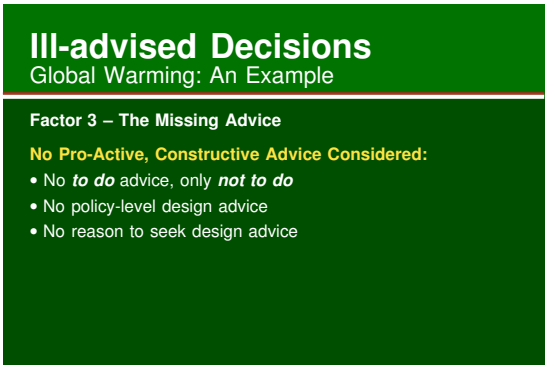

Figure 23 **Ill-advised Decisions: Global Warning - Missing Advice**

it—played directly into the hands of those politicians who felt that they had to oppose reductive solutions that would lead to economic downturn.

The advice that was missing was advice offering proactive options "to do" (Figure 23). Design thinking as naturally looks for what "to do" to solve a problem as science thinking looks for what "not to do"—or stop doing—to solve the problem. But there are no design advisors at policy-making levels of government, and design—as we have practiced it around the world—is not perceived as having value for political and institutional policy making.

Project Phoenix, An Example

In 1988, the Institute of Design decided that looking at the global warming problem from a design perspective would be highly appropriate as a subject for the Japan Design Foundation's 4th International Design Competition (Figure 24). In two proposals that we invested 10,000 man-hours developing[15], we showed how ultra-large-scale solar power-generation satellites, environmental-scale coverings for regreening deserts, and deep-ocean floating mangrove-island and kelp-bed complexes could both reduce atmospheric carbon dioxide *and* support significant economic and environmental development. They could make money and increase quality of life while fighting global warming! We made the project reports available to governmental leaders in the U.S., Japan, U.K., Germany, France and Russia, with mixed response. Germany and the U.K. responded enthusiastically and received our permission to copy the reports for stimulation of similar research in their universities. No other governments replied.

On reflection, it was not surprising. Given the conservative position all of these governments held on the economic implications of any carbon emissions reduction, and the total lack of political credentials for any of the design fields, it was not advice they wanted or thought they needed to hear. Popular Science magazine, however, awarded the project its "Grand Award" in the environmental technology category of its "Year's 100 Greatest Achievements in Science and Technology" for 1991.

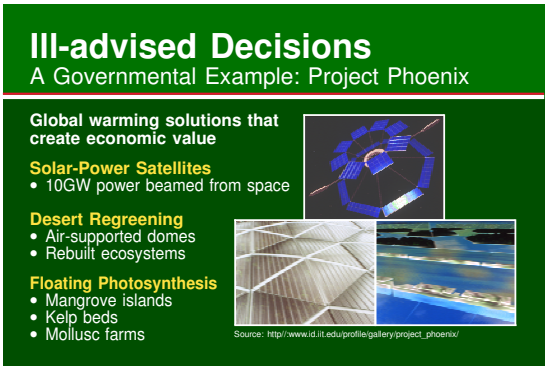

Figure 24 **Ill-advised Decisions: The Project Phoenix Example**

Advice Design Can Offer

Design thinking is particularly good at finding problems, asking the right questions about them, and generating creative ideas. Characterizing problems insightfully and inventing solutions that both uncover the best information and employ it ingeniously is a hallmark of design thinking. Design can model the future in ways that can be evaluated for action. Project Phoenix was an example of that kind of design thinking.

Figures 25 through 29 are samples from five more recent projects from the Institute of Design's Systems and Systematic Design course. Each addresses large-scale problems or opportunities that cry out for innovative crystallizations

