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Design Research Quarterly Volume 2 Issue 1
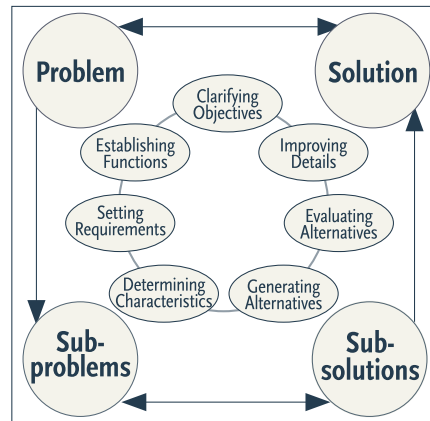
Peter Storkerson

Wonderground 2007 Plenary: Sociedade de Geografia de Lisboa

Paolo Astrade

3 Perspectives on Design

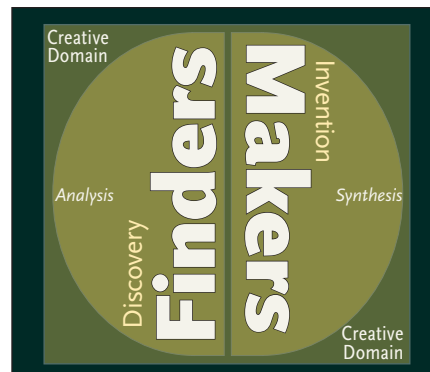## Nigel Cross
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From the Editor

Peter Storkerson

In this second issue of Design Research Quarterly, we have three major articles on the nature of design: two plenary addresses from the Wonderground conference in Lisbon, 2006 and one from the International Conference on Design Research and Education for the Future, Korea, 2005. Each of these presents a particular perspective on design thinking, processes, and goals, and each provides a basis for discussion and debate.

In *Forty Years of Design Research* Nigel Cross presents the sweep of design research in its formative decades, from 1960 to the present, covering the development of systematic methods in design and in design as an object of study.

Charles Owen's D*esign Thinking: Notes on Its Nature and Use* presents a concise, diagrammed analysis of design thinking and of design as the obverse complement to scientific thinking. His article also gives a taxonomy, locating design with respect to other fields of endeavors, scientific and practical. On that basis, he develops his list of the characteristics needed of designers and the questions that educators need to address in constructing programs that will cultivate those characteristics.

Per Mollerup's *Simplicity* returns to a familiar theme, and develops it in its different types, relations, and trade-offs: simplicity of appearance, of use, of construction, and of internal structure. But, simplicity itself is not simple, and Mollerup presents an intriguing challenge to consider: 'If simplicity is essential to design, then it is doubly vital to design research.'

We also have, from Wonderground, closing remarks by Chris Rust, Chair of the Design Research Society, with its notes on presentation and on ongoing plans for the development of the society.

Forty Years of Design Research

Nigel Cross
President, Design Research Society

The 40th anniversary of the founding of the Design Research Society falls in this year, 2006, and thus provides a suitable moment to reflect on the first forty years of design research. From the very beginning, the purpose of the DRS has always been stated clearly in its aims: 'to promote the study of and research into the process of designing in all its many fields'. Its purpose therefore is to act as a form of learned society, taking a domain independent view of the process of designing.

The emergence of the Society lay in the success of the first 'Conference on Design Methods', which was held in London in 1962 (Jones and Thornley, 1963). That conference is generally regarded as the event which marked the launch of design methodology as a subject or field of enquiry, and the 'design methods movement'. In the UK the new movement developed through further conferences in the 1960s – 'The Design Method' in Birmingham, 1965 (Gregory, 1966), and 'Design Methods in Architecture', in Portsmouth, 1967 (Broadbent and Ward, 1969).

The origins of new design methods in the 1960s lay further back in the application of novel, 'scientific' methods to the novel and pressing problems of the 2nd World War – from which came operational research methods and management decision-making techniques – and in the development of creativity techniques in the 1950s. (The latter was partly, in the USA, in response to the launch of the first satellite, the Soviet Union's 'Sputnik', which seemed to convince American scientists and engineers that they lacked creativity.) The 1960s also saw the beginnings of computer programs for problem solving. The first design methods or methodology books appeared – Asimow (1962), Alexander (1964), Archer (1965), Jones (1970) – and the first creativity books – Gordon (1961), Osborn (1963).

A statement by Bruce Archer (1965) encapsulated what was going on:

> The most fundamental challenge to conventional ideas on design has been the growing advocacy of systematic methods of problem solving, borrowed from computer techniques and management theory, for the assessment of design problems and the development of design solutions.

And Herbert Simon (1969) established the foundations for 'a science of design', which would be 'a body of intellectually tough, analytic, partly formalizable, partly

Nigel Cross

Nigel Cross is a leading international figure in the world of design research. With academic and practical backgrounds in architecture and industrial design, he has conducted research in computer-aided design, design methodology, and design cognition since the nineteen-sixties. His main current research is based on studies of expert and exceptional designers. He has been a member of the academic staff of the UK's pioneering, multi-media Open University since 1970, where he has been responsible for, or instrumental in, a wide range of distance-education courses in design and technology. Books by Professor Cross include *Designerly Ways of Knowing* (Springer, 2006), *Analysing Design Activity* (co-edited with Christiaans and Dorst; Wiley, 1996) and the third edition of his successful textbook on *Engineering Design Methods* (Wiley, 2000). Professor Cross is also Editor-in-Chief of the international journal of *Design Studies*. In 2005 he was honoured with the Lifetime Achievement Award of the Design Research Society. He is President of the Design Research Society, and of the International Association of Societies of Design Research.

empirical, teachable doctrine about the design process.' In some senses, there was a desire to 'scientise' design in the 1960s.

However, the 1970s became notable for the rejection of design methodology by many, including some of the early pioneers. Christopher Alexander said: 'I've disassociated myself from the field... There is so little in what is called 'design methods' that has anything useful to say about how to design buildings that I never even read the literature any-more... I would say forget it, forget the whole thing' (Alexander, 1971). And J. Christopher Jones said: 'In the 1970s I reacted against design methods. I dislike the machine language, the behaviourism, the continual attempt to fix the whole of life into a logical framework' (Jones, 1977).

These were pretty harsh things for the founding fathers to say about their offspring, and were potentially devastating to those who were still nurturing the infant. To put the quotations of Alexander and Jones into context it may be necessary to recall the social/cultural climate of the late-1960s – the campus revolutions, the new liberal humanism and rejection of previous values. But also it had to be acknowledged that there had been a lack of success in the application of 'scientific' methods to design. Fundamental issues were also raised by Rittel and Webber (1973), who characterised design and planning problems as 'wicked' problems, fundamentally un-amenable to the techniques of science and engineering, which dealt with 'tame' problems.

Design methodology was saved, however, by Horst Rittel's (1973) proposal of 'generations' of methods. He suggested that the developments of the 1960s had been only 'first generation' methods (which naturally, with hindsight, seemed a bit simplistic, but nonetheless had been a necessary beginning) and that a new second generation was beginning to emerge. This suggestion was clever, because it let the methodologists escape from their commitment to inadequate 'first generation' methods, and it opened a vista of an endless future of generation upon generation of new methods.

Where the first generation of design methods was based on the application of systematic, rational, 'scientific' methods, the second generation moved away from attempts to optimise and from the omnipotence of the designer (especially for 'wicked problems'), towards recognition of satisfactory or appropriate solutions (Herbert Simon had even introduced the notion of 'satisficing') and an 'argumenta-tive', participatory process in which designers are partners with the problem 'owners' (clients, customers, users, the community). However, this approach seemed to be more relevant to architecture and planning than engineering and industrial design, and meanwhile these fields were still developing their methodologies in somewhat different directions.

Engineering design methodology of the systematic variety developed strongly in the 1980s; for example, through ICED – the series of International Conferences on Engineering Design. The early developments were especially strong in Germany and Japan. (Although there may still have been only limited evidence of practical applications and results.) A series of books on engineering design methods and methodology began to appear. Just to mention some English language ones, these included Hubka (1982), Pahl and Beitz (1984), French (1985), Cross (1989), and Pugh (1991).

It should also be acknowledged that in the USA there were some important developments in design theory and methodology, including the publications of the Design Methods Group and the continuing series of conferences of the Environmental Design Research Association (EDRA). The National Science Foundation initiative on design theory and methods (perhaps in response to German and Japanese progress – like the earlier response to Sputnik?) led to substantial growth in engineering design methodology in the late-1980s. The American Society of Mechanical Engineers (ASME) launched its series of conferences on Design Theory and Methodology.

In fact, after the doubts of the 1970s, the 1980s saw a period of substantial consolidation of design research. The constraining link with science was severed at the DRS conference on Design:Science:Method in 1980 (Jacques and Powell, 1981). Historical and current developments in design methodology were recorded in Cross (1984). A particularly significant development was the emergence of the first journals of design research. Just to refer, again, to English–language publications, DRS initiated *Design Studies* in 1979, *Design Issues* appeared in 1984, and *Research in Engineering Design* in 1989. Some significant books also appeared, with a new emphasis on design cognition signalled from the architectural field in Lawson's *How Designers Think* (1980) and Rowe's *Design Thinking* (1987).

In the 1980s we saw the establishment of design as a coherent discipline of study in its own right, based on

the view that design has its own things to know and its own ways of knowing them. This had been heralded in the very first issue of *Design Studies*, when we launched a series of articles on 'Design as a Discipline'. Bruce Archer again encapsulated the view in stating his new belief that 'there exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry when applied to its own kinds of problems' (Archer, 1979). A little later, expanding the idea, Cross (1982) suggested that 'We need a research programme ... At its core is a 'touch-stone theory' or idea – in our case the view that 'there are designerly ways of knowing'. (For further development of the programme see Cross, 2006.) Most significant of all, Donald Schön (1983) promoted the new view within his book *The Reflective Practitioner*, in which he sought to establish 'an epistemology of practice implicit in the artistic, intuitive processes which [design and other] practitioners bring to situations of uncertainty, instability, uniqueness and value conflict.' Design as a discipline means design studied on its own terms, within its own rigorous culture, based on a reflective practice of designing.

It might be said that design research 'came of age' in the 1980s, since when we have seen a period of expansion through the 1990s right up to today. More new journals have appeared, such as *The Design Journal*, the *Journal of Design Research*, and *CoDesign*. There has also been a major growth in conferences, with not only a continuing series by DRS, but also series such as Design Thinking, Doctoral Education in Design, Design Computing and Cognition, Design and Emotion, European Academy, the Asian Design Conferences, etc., etc. Design research now operates on a truly international scale, acknowledged in the cooperation of DRS with the Asian design research societies in the founding in 2005 of the International Association of Societies of Design Research. DRS itself celebrated its 40th anniversary with its largest conference yet, in Lisbon, Portugal, in November 2006, for which this brief, and partial, history was prepared.

Forty years on, design research is alive and well, and living in an increasing number of places.

Nigel Cross

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Emerging Trends in Design Research

11-15 November, 2007

Hong Kong Polytechnic University

http://www.sd.polyu.edu.hk/iasdr

Call for Papers

February 27	Abstracts deadline
March 26	Paper selection & invitation
June 1	Full paper due
August 1	Review return to author
September 1	Complete paper

Description

This is a large, international design research conference with an intensive and high quality programme. Keynote speakers will be invited from other disciplines—the social sciences, computing, and business, for example. Multiple paths through the papers will be suggested to help participants find synergies among people and papers. Ample time will be available for informal meeting and discussion. Please consider your research interests in terms of the following description and consult your calendar for availability.

Emerging Trends in Design Research

Design Research is becoming more acceptable as a knowledge resource in collaborative actions, in practical applications, in building scholarly foundations for the discipline, and in post-graduate programmes worldwide. Some research follows well-worn paths of investigation and development, and some research strikes out into new territories of disciplinary overlap, technology development and application, large system dynamics, difficult to solve social problems, fundamental knowledge development, or needs for better processes or methods. Emerging Trends is particularly interested in design research explorations that respond to our changing life context, globally, locally, economically, educationally, socially, technologically, and particularly through design research interventions.

Emerging topics

Design Process issues:
- ▶ identifying the limits of user research
- ▶ making collaborative decisions
- ▶ managing information resources
- ▶ evaluating innovation potential
- ▶ exploring multimedia and multimodality

Design Research issues:
- ▶ developing collaborative research strategies
- ▶ exploring digital convergence
- ▶ managing multiple problem/solution perspectives
- ▶ translating research findings to design action
- ▶ communicating research findings effectively
- ▶ creating research community
- ▶ developing new research methods
- ▶ funding basic research in design

Design Education issues:
- ▶ blending art and science
- ▶ identifying fundamental knowledge for design
- ▶ creating distance learning approaches for design
- ▶ exploring industry-academia research partnerships
- ▶ developing quality assurance for design education

Social issues:
- ▶ controlling privacy
- ▶ controlling environmental degradation
- ▶ supporting human equality
- ▶ supporting development in undeveloped regions
- ▶ changing human behavior

Simplicity

Per Mollerup
Professor, The Oslo National Academy of the Arts

After my company completed a job in Estonia, we celebrated at an expensive restaurant in Tallinn. When I wanted to relieve myself, I left the table and sought the facilities next to the cloakroom. There, I found two doors, each one marked by an equilateral triangle. One triangle rested on a flat side with the point up, while the other stood on a point, flat side up. The latter triangle reminded me of something female. Using logical inference, I decided to enter the room marked with the point-up resting triangle. I soon discovered my mistake, left the room with the resting triangle and entered the room with the standing triangle.
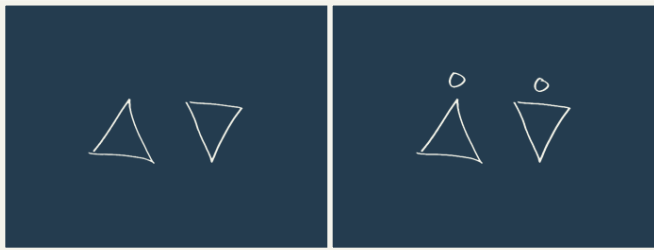
Toilet door signs, Tallinn, Estonia

Back at the table I explained the incident. My Estonian friends had a cheap laugh. What a dirty old man, they snickered. Couldn't I see that the resting triangle was a skirt and the standing triangle was the shoulders of a gentleman? Later, in a similar situation in the airport of Tallinn, I saw similar triangles. This time, each triangle had a dot on the top, suggesting a head. Now I had no problem finding the right room.

The problem of marking toilet doors in an easily understandable – yet civilized – way is an international design challenge of great importance. No nation has found a better solution than Portugal. I am talking about the pictograms designed for the 1998 Expo in Lisbon. Maximum meaning, minimum ink. Simplicity at its finest hour. Much too
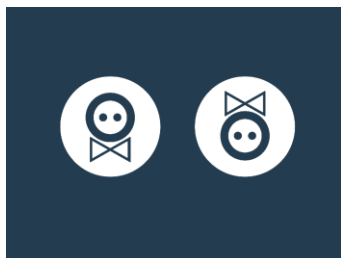
Toilet door signs, 1998 Lisbon Expo

Per Mollerup
Professor, The Oslo National Academy of the Arts.
Dr. Tech., Managing Director, Mollerup Designlab A/S, a Copenhagen based graphic design office working primarily with identity and signage.

Prof. Mollerup has written a number of books on design including: *Marks of Excellence, The history and taxonomy of Trademarks*, Phaidon, London 1996; *Collapsibles, A design album of space saving objects*, Thames & Hudson, London 2000; *Wayshowing – A Guide to Environmental Signage. Principles & Practices*, Lars Müller, Baden CH, 2005.

late, I discovered that Japanese designer Shigeo Fukuda designed the Portuguese pictograms. Desculpa Portugal.

Simplicity

All designers seek simplicity, some more consciously and consistently than others. They do so with different objectives in mind, with different skills, and with different results. However, in one way or another, simplicity is a success criterion of most – if not all – serious design. That makes simplicity a natural part of our business as design researchers. Simplicity is simply an essential part of our chosen field of research.

One objective of design research is to throw light on the design process, in other words to explain how wanted ends can be reached with disposable means. In Herbert Simon's tradition, that spells: *How to devise courses of action that can change existing situations into preferred ones*. Devising such courses of action can be complex business, but in our research we strive to find and liberate hypothesized simplicity hiding under the muddy surface. Our mission is clarification.

If simplicity is essential to design, then it is doubly vital to design research.

Simplicity is part of our subject and part of our goal. Strangely enough, simplicity in design is more or less *terra incognita* as far as written sources are concerned. I offer you a guided tour to this uncharted land. Follow me.

Background

Our forefathers and foremothers lived a simple life. Few will contend that. Also, few will deny that later generations have developed an enormous arsenal of tools, each of which was designed to simplify some practical function or another. Nevertheless, many of us feel that life today is as complicated as ever before. How did that happen?

Simplicity is not just simplicity.