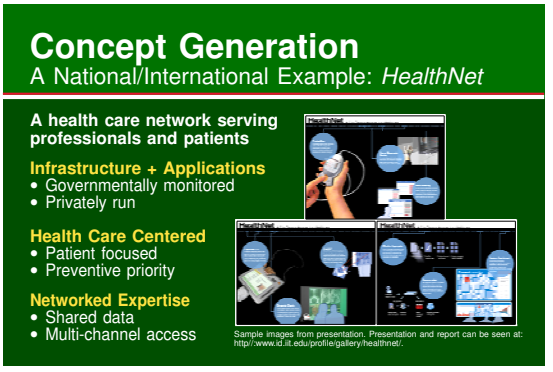

Figure 25 **Concept Generation: HealthNet**

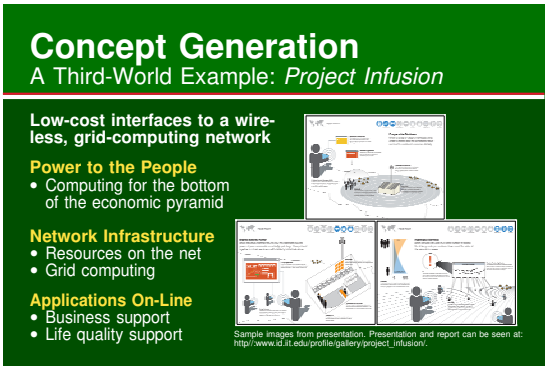

Figure 26 **Concept Generation: Project Infusion**

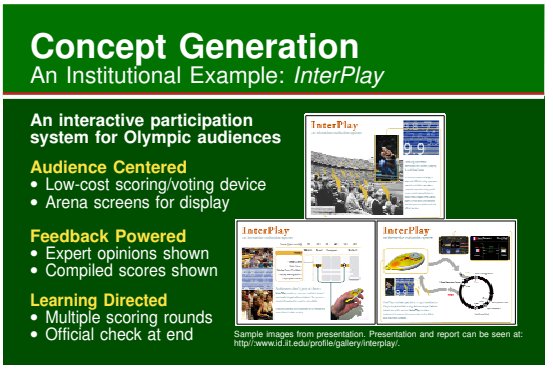

Figure 27 **Concept Generation: InterPlay**

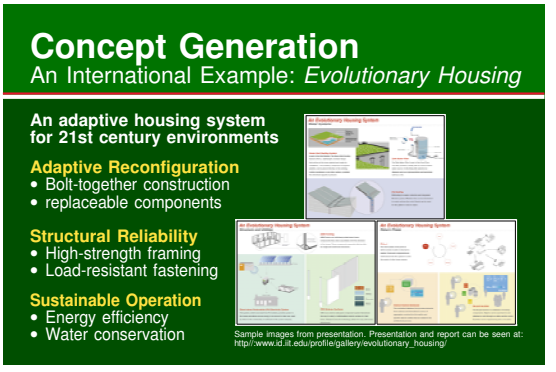

Figure 28 **Concept Generation: Evolutionary Housing**

of concepts—models decision-makers can use to shape plans of action. Full presentations can be seen at the Institute of Design's web site[16].

The first, HealthNet, addresses a problem absorbing the attention of everyone in the U.S.: the future of health care. A major aspect of that problem is information transfer, and HealthNet offers a plan for a network with system infrastructure and specialized applications to serve care seekers and care givers: patients, medical professionals, pharmacists, hospitals, health-care providers, emergency services, family members and others.

Project Infusion is a model showing how multinational corporations can help to build the economies of the poorest of nations—and make money doing so. Contrary to popular belief, the poor in every country find money to buy things that will make their lives better. Television sets and cell phones are well-known examples. Project Infusion shows how a low-cost network computer (little more than an input/output device) can be coupled with grid computing and a wireless network to bring computing and communication power to the bottom of the economic pyramid.

InterPlay shows how audiences at sporting

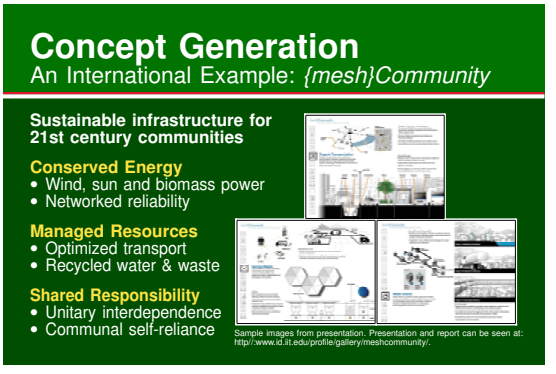

Figure 29 **Concept Generation: {mesh}Community**

events like the Olympics—and public events generally—could participate in mass judging, voting and evaluating with low-cost, wireless scoring devices and feedback from television monitors in public venues or TV sets at home. A process of audience feedback combined with expert and official judgments promotes understanding, learning and consensus building.