The simplicity enjoyed – some will say suffered – by our early ancestors was of a quantitative nature. Choices were few. On a qualitative level, life was not that simple. It was complicated. Life was a fight for survival, for food, and for shelter. *The simplicity of poverty implies physical burdens and demands physical skills and efforts.*

The simplicity created by the ensuing technological avalanche is qualitative. Today, most of us don't have to fight for survival, food, and shelter. Division of labour, special-

ization, and technological development have made our life quite easy and quite simple, qualitatively. At the same time, our life has become quite complicated on the quantitative level: so many choices, so much to know, to understand, and to respond to. *The simplicity of affluence implies mental burdens and demands mental skills and efforts.*

From a physically demanding life we have moved to a mentally demanding life.

Home of simplicity

In Scandinavia, where I live and work, it is a widespread belief that simplicity in design is – if not a Scandinavian invention – then a unique Northern sales proposition. The sea, the bright summer nights, the northern light, the blond population, the long democratic tradition, and – of course – our legendary modesty, all fit simplicity in design.

Logotype for Oslo Airport by Mollerup Designlab.

In my own company, we also refrain from adding what should be subtracted. When we did the visual identity for Oslo's new airport at Gardermoen, we took our point of departure in the international civil aviation's abbreviation for Oslo: OSL. Before adding anything, we deducted something. We reduced the size of the letters to mimic the generic airport experience where everything gets smaller and smaller. The small aircraft came almost by itself.

So, is Scandinavia the true home of simplicity in design? Yes. And no.

There are certainly aspects of Scandinavian design that are not simple by any standard. And more important, there are other geographical regions that have the same right for bragging about simplicity in design.

Verdict: Simplicity in design is not restricted by geographical boundaries.

Fields of simplicity

Simplicity is an option in designing all kinds of artefacts: tools or appliances, visual communications, buildings, towns, systems, processes, and many other things.

We curse the complicated videocassette recorder. It should be simpler for non-nerds to operate. The written instruction is complicated too. It is probably written by technicians who themselves understand everything, but can't imagine how difficult VCRs can be to lay people. Appliances can be complicated or simple, and so can communications.

Work places, office buildings, hospitals, airports, freeway junctions, and many other man made environments tend to become sheer labyrinths, yet without the charm of such mazes as Venice or the Kasbah of Marrakech.

We have problems completing our income tax form, partly because of the design of the form, partly because of the underlying system. Communications can be complicated or simple, and so can systems: railway networks, accounting systems, organizations, political bodies, etc, etc.

Definition

Now, let's not forget to talk about, what we are talking about.

▸ *Simplicity* means the *quality of being simple.*
▸ Simple is one of those concepts that are best defined by their opposites.
▸ *Simple* means *not complex and not complicated,* and a lot of other things irrelevant to our inquiry.

Complex and complicated have neighbouring meanings and are often used synonymously. Nevertheless there are nuances in the usage of the two expressions. Let us look at them one by one.

Complex

In its nuanced meaning, *complex* means *consisting of interconnected parts.*
▸ Seen from this vantage point, *simple* means *not consisting of interconnected parts.*
▸ In this meaning, simple stands for an objective quality.
▸ In this meaning, simplicity is part of the object.

Complicated

In its nuanced meaning, *complicated* stands for *difficult to understand or analyze.*
▸ Seen from this vantage point, *simple* means *not difficult to understand or analyze.*
▸ In this meaning, *simple* stands for a subjective quality.
▸ In this meaning, simplicity depends on the abilities of the subject.

As the antonym of complicatedness, simplicity is subjective by implication. A simple equation of second degree may be totally complicated to a person who never learned maths. Simplicity is very much in the mind of the beholder.

Parameters of simplicity

Although simplicity to a considerable extent is a matter of subjectivity, we can identify some general factors that tend to influence the simplicity of a tool, a building, a town, a system, a process, visual communications, or whatever. To what degree a whole is conceived as being simple depends generally on three factors, one quantitative, and two qualitative.

Number of parts

First, the number of parts or elements included generally influences the simplicity of a whole. As a broad rule, more parts or elements mean less simplicity. The number of parts is a quantitative factor.
▸ London Underground – is less simple than Copenhagen Metro
▸ More elements mean less simplicity.

Variety

Second, the simplicity of a whole is generally influenced by the diversity of the elements included. More variety in appearance can – depending on our focus – mean more or less simplicity. A radio with all knobs identical may on a superficial level appear quite simple However, the supersonic aircraft may be simpler to operate if the knobs are different. The diversity will facilitate 'reading' the knobs by seeing and by touching them. Diversity is a qualitative factor.

Structure

Third, the simplicity of a whole is generally influenced by the way the whole is structured, how comprehensible the elements relate to each other. A comprehensible structure

may depend on such factors as pattern, sequence, grouping, and procedural flow. Less logical structure means less simplicity. Structure is a qualitative factor.

New York Midtown with its Roman grid facilitates easy wayfinding. The physical layout with the perpendicular streets and avenues and its toponymy, the numbering of streets and avenues, both help us to infer the structure of the environment. Not so in New York South with is organic structure.

Motives

Simplicity in the design of artefacts can be intentional or dictated by the lack of resources. When intentional, simplicity can be developed with one or more motives in mind. These motives are functionality, aesthetics and ethics.

Functionality, aesthetics, and ethics serve comfort, pleasure, and conscience. Comfort is achieved by easier work. Pleasure is achieved by clarity in expression. Conscience is served by limited use of resources.

Functionality

Functionality is the most obvious and most common motive for seeking simplicity. Simple solutions are easier to deal with than complicated solutions. That applies to physical design and it applies to communication. It is easier to operate a simple photocopier than a complicated photocopier. If we need written user instructions, we prefer simple instructions to complicated instructions. We hate instructions that themselves need instructions: *How to read these instructions.*

When the word simple refers to functionality it can as a rule be substituted by uncomplicated or easy.

The simplicity of a product may exist on many levels: the appearance of the finished product, the product's affordance, its readability, its ease of operation, its reparability, its logistics, its storage, its production, and maybe more. Products that are simple in one respect are often not so simple in others. Simplicity in one respect is typically balanced by less simplicity in another respect.

A Citroën DS is extremely simple in its appearance. The dashboard is less simple, but OK. Problems start under the hood. There, simplicity has given way to complexity and complicatedness.

A similar trade off between different aspects or levels is reflected in the production-distribution-use chain. Simplicity at one stage is often countered by less simplicity at

another stage. One person's comfort is paid by another person's discomfort. Simplicity is always seen from a certain vantage point. *One-size-fits-all* designs mean a simple solution to the supplier, but not necessarily to the user. It is no fun to wear a hat that covers the eyes.

Buyers of IKEA furniture wonder why the cheap furniture has *so many parts.* The explanation is simple: To keep prices down, IKEA fights transportation and storage costs. To IKEA, simplicity in furniture design means a decent piece of furniture that is packed to use as little volume as possible. To this end, IKEA furniture is broken down into small pieces. Subsequently, brown cardboard boxes marked IKEA are filled with furniture parts, rather than air. However, simplicity in logistics is made possible to a certain degree because customers pay the corresponding price of less simplicity in assembling. On the positive side, the breakdown in small parts accommodates standardization and use of the same parts in several furniture types.

The distribution of simplicity and complexity between seller and buyer may work in both directions. Sometimes, the buyer reaps the fruits of simplicity made possible by some complicatedness on the seller's side. One Danish firm that rents and sells DVDs, PCs and washing machines power advertises that serviceman Peter will bring the merchandise and not leave the buyer before it works.

Courtesy Jock Mills

Citroën D Special c. 1970

Citroën Dashboard, c. 1967

One stop shopping – the idea that the tenacious spender can complete a shopping spree at one place – may be a very convenient and simple operation for the shopper and not too complicated for the shop owner. The philosophy behind is that sellers and buyers share advantages of scale.

Aesthetics

Aesthetics is a second motive for investing in simplicity. Aesthetes often prefer simple solutions to complex solutions. They simply find simple solutions more attractive, and they sharply disagree with Mae West that *too much of a good thing is wonderful*. When the word simple refers to aesthetics, it can as a rule be substituted by *minimalist*.

Minimalism

Minimalism or *minimal art* is a label first attached to the work of certain American artists in the 1950s, –60s and –70s, most notably Donald Judd, but also Dan Flavin, Sol Lewitt, and Robert Morris. These artists did not create the label themselves and they did not write a manifesto or consider themselves a group. The label was introduced by an art critic.

The linguistic basis for the term *minimal* art is obviously the limited number of effects used by these artists. Their declared intention was to free their works from any personal expressivity. The alleged aim was to allow the spectator greater freedom of experience, not being distracted by composition and theme. Industrial materials, monochromatics, repetition, repetition, repetition, and no organic lines characterise most minimalist art.

The minimalist artists acknowledged architecture as an inspiration. Later in the same century, architects and critics of architecture appropriated the term *minimalism*. Now, the term refers to characteristics that we normally use to describe aesthetically simple buildings and designed objects with utilitarian purposes. These characteristics are primarily clear structure, repetition, and limited variety, and of course, the absence of ornament. Ludwig Mies van der Rohe and cohorts who reportedly inspired the minimalist artists now were themselves appointed minimalists.

Today, the term *minimalism* is widely used to describe architecture and design characterised by the presence of absence and by great visual clarity. John Pawson, Peter Zumthor, and Tadao Ando are the architects most frequently classified as minimalists.

Exit ornament

While it seemed natural to decorate the surface of buildings and utensils in earlier times, modern design and architecture have expelled ornament to a considerable degree. The shape of the building or utensil should itself deliver the aesthetic experience. This view was not generally accepted overnight.

No single person is responsible for the death of ornament, but Adolf Loos, the Austrian architect and critic, delivered some severe blows. In a famous essay of 1908, *Ornament und Verbrechen*, Ornament and Crime, Loos argued that *the evolution of culture is synonymous with the removal of ornament from objects with utilitarian purpose*. Although others accepted and followed this dictum for *aesthetic* reasons, Loos primarily justified his argument by economics: *Ornament means wasted materials and wasted time*.

In the buildings and interiors that Loos himself designed, rich materials fully compensate for the lack of ornament, much as they did in the Barcelona Pavilion designed by Mies van der Rohe in 1929.

Le Corbusier and other modernist architects had no problems with the ornament expelled. They sublimated with free art whenever they felt like. In addition, both Le Corbusier and Mies van der Rohe freely entered the grey zone between pure ornament and decorative structure. They used structure in ornamental ways that were not strictly dictated by constructive considerations.

The *form follows function* dictum was the often repeated official rationale of the *functionalism* that later morphed into *the international style*. This innocent dictum, however, carefully hides the fact that the real interest of the functionalists is not the function per se, but the aesthetic expression of the function. Functionalism is a doctrine, not a law of nature.

Unconcealed structure was one of the great ideas of functionalist architecture. Following the death of ornament, structure took over the role as *maître de plaisir*. Simplicity and honesty were the key to good architecture. Unconcealed structure that celebrated the constructive principle became a major source of aesthetic experience. Supporting and supported elements delivered much of the aesthetic argument in buildings designed by Mies van der Rohe and cohorts. The Seagram Building by Mies and Philip Johnson exemplifies. Later in same century, Richard Rogers and Renzo Piano went a step further. They introduced unconcealed service structure and let it all hang out on

Centre Pompidou, née Centre Beaubourg. Today, trend-setting architects apparently deny all functional responsibility and consider themselves free artists.

In furniture design, unconcealed structure still counts as respected aesthetic currency. Furniture by Charles Eames blazed the trail.

Eames Plywood Chairs

In designing appliances with complex technological content, development has long gone in the opposite direction of architecture's and furniture design's unconcealed structure. The technology works undercover. So it has been ever since the 1930s when Raymond Loewy and other American industrial designers made themselves a name by wrapping up technical insides in more or less streamlined outsides. In terms of visual appearance, Loewy's locomotive design for Pennsylvania Railroad in the late 1930s meant a considerable simplification of its rail-borne ancestors.

Automobiles are interesting cases of outside simplification. The outside doubles as aesthetic pleaser and aerodynamic reducer. Both parts of this double function are of paramount importance. Consequently, a considerable share of the inside car parts are subordinated to the outside.

Ethics

Ethics is the third motive for seeking simplicity. Followers of religious movements, citizens with social convictions, people with ecological conscience, and many other thoughtful people quest simplicity for moral reasons. They prefer little to much. When the word simple refers to ethics, it can as a rule be substituted by austere.

Ethics deals with ideas about what is right and what is wrong. This distinction allows for a fair number of ideas anchored in many different ideologies, religions, and political convictions, as well as idiosyncratic beliefs. Most of these ideas are externally anchored in so far as the believer transcends himself and responds to some external authority or set of values, be it a god, a political system, or an exist-

Raymond Loewy and GG-1 Electric Locomotive

ing moral code. However, the idea may also be purely internal; simplicity is best for me.

Evangelist Matthew reported Christianity's killer argument against earthly wealth when he declared it *easier for a camel to pass through the eye of a needle than for a rich man to enter the kingdom of God.* However clear, the parable hasn't been totally successful on a pragmatic level. Rich and super rich Christian people have no apparent problems in bending Matthew's presentation of Jesus's message. For that matter, the church itself has not read Matthew's gospel in a way that prohibits amassing robust fortunes.

Many Christian churches and monasteries are ambiguous when it comes to gathering material possessions. At the same time, they show off both austerity and ostentatious wealth. In some situations, they translate the ban on wealth into qualitative terms. As a rule, they offer strictly Spartan seating to worshippers. The rationale seems to be that uncomfortable seating is conductive to serious worshipping. As a useful side effect, it prevents churchgoers from snoozing during the service. Some monasteries and some churches are extremely austere, while other Christian churches are stuffed with rich ornamentation and valuable works of art. Sometimes austerity and the highest claims for architectural quality go hand in hand.

When the Cistercians, a.k.a. the Trappists, after the communist intermission, re-established with a monastery in the Czech Republic, they did so with flamboyant austerity. These religious hardliners who spend their life with prayer, work, and silence commissioned minimalist architect number one, John Pawson, best known for showrooms for Calvin Klein in London and New York and for living spaces for the super rich. The monastery in Novy Dvur is not open to the public, but it was thoroughly reviewed in *Vanity Fair*.

Many religions other than Christianity recommend material simplicity. They seem to believe that restrain in earthly possession is conducive to attention to their chosen God.

Other ethical – including political – considerations keep people from gathering earthly wealth. Left wing people and others with a social conscience pay special attention to the middle section of the socialist freedom-equality-fraternity dictum. Ecologists focus on the state of the Earth and its limited resources. Still others think about their own happiness and sanity.

Danish poet, aphorist, and designer Piet Hein was apparently in line with such thoughts when he in *The Tyranny of Things* suggested, that people who owned more than eight things, were in fact owned by their things.

> I am trying to rule over ten thousand things
> which I thought belonged to me.
> All of a sudden a doubt take wings:
> Do they... or could it be..?
> A hardhanded hunch in my mind's ear rings
> from whence such suspicions may stem:
> that if you possess more than just eight things
> then you are possessed by them.
>
> <div align="right">Piet Hein</div>

The Shakers

The Shakers were religious worshippers with a highly developed material culture characterised by simplicity, utility, and beauty. They lived and practiced their religion in Eastern and Midwestern communities in North America from the middle of the eighteenth century. Their official name was *The United Society of the Believers in the First and Second Appearance of Christ*. The Shaker name referred to a state of ecstasy reached through their communal dances. At some point, that part of their worship was abandoned.

The first Shakers were an offshoot of the Quakers, themselves dissidents from the British Anglican church. Under the spiritual leadership of Mother Ann Lee, nine Shakers immigrated to North America in 1774. When the movement in the middle of the nineteenth century was at its largest, the Shakers counted around 6,000 members in 19 settlements. In the twentieth century the movement declined and by the beginning of the twenty-first century only few Shakers remain.

The Shakers were utopians. They lived in celibacy with segregated sexes. New members were converts and orphans from the outside world. The Shakers shared belief, work and ownership. They also believed in equality among sexes, in confession, and in pacifism.

The Shakers developed an outstanding material culture. They designed themselves their tools and surroundings from the smallest utensils to houses and carefully planned villages. In the process they developed such practical inventions as the flat broom and the circular saw and took patent for a washing machine. After fulfilling their own needs, the Shakers would sell their products to the World.

Shaker design is influenced by functional as well as ethical and aesthetic considerations. The Shakers had a clear vision that their tools should be useful, but also that austerity and beauty should go hand it hand with utility. The Shakers had their eyes in Heaven while their feet remained on Earth, said Paul Rand.

Shaker design gave rise to a small industry of chairs, boxes, baskets and more. Shaker design has survived as a never forgotten legacy. Especially Danish designers have taken much inspiration from The Shakers and in some cases taken up Shaker furniture models for further development.

Forced simplicity

Simplicity is not necessarily a result of one or more of the three key motives: functionality, aesthetics, or ethics. Simplicity can also result from material and technological constraints. Primitive technology and limited resources are major causes of simple physical solutions to life's material problems. The simple life that our ancestors practiced just a few generations ago was not intentional. Simplicity was determined by the lack of economical and technological development rather than by choice. The same mechanism works in less developed societies today.