Evolutionary Housing considers the design of housing systems at a time when sustainability and adaptability are becoming primary, critical criteria for housing. In a world of diminished resources, urban crowding, and environmental threats from global warming, new approaches to

housing construction are needed. Evolutionary Housing combines concepts for modular, high-strength, replaceable components with functional cores and self-sufficient resources and utilities to meet the new conditions.

Finally, {mesh}Community extends the concerns of a population-rich world from the housing level to the community level. Recommendations for changes to infrastructure show how services and functionality can be optimized to improve sustainability and reduce the dangers imposed by diminishing resources and growing environmental threats.

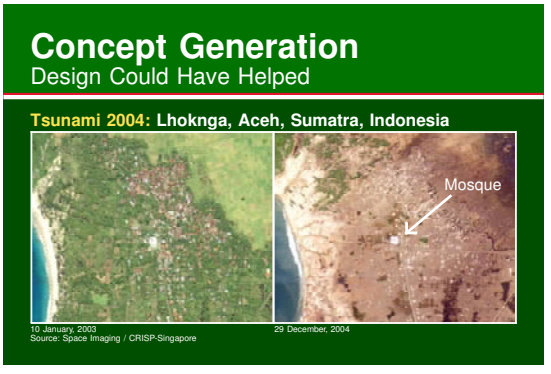

Figure 30 **Concept Generation: Design Could Have Helped**

As a reminder of what nature can do, we only have to reflect on the fate of so many people caught by the December tsunami in the Andaman Sea (Figure 30). Shown in the before and after views, is a community of 6,500 a few kilometers west of Banda Aceh in Sumatra. Only the mosque, the white building near the center of the photograph, remains standing. It was built well. Better housing would not have prevented the disaster, but it could have greatly reduced the amount of destruction and, consequently, the amount of debris acting as floating battering rams. The great storms and rising waters that will be initiated by global warming will demand our finest thinking to avoid repeating such disasters.

Preparing for the Responsibilities

How soon and how well will policies be made and plans produced to respond to what we *know* is coming? Right now, I would have to say, not so soon and not so well. A big part of the problem is that design thinking is missing in the advice sought and used for policy-making. To be valued, a source of advice needs credibility. A concise, easy-to-remember measure of that is the four R's test (Figure 31). What is the *recognition* of the field, *reputation* of its professions, *record* of the advice-givers, and *relevance* to the problem? There is little appreciation now for the worth of design thinking at the levels of policy planning.

Unfortunately, that is partly our own fault. Designers have been less than eager to assume roles in high level management and governance outside their training. Perhaps, the inherent fascination that draws designers to the visual and functional world has led us to prefer dealing with ideas than with people. In any case, the result has been that few design professionals have aspired to general positions of authority where their achievements would be measured in the world of policies, political actions and events. They have chosen instead to concentrate their attention on the built environment and find their rewards in the successes of their commissions.

The motivation is understandable, but no longer wholly acceptable. We have new responsibilities. Although they may have been thrust upon us, we must respond.

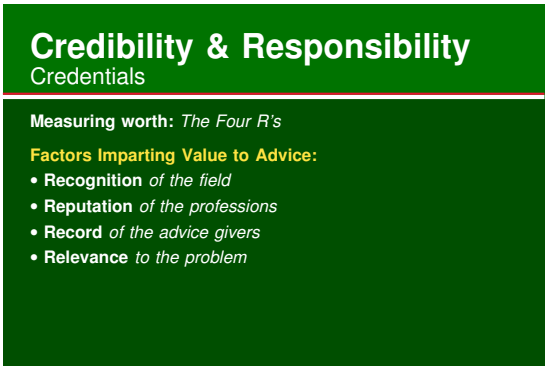

Figure 31 **Credibility and Credentials**

Of great importance, we must understand that it is not because of our special abilities to create products, messages, buildings and the rest of the built environment that we need to be heard. It is because of the way that we think and the approach that we bring to problem finding and problem solving (Figure 32). We need to be heard in the policy-making process because we offer another way to find information, gain insight from it, organize it, evaluate it and project inventive concepts. Whether the problem is resolvable through physical constructions or concepts as intangible as organization models, event