There is a world of difference between the way that we experience forced simplicity or voluntary simplicity. The

simple surroundings that can be a blessing to those who choose them voluntarily can be a pestilence to those confined by them. Sometimes, however, ends meet. That happens when those forced to simplicity make a deed out of necessity, accept their material condition, and focus on the bright side rather than the dark side of life: *We don't have much. Let's enjoy the limitations.*

A MODERN CHOICE

Everything was much simpler in bygone times when we had fewer choices. In *The Paradox of Choice*, Barry Schwartz describes how the number of choices has grown beyond imagination while we would be better off with fewer choices in many situations. The abundance of choices is ubiquitous. It overwhelms us when we shop, when we choose clothes, cars, education, pension schemes, health care, or anything else. This freedom of choice tends to become a burden rather than a blessing, says Barry Schwartz. The copious choices make us insecure before, while, and after we choose. How do we make the right choice? What are the missed opportunities? Shouldn't we have chosen something else? More choices make us less happy. *Maximizers*, those who always go for the best, suffer more than *satisficers*, those who settle with enough.

Many of us feel that life has become more complicated. That is, of course, a truth with limitations. In fact, we can also say that life today is simpler than ever before. In the rich part of the world, we don't have to hunt for food. We do not walk long distances to get fresh water. We don't have to make a fire to heat or light our homes. We have 'outsourced' all these functions. Our life has become simpler, easier as far as physical effort is concerned. In the process, scarcity has given way to abundance and life has become more complicated mentally.

The problem is not only that categories of goods and services become larger. It is also that the number of categories grows. While having simplified our daily life in many ways, we have used the resulting spare time and energy to choose new things to be done. The result is immanent. In one way or another our day is filled with jobs, problems, and obligations that together make our life quite complex. The rule seems to be that *Complexity expands to keep us busy*. That is a close relative of Parkinson's Law, given by Cyril Northcote Parkinson: *Work expands to fill the time available for its completion.*

When we get rid of old problems, we tend to invent new problems to fill the void. When not in war we compensate with speed driving, games, and high-risk sport. When we get rid of physical work, we compensate with mountain biking, running, and pumping iron at the fitness centre. When life becomes simple in some ways, we tend to compensate with new complexity. The modern choice concerns the mix of simplicity and complexity.

OCCAM'S RAZOR

I have talked to some extent about simplicity in design. Let me conclude by talking about simplicity in research. Occam's Razor – the principle of parsimony – is a scientific principle attributed to William of Occam, a medieval English logician and Franciscan Friar. The principle says: *Entities should not be multiplied unnecessarily*. In small words that means that if two theories make the same predictions, the theory with fewest unproved assumptions – the simplest theory – should be preferred. Occam's Razor shaves off what is not needed.

A great many great scientists have used, referred to, and discussed Occam's Razor. Sir Isaac Newton phrased his own version *We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearance.*

Later, Occam's Razor has been interpreted with considerable latitude, sometimes used to choose between theories with different predictions, sometimes used to cut out features that cannot be observed, and sometimes used as a general call for simplicity in science and elsewhere.

A liberal design-orientated interpretation of Occam's Razor would come something like: *Superfluous elements should be shaved off*. Applied to tools and visual communication that dictum can address both aesthetic appearance and functional elements. Unnecessary form elements and unnecessary functional features should be dispensed with.

How close the razor metaphor lies to popular design understanding was demonstrated by this poster for the 1930 Stockholm exhibition that introduced functionalism in Scandinavia. The poster designed by Sigurd Lewerentz

formally presents a pair of wings inspired by an Egyptian birdman. However, lay Stockholmers saw no wings. They saw a razor and dubbed the symbol accordingly. The saw the razor, that had shaved away all superfluities at the exhibition.
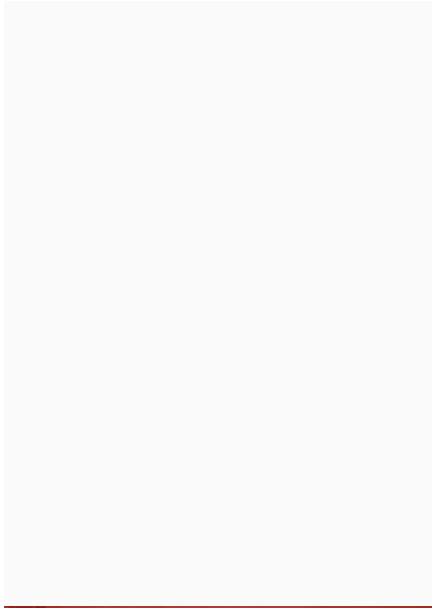
Stockholm Exhibition Poster, 1930

Einstein's warning

Now, to talk any longer would contradict my subject. On my way out, I shall remind you of Einstein's reminder (what a simple name – Einstein!):

> *Everything should be made as simple as possible, but not simpler.*
>
> *Albert Einstein*

Per Mollerup

Shaping the Future?

The 9th International Conference
on Engineering and Product Design Education

**13-14 September, 2007
School of Design at Northumbria University, Newcastle
upon Tyne, UK**

*Call for Papers*   **January 12 Abstracts deadline**

The conference will bring together representatives from education and industry who have an interest in shaping the future of design education. It will provide a forum for educators and researchers from product development, engineering and industrial design, together with industry and government representatives to discuss current educational issues and the nature of design education in the future. This year's conference theme, 'Shaping the Future?', will provide the opportunity for participants to exchange ideas and build collaborative relationships.

Topics:

- Design and local community
- Design and government
- Teaching tools and techniques
- Developing links with industry
- Design curriculum development
- Philosophies of design education
- Professional development in design

- Cross-disciplinary projects
- Work-based learning
- Future industry needs
- Learning environments
- Industry based student projects
- Assessment
- Professional doctorates
- 'New' Knowledges for design
- Design manifestos

Presentations:

- Paper and poster presentations
- Roundtable discussions

- Exhibition
- Workshops
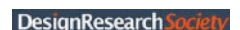
Design Thinking: Notes on Its Nature and Use

Charles Owen

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Abstract

Problems induced by continuing population growth and its pressure on resources and environment have reached a stage where serious concern must be given to the processes of decision making being used by governmental and institutional leaders. Science thinking is frequently unheard or unheeded and design thinking is not engaged at all.

Design thinking, as a complement to science thinking, embodies a wide range of creative characteristics as well as a number of other special qualities of distinct value to decision makers. In advisory roles, properly prepared design professionals could make substantial contributions to a process now dominated by political and economic views. This paper examines the nature of design thinking as it differs from other ways of thinking. A model for comparing fields is introduced and a number of characteristics of creative individuals in general and designers in particular are presented.

Preparing designers for participation in policy planning will be a challenge for design education. Meeting the challenge will require new understanding, an extended range of design tools, and concerted support from the design professions to demonstrate the value of design thinking to decision making at the highest levels.

Introduction

The handiwork of humankind is finally beginning to impress itself on the global environment and on us, its inhabitants. This should inspire us as design professionals to reconsider what we do, who our clients are, and where we can best offer our expertise. In particular, the decision processes of high-level decision makers are in need of serious overhaul.

It is news to no one that current rates of resource consumption cannot keep up with population growth as it exists. World population is virtually certain by 2050 to increase by half again from its present 6.46 billion—with all that means for our dwindling resources. Coupled with that, it is at last clear that global warming is fact, and its growing control over Earth's climate and weather systems will unpredictably complicate problems already made serious by population pressures.

The road ahead indeed seems dark, but there is hope. A profusion of new technologies is emerging, many with potential to alleviate or even eliminate the problems induced by population growth. As Jared Diamond points

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He joined the IIT faculty in 1965 following studies for degrees in chemistry and product design, additional studies in city planning and computer science, and four years as an officer in the U.S. Navy. Since then, he has worked in the fields of product design, design planning, computer-supported design, design methodology and design theory—directing the Product Design program for 20 years, founding and directing the Design Processes Laboratory for 14 years, publishing the *Design Processes Newsletter* for 10 years, and teaching, conducting research and consulting. He has acted as advisor to several universities in the U.S. and abroad and has served or now serves on the advisory boards of the journals: *Visible Language* (U.S.), *Design Recherche* (France), *Design Studies* (UK), *ARCOS* (Brazil), *Asia Design Journal* (Korea), *Journal of Design Excellence* (Malaysia) and the Wiley International book series on design.