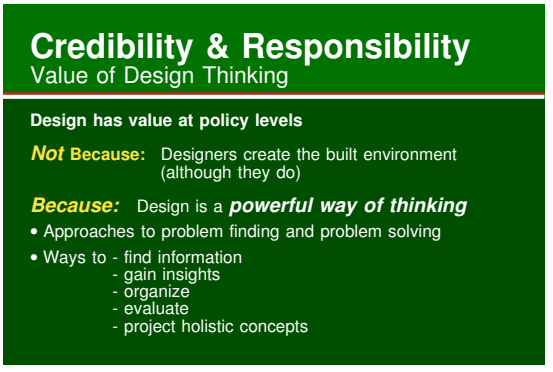

Figure 32 **Credibility & Responsibility: Value of Design Thinking**

Figure 33 **Preparing for Responsibility: Professions**

plans or policy formulations, design thinking offers alternative ways of conceptualizing, inventing and planning critically valuable to the decision maker. We must find the way to be heard.

The Professional Organizations

As we rise to that challenge, our professional design societies will be in the front ranks (Figure 33). To the extent that designers have national and international credibility as professionals, it is through the public awareness created by the activities, communications and actions of our professional societies.

Professional societies must reconsider their charters with a view toward how we can provide high-level service to institutions and government. Beyond the traditional services they offer their memberships, professional societies must find ways to make the value of design thinking paramount where it was not previously thought to be even relevant. They must take a proactive role in connecting decision makers with design experts and design organizations able to make substantive contributions.

Professional societies must also work to enlarge the supply pipeline. In this role, they must encourage researchers and schools to evolve applications of design processes to non-physical subjects—the non-tangible, institutional things people need beyond cars, buildings, communications and the rest of the hardware and software we traditionally create. Perhaps better than any other of our resources, professional societies can make the new values visible and incentives desirable to new generations of students and their teachers.

Design Research

Those concerned with design research must now

Figure 34 **Preparing for Responsibility: Research**

Figure 35 **Preparing for Responsibility: Education**

extend its focus. The increased commitment to research we are experiencing in design is a welcome development, and an exciting one, but already it is not enough (Figure 34).

In recent years, inspiration for design research has see-sawed between the engineering sciences and the social sciences, sometimes more inspired by the one, sometimes the other—most recently, the social sciences. In the meantime, the development of computer technology has continued at an exponential pace, and graphic and computational tools for creating highly sophisticated processes and methods for a wide range of design and planning research simply

await incorporation and refinement by design methodologists. It is time to widen our research vision, to see the full range of problems that can benefit from design thinking, and to create the tools and specialized knowledge that will enable designers and planners to participate in these kinds of decision making.

Education

All efforts ultimately will succeed or fail in the hands of our academic institutions. Design education around the world must also extend its vision and grow to prepare the designers and planners of tomorrow for greater responsibilities (Figure 35).

Without abandoning our traditional commitment to individual users, business and industry, design education must add a new commitment to institutions and government. Students must be prepared to work with topics, concepts and processes that have not previously been considered within their realm of expertise. They must also be prepared to work with others in roles designers and planners have not normally experienced.

Fundamental changes will be needed to university-level design education. Design and planning should be treated as a body of knowledge distinct from, but highly associated with other fields. Design should be positioned in its own college, not in a College of Art—or Engineering—or Architecture—or Liberal Arts. Design should be positioned to work in multidisciplinary relationships with all of these colleges—as well as the College of Law, the Business College, the College of Medicine and others.

Curricula at the undergraduate level should contain significant courses in the sciences, humanities, technology and the arts. Graduating students with baccalaureate degrees should not be expected to be professionals but, rather, generalists appropriately prepared for more specialized graduate education. Professional programs should be at the graduate level, and PhD programs should be established as research expertise matures. The best and the brightest graduates should find their way back to these programs to further the development of design and planning knowledge and to teach those who would follow on in teaching and conducting research.

Figure 36 **International Design Institutes**

Lighting the Beacon

Given the scale of the problems, the moving hand on the clock, and the size of the communicative challenge, we need to energize the effort visibly. We need to draw attention with high-energy points of focus. There need to be *places* where advanced design thinking is on display—celebrated, demonstrated and communicated. These "places" should be international in scope, sharing the best of what they develop with professionals and public locally and around the globe: regional International Design Institutes (Figure 36)[17].

An International Design Institute should be a knowledge-age, multi-channel institution designed to meet regional and global demands for research, education, information and communication about design. It should have a place, probably in a major city, and it should serve its national and regional constituency while operating internationally in scope and direction. It should be multidisciplinary in its approach to design: drawing on the arts, humanities, technologies and sciences, and cross-communicating knowledge among all design fields.

While broadcasting the values, benefits and culture of good design, the Institute, as a place, should also be a *working example* of advanced design thinking. It should demonstrate the best of sustainability in its own architecture and operating systems, and it should exemplify principles of adaptivity in its ability to evolve physically and operationally to meet changing needs. Symbolically, it should express the qualities that good design can bring to an environment while clearly communicating purpose and values.

Elements of an International Design Institute
The elements of such an Institute each contribute special functionality to the design resource. Integrated, they form a complete, working design culture accessible locally, regionally and internationally (Figures 37, 38 and 39). Some of the elements are:

• **Hall of Recognition**. Individuals prominent for their contributions to design practice, research and education will be honored here. Design Awards will be made bi-annually and will carry with them a significant monetary prize equivalent to those of the highest prizes awarded regionally. Separate awards will be given in each of the major design disciplines, including engineering design, design planning, product design, environmental design, communications design, architecture, interior design and other forms of design as deemed appropriate. Winners will given the same kind of recognition accorded winners of other national and regional prizes, with the intention that youth will be inspired to emulate winners' achievements.

• **Design Museum**. A permanent collection of the region's and world's best design in each of the areas recognized will be maintained here. Study collections, available to international scholars, will trace the evolution of design in many fields. Traveling shows will be assembled and sent worldwide from the Design Museum. The Hall of Recognition may be located here.

• **Graduate Design Education Facility**. The graduate program of a major design school or a Center uniting cooperating elements of multiple graduate programs will be located permanently here as the anchoring activity. The vitality of a facility always alive will affect all aspects of the Institute's behavior. Students, faculty, visiting scholars and researchers will enrich activities—forming a working population that energizes the Institute and sets an exciting pace for visitors and those who have come to participate.

• **Design Research Facility**. A research program with high-level capabilities will underpin research activities at the Institute. As it develops a body of work, its achievements in building design knowledge, theory and methods will provide a model for research in schools and professional institutions locally and internationally.

• **Design Communications Center**. A Design Communications Channel will use the Internet to connect design professionals, educators and researchers worldwide in an information network. As a node on that network, the Institute will use its Design Communications Center to initiate design services for schools, the public and professionals, from archived historical information on cultural artifacts produced locally, to the latest in computerized tools of design technology.

• **Conference Facilities**. In consonance with its role as a major center for design knowledge, the Institute will have conference halls and specialized meeting facilities with electronic support for multi-lingual, local, regional and international conferences on design. These, with the Institute's educational and research facilities, along with

Figure 37 **International Design Institute: The Elements**

Figure 38 **International Design Institute: The Elements**

Figure 39 **International Design Institute: The Elements**

exhibition facilities in the city, will make extensions of exhibitions possible as well as combined-sponsor shows and conferences optimized for the interests of vendors, conferees and attendees.

• **Design Library**. Design is a category not found often in libraries because its content is spread among many categories. The Institute's Design Library will bring together all that can be assembled about design, reversing traditional notions of categorization and juxtaposing content from all fields as it pertains to categories of design. Electronic and hard copy materials will be gathered equally, and important documents from one medium will be converted to others to maximize the usability of the information.

• **Design Bookstore**. Just as the design category is missing in the library, it is missing, too, in most bookstores. The Design Bookstore will be the commercial mirror of the Library, assembling examples of all that can be purchased in new and used design books and other media products from around the world.

• **Design Store/s**. Besides books and other communications, a major design center such as the Institute will be expected to be a source for the latest and "best" products of design. Design Stores will fill that need. A number of countries now annually award "Good Design" status to selected products. There will be opportunities for a variety of specialized stores in the Institute complex to sell those products as identified by the Institute and design organizations in other countries.

• **Offices for Design Associations**. National offices for professional design associations logically will be located at the Institute where they can have direct access to the research, communications and resources they need as well as design professionals and a public interested in design. Provided space at low rental rates, they, in turn, will open channels to the thousands of professionals and educators, students and friends of their individual disciplines.