Professor Owen has written a number of computer programs for business and institutional applications, has published widely (over 125 articles, papers, books and book chapters), has served on international juries, and has been an invited lecturer at over 200 institutions in the U.S. and abroad. Among many awards his students have won are two Grand Prizes in the Japan Design Foundation's International Design Competition, the Grand Prize in Sony Corporation's International Design Vision Competition, and the 1991 Grand Award in the Environmental Technology category of *Popular Science* Magazine's 'The Year's 100 Greatest Achievements in Science and Technology'. In 1990, he was the recipient of the American Center for Design's Education Award for his contributions to design history, theory and practice. In 1995 he was honored at IIT with recognition as Distinguished Professor of Design. In 1997, he was elected Honorary Member of the Japanese Society for the Science of Design, the first in its 44 year history. In 1999 the Institute of Design honored his work with the establishment of an endowed Chair in his name, and he was named one of 36 'IIT People of the Millennium' by the university for his contributions.

out[1], technologically complex societies autocatalyze techno-logical growth, and the resulting development accelerates over time. We are, in effect, unintentionally creating the highly sophisticated tools that may prevent the destruction initiated with earlier created tools.

Key to the use or misuse of these technologies are the decision processes employed by those in power. History has shown that political decisions do not always favor the best interests of all, and when critical factors include information not easily understood by political decision makers, that information may be disregarded or not even considered. My argument in recent papers[2] is that the stakes are now too high for critical information to be unheard or ignored.

'Design thinking is in many ways the obverse of scientific thinking.'

Science advisors have long been included among high-level governmental advisory staffs. How their advice is valued, however, has varied with the problem context, and political interests have almost always trumped scientific advice. More than ever before, scientific advice requires serious consideration. And another kind of thinking deserves equal attention.

Design thinking is in many ways the obverse of scientific thinking. Where the scientist sifts facts to discover patterns and insights, the designer invents new patterns and concepts to address facts and possibilities. In a world with growing problems that desperately need understanding and insight, there is also great need for ideas that can blend that understanding and insight in creative new solutions. Implicit in this notion is the belief that design thinking can make special, valuable contributions to decision making. In this paper, I will explore the nature of that kind of thinking, its value, and the differences between design thinking and other ways of thinking.

Finders, Makers and Applied Creativity

A sensitive observer might notice an interesting thing about creative people. They tend to work in two different ways (Figure 1).

Those who work in the first way, might best be called 'finders'. They exercise their creativity through discovery. Finders are driven to understand, to find explanations for phenomena not well understood. In professional life, they usually become scientists or scholars and are responsible for much of our progress in understanding ourselves and our surroundings.

Those who work in the second way are 'makers', equally creative, but in a different way. They demonstrate their cre-
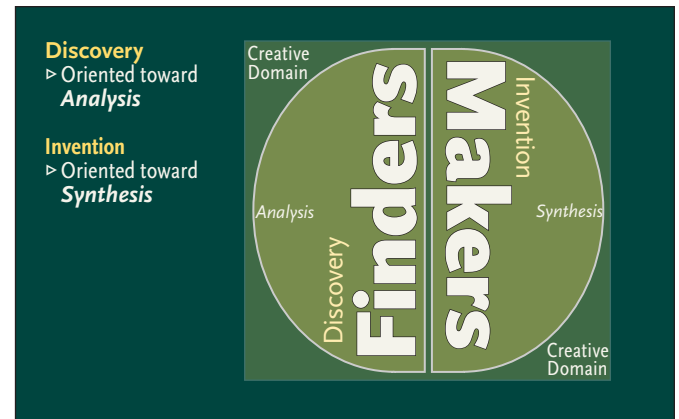
Figure 1 Two-domain Creativity Model

ativity through invention. Makers are driven to synthesize what they know in new constructions, arrangements, patterns, compositions and concepts that bring tangible, fresh expressions of what can be. They become architects, engineers, artists—designers —and are responsible for the built environment in which we live and work.

Design Thinking vs Other Kinds of Thinking

Given the fundamental process differences between how finders and makers think and work, it is reasonable to
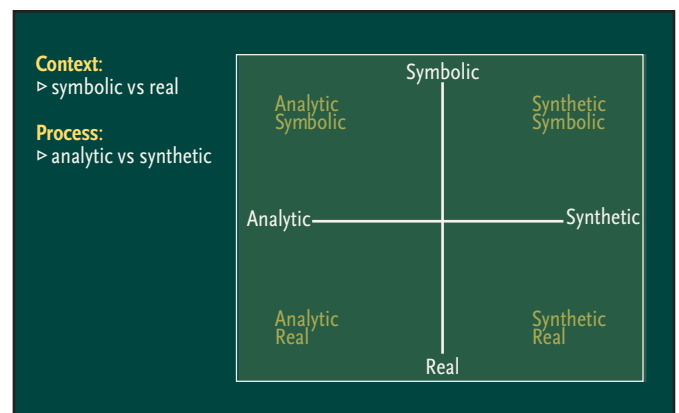
Figure 2 Map of Fields: Context and Process Differentiate

believe that other factors might similarly reveal differences among professional fields and, therefore, help to define the nature of design thinking. One such factor is the content with which a field works. A conceptual 'map' can be drawn to use both content and process factors (Figure 2).

Two axes define the map. Separating the map into left and right halves is an Analytic/Synthetic axis that classifies fields by process—the way they work. Fields on the left side of the axis are more concerned with 'finding' or discovering; fields on the right with 'making' and inventing. A Symbolic/Real axis divides the map into halves vertically, according to content or realm of activity. Fields in the upper half of the map are more concerned with the abstract, symbolic world and the institutions, policies and language tools that enable people to manipulate information, communicate and live together. Fields in the lower half are concerned with the real world and the artifacts and systems necessary for managing the physical environment.

A sampling of fields illustrates how the map differentiates (Figure 3). The five chosen are highly recognizable
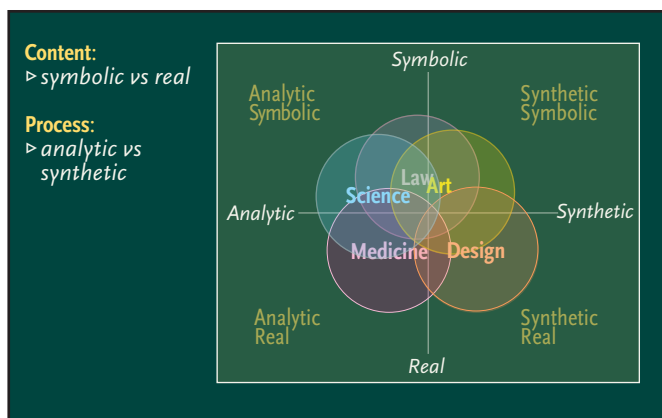
its analyses. There are elements of science, however, that are synthetic in process (as, for example, in materials science or organic chemistry), and science can deal directly with unabstracted, real content, particularly in the natural sciences.

Law, as a generalized field, is located higher on the map, concerned extensively with the symbolic content of institutions, policies and social relationships. It is also positioned more to the right, as a significant portion of its disciplines are concerned with the creation of laws and the instruments of social contract. Medicine, in contrast, is sharply lower on the content axis, vitally concerned with the real problems of human health. On the process scale, it is strongly analytic; diagnostic processes are a primary focus of medicine. Art is high on the content axis, strongly symbolic, and almost evenly divided on the process scale, still more synthetic than analytic, but very much involved with interpretation of the human condition.

Design in this mapping is highly synthetic and strongly concerned with real world subject matter. Because disci-

Figure 3 Differences: Discrimination among Fields
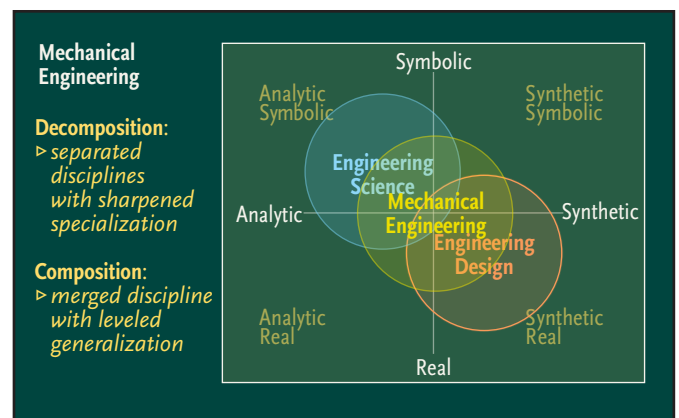
Figure 4 Hierarchy: Fields Decompose to

with well defined disciplines and well understood differences. Every field has component elements in each of the four quadrants. What distinguishes one field from another is the degree to which a field positions its 'center of gravity' away from the center into the quadrants and the direction that positioning takes. In Figure 3, fields close to the center are more 'generalized' with respect to the axes; fields away from the center are more 'specialized'.

Science is farthest to the left as a field that is heavily analytic in its use of process. Its content is also more symbolic than real in that subject matter is usually abstracted in

plines of design deal with communications and symbolism, design has a symbolic component, and because design requires analysis to perform synthesis, there is an analytic component—but design is a field relatively specialized, and specialized nearly oppositely to science.

For almost any field, a case can be made for movement to the left or right based on the variety of detailed interests the field subsumes. Positioning is very subjective, but absolute positioning is not what is important in this kind

of mapping. Relative positioning is. It provides a means for comparing multi-field relationships with regard to the two important dimensions of content and process.

Fields, of course, are just the tops of hierarchies, and the hierarchical nature of their subject matter opens a door to the examination of relationships among elements at finer levels of detail (Figure 4). Mechanical engineering, a subject at the discipline level, is nicely centered between the analytic and synthetic domains, but that is only true when it is considered as a whole. Engineering science, one of its sub-disciplines, would be located much farther to the left; engineering design would be on the right. Decomposing mathematics produces, among other subspecialties, applied mathematics, which is concerned more generally with the real domain than is mathematics, the parent discipline. The complexity of most fields affords opportunities for such leveling and sharpening through hierarchical examination. Composition is a leveling process, lessening distinctions and moving more inclusive concepts, such as fields, toward the center of the map; decomposition is a sharpening process, revealing differences and dispersing more tightly defined disciplines and sub-disciplines into the quadrants.

Movements of fields and disciplines through time and culture can also be tracked. Through much of the last two thousand years, for example, western sculptors rendered realistic subjects for their clients, commemorating individuals and events. Since the turn of the last century, cultural trends in the arts have moved sculpture up and to the left on the map. Architecture in this century has moved up and down on the map as various movements have shift-ed the discipline's focus of interest between symbolic and functional goals.

A field's choice of subject matter and procedure distinguishes it from others. Design, as a field, clearly occupies a special place on the map, more complementary to science than any other field in that, coupled with science, it fills out the space most completely (Figure 5). The source of the
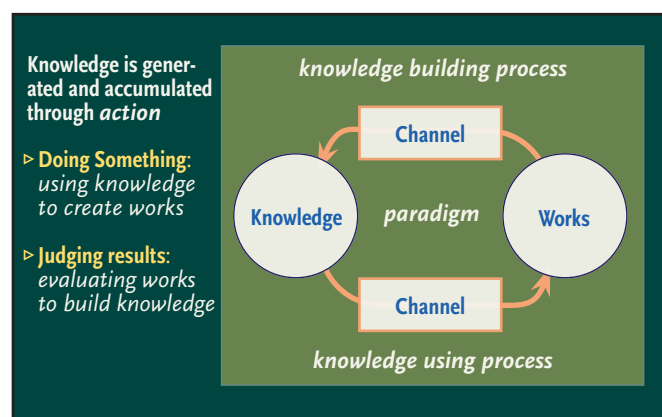
Figure 6 Foundations: Knowledge Building; Knowledge Using

complementation lies in deeply rooted differences in ways of thinking. To understand the differences, it is useful to look at how knowledge is built and used in a field.

FOUNDATIONS

In any field, knowledge is generated and accumulated through action: the model is doing something and evaluating the results. In Figure 6, the process is shown as a cycle in which knowledge is used to produce works, and

Figure 5 Differences: Design and Science are Complementary
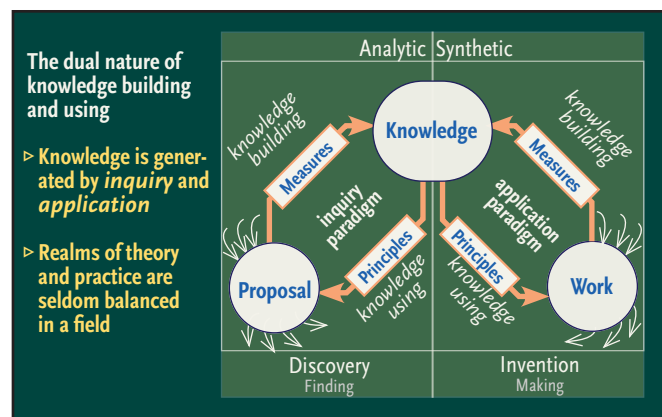
Figure 7 Foundations: Paradigms of Inquiry and Application

works are evaluated to build knowledge. Knowledge using and knowledge building are both structured processes controlled by channels that contain and direct the production and evaluation processes.

These channels are the systems of conventions and rules under which a field and its disciplines operate. They embody the values and integrate the principles and measures that have evolved as 'ways of doing and knowing' as the field has matured. They may borrow from or emulate aspects of other fields' channels, but over time, they become custom tailored to a field as products of its evolution.

The general model can be extended to one that reflects the dual nature of fields and disciplines suggested by the analytic/synthetic dimension of the Map of Fields. In Figure 7, this is done with an addition of realms of theory and practice within which paradigms of inquiry and application operate[3].

Underlying knowledge building and knowledge using in any field are deep foundation layers that direct and inform higher levels all the way to the level of overt procedure. In order from most fundamental to most directly operational, these can be expressed as needs or goals, values and measures. Qualities that a field exhibits on the surface and differences among fields can be best understood by examining these foundations.

Figure 8 presents the foundation model diagrammatically. At the most fundamental level, a driving force—a need/goal that must be satisfied—generates a field. For any well-defined field this usually can be encapsulated in a word, the purpose for which the field evolved. For disciplines, as the focused specialties of a field, it is frequently a need felt strongly and seen purely enough to enlist individuals in a career.

From a need or goal, values emerge to identify the qualities important to fulfilling the need. The work of the field is evaluated in terms of these values. Both needs and values exist at an abstract level, providing reference and foundation against which procedures at an operational level can be tested.

The third and fourth layers of the model take values into the domain of action. The third layer, still relatively abstract, is concerned with the interpretation of values into measures that guide the creation of instruments to manage

the processes of knowledge using and building. Measures are conveniently conceptualized as scales. Because they include expressions for the description of quality at high and low ends, and can have intermediate descriptions as well, they form an ideal bridge from single-word notions of value to evaluative dimensions. Most typically, measurement scales are bipolar with a 'good' side and a 'bad' side (e.g., true/false, right/wrong, works/doesn't work, etc.), but
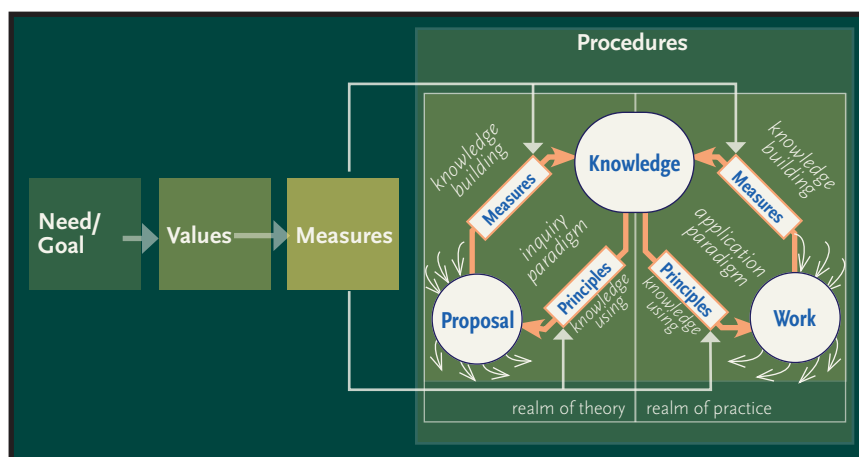
Figure 8 Foundations: Fields Are Founded upon Values

they need not be. Triangular and higher dimension scales (essentially maps) also work, but are less readily applied. Further, scales need not be continuous or even multi-stepped. True/false is perfectly valid as a binary yes/no proposition. And they need not be linear; whether steps are uniform or progressively larger or smaller is not at issue—the issue is resolution in the measurement of value.

The value frameworks created by measures guide the formation of operational methods for producing and judging work. Methods, in turn, combine into the familiar working procedures and processes that encode the knowledge of the discipline operationally for paradigms of both application and inquiry.

Figure 9 uses the model to compare design with the four previously introduced fields. The measures suggested are examples, by no means a complete set.