• **Corporate Design Showrooms**. Design, in its most traditional role, serves commercial purposes. The products of design are often for sale, and can benefit significantly from being recognized as "good design". The Institute will provide a venue for industries highly regarded for their design to help show off their wares. Corporate show rooms will be discreetly rented to those corporations most identified with good design. The attainment of a showroom at the Institute will come to be regarded as a reward in itself for good design.

• **Design Consultancies**. A strong addition to the "working environment" ambiance of the Institute will be the presence of the offices of highly regarded design consultants. A select group of design consultants representing a variety of design disciplines will be permitted to rent space in the Institute complex.

• **Apartments/Condominiums**. As space permits, a limited number of apartments and/or condominiums may be constructed in the Institute complex. Their existence and the presence of their inhabitants will further strengthen the vitality of the Institute community.

• **Guest Room Hostel**. Visiting scholars, researchers and students will be able to rent rooms in the Institute's minimal, highly functional hostel. Rooms will be designed to provide basic sleeping and hygiene facilities at very low cost.

• **Restaurants**. Completing the response to community needs, restaurants in the Institute will both provide convenient dining for those working or visiting, and dining with a "difference" for lunch and dinner-goers attracted by good design. Restaurateurs will be selected for their commitment to the principles of experiment, invention and style expected in an environment concerned with design.

• **Computer Utility**. Linking and supporting all activities in the Institute and the operating environment itself will be a central computing and control utility. Necessary for many functions required by teaching, research and communication, the computing resource will be extended as a utility to all facilities in the complex. High-speed, high-bandwidth access to multi-media information and the services of the Design Channel will add significantly to the desirability of using, working in, and living in the Institute.

Summary and Conclusions

We are entering a period of peril and promise (Figure 40). The design disciplines—if they are ready—have a vital role to play in determining which will be the central theme. Quality of life may suffer grimly or may reach new levels of richness, depending on how wisely we confront the problems we have made. For perhaps the first time in history, man-made problems may

exceed the limits of our ability to check them. Our actions in the next decades will be critical.

Our political leaders will have to make decisions, often difficult, that will take all of our combined wisdom. Traditional political processes will not be sufficient. We must have the best scientific thinking in creative advisory roles. We must also have design thinking, a new voice, in advisory roles where constructive vision is vital.

For those of us in leadership positions among the design professions, professional societies, research institutions and universities, the evidence visible today should be enough. Within each of our fields we must initiate the changes that will allow us to contribute.

Professionals and Professional Societies must build bridges to government and institutions, establish the credibility of design thinking, and demonstrate its value to the analysis of problems, development of concepts, and making of decisions.

Researchers must widen the scope of design research and pursue the kinds of knowledge, processes, methods and tools that will better enable design thinking to be used in policy making.

University faculty and administrators must reinvent curricula to fit the times, recognizing the growing maturity of the design fields and the new commitments necessary to match daunting new responsibilities.

And all of us must cooperate in making the case that our counsel is vital. Visibility will be a powerful ally, and the creation of International Design Institutes—focused institutions with *place* where the values of design can be seen, experienced and drawn upon—will immeasurably help to convince.

Summary & Conclusions
Peril and Promise

Quality of Life *may depend upon design*

Coming Problems and Opportunities are Formidable
- Quality of life for a burgeoning population will be a challenge.
- Man-made problems may exceed our ability to solve them.

Leaders Will Need a Full Range of Advice
- Traditional political advice will not be enough.
- Creative science and design thinking must be heard and heeded.

The Design Community Must Rise to the Challenge
- Professional organizations, research and education must evolve.

Design Thinking Must Made Visible
- **International Design Institute** *places* should be created

Figure 40 **Summary and Conclusions: Peril and Promise**

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16. All five example projects can be seen in full presentations at the Institute of Design web site: http://www.id.iit.edu/profile/gallery/.

17. Images in the figures illustrating the International Design Institute and its elements are from a Systems and Systematic Design project report: **The International Design Institute. *Considering the Future of the Institute of Design.*** Jeff Gershune, Sean Gaherty, Brad Nemer and Ameresh Viswanathan. Chicago: Institute of Design, Illinois Institute of Technology, 2003.