Science is driven by the need for Understanding. To achieve this goal, it values Correctness, in the sense that theories can be evaluated for whether they are correct, as best can be determined with current data. It also values Thoroughness because understanding must be thorough to remove uncertainty. Testability is valued because closure

demands that theories be tested and determined to be correct or incorrect. These values (and others) find expression in measures that expand the essence of the value into tools that can be incorporated directly or indirectly in frame-

of good citizenship. Measures such as Just/Unjust, Right/Wrong, Complete/Incomplete, Appropriate/Inappropriate and Fair/Unfair draw out the evaluations appropriate to the field.
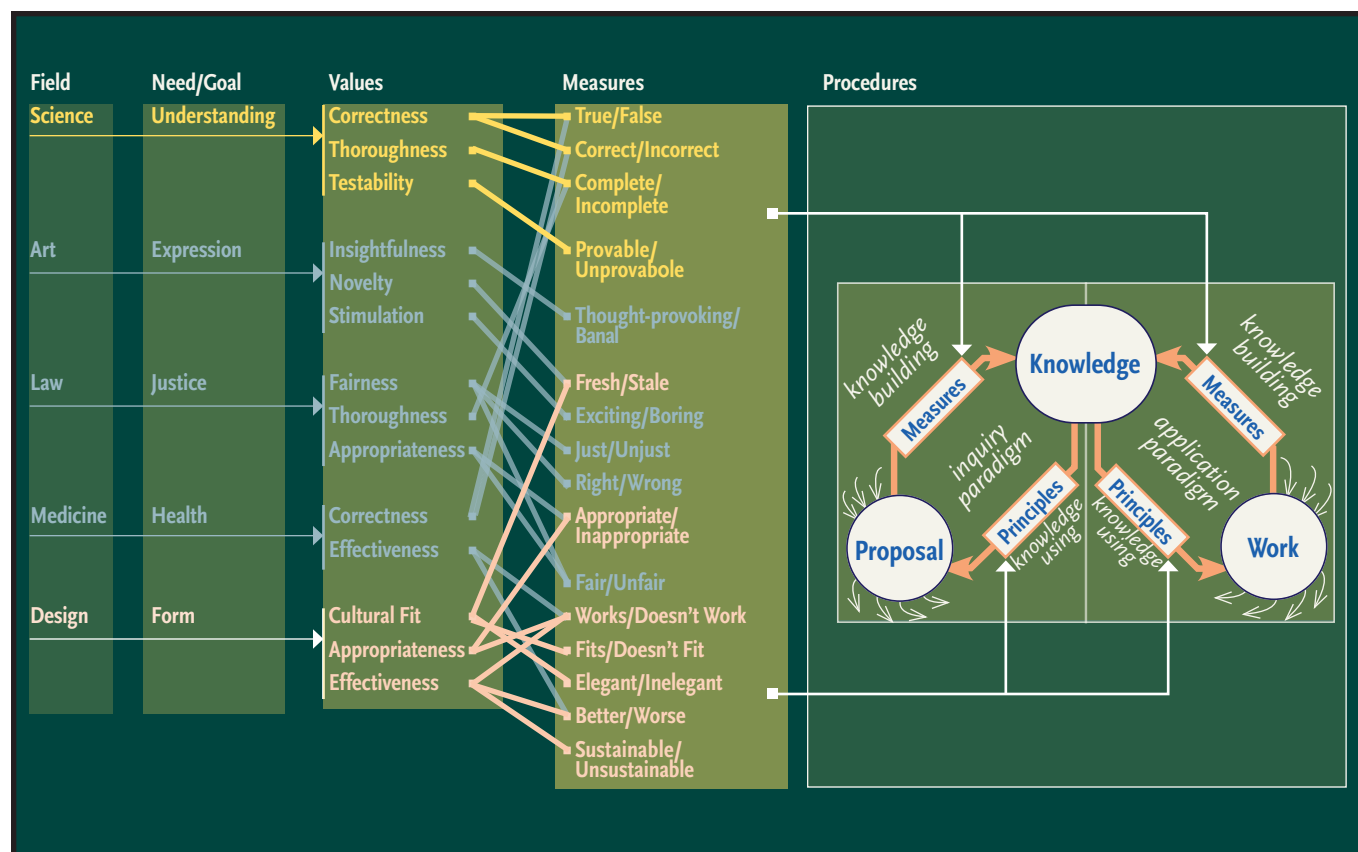
Figure 9 Foundations: Viewpoints and Values for Science, Art, Law, Medicine, and Design

works, methods and procedures. Measures such as True/False, Correct/Incorrect, Complete/Incomplete, and Provable/Unprovable exemplify these.

Art, quite different in this kind of analysis, derives from the need for Expression. Values such as Insightfulness, Novelty and Stimulation highlight important aspects of expression as it is regarded today, and measures such as Thought provoking/Banal, Fresh/Stale and Exciting/Boring particularize these for the criteria to be used in the production and criticism of art.

Law strives for Justice. Its values, Fairness, Thoroughness and Appropriateness, are concerns important to writing the law and ensuring that it is properly used in support

Medicine shares much with science, but has its own need for being in maintaining, promoting and regenerating Health. Among its values, Correctness is critical for diagnoses and procedures, and Effectiveness, a value strongly shared with design, is relevant when something is better than nothing. Measures include Correct/Incorrect, Works/Doesn't work and Better/Worse.

Design exists because of the need for Form. The form giver, in the broadest use of the term, creates order. Because the world of design is the world of the artificial, the values of design tend to be ones associated with human needs and environmental needs created by or resulting from human actions. Cultural Fit is associated with aesthetic issues; Appropriateness targets the wide range of

physiological, cognitive, social and cultural human factors; and Effectiveness gauges functionality and utility. For Cultural Fit, good measures are Fresh/Stale, Fits/Doesn't Fit and Elegant/Inelegant; for Appropriateness, Appropriate/Inappropriate and Works/Doesn't Work (from the human factors perspective) are helpful. From a utility perspective, Works/Doesn't Work, Sustainable/Unsustainable and Better/Worse measure Effectiveness.

'...a combination of science thinking and design thinking is better than either alone as a source of advice.'

Seen through the differences in underlying values, differences among fields become clearer and more understandable. As a case in point, a major difference between science and design lies in the difference between Correctness and Effectiveness as important measures of success. Correct/Incorrect (or True/False) is appropriate for a field in which there can only be one 'true' answer or correct explanation for an observed phenomenon. Better/Worse is appropriate for a field in which multiple solutions can be equally successful because the conditions for judgment are culturally based.

From all this, it is easier to see why a combination of science thinking and design thinking is better than either alone as a source of advice. Either is valuable, but together they bring the best of skeptical inquiry into balance with imaginative application. Both are well served by creative thinking. In preparation for a wider consideration of design thinking, therefore, it is time to look at the general characteristics of the creative thinker.

Characteristics of Creative Thinking

Despite great interest and considerable speculation over many years, the nature of creativity, what makes one person creative and another not, and the creative process itself, remain elusive. Nevertheless, a number of characteristics have been identified and these can be useful in contemplating the nature of creative thinking and, in particular, creative design thinking as it is and as we would like it to be.

Fabun's List

In a special issue of *Kaiser Aluminum News* some years ago, editor Don Fabun assembled characteristics of the creative

individual culled from the observations of a number of thoughtful writers[4]. While they are not all-inclusive, they provide a good start for assembling a catalog:

► *Sensitivity.* A propensity for greater awareness which makes a person more readily attuned to the subtleties of various sensations and impressions. Eric Fromm[4] writes, 'Creativity is the ability to see (or be aware) and to respond'.

► *Questioning attitude.* An inquisitiveness, probably imprinted in early home training that encourages seeking new and original answers.

► *Broad education.* An approach to learning instilled from a liberal education that puts a premium on questions rather than answers and rewards curiosity rather than rote learning and conformity.

► *Asymmetrical thinking.* The ability to find an original kind of order in disorder as opposed to symmetrical thinking that balances everything out in some logical way. 'The creative personality is unique in that during the initial stages he prefers the chaotic and disorderly and tends to reject what has already been systematized'. Ralph J. Hallman[4]

► *Personal courage.* A disregard for failure derived from a concern, not for what others think, but what one thinks of oneself. 'They seemed to be less afraid of what other people would say or demand or laugh at ... Perhaps more important, however, was their lack of fear of their own insides, of their own impulses, emotions, thoughts'. Abraham Maslow[4]

► *Sustained curiosity.* A capacity for childlike wonder carried into adult life that generates a style of endless questioning, even of the most personally cherished ideas. Eric Fromm[4]: 'Children still have the capacity to be puzzled... But once they are through the process of education, most people lose the capacity of wondering, of being surprised. They feel that they ought to know everything, and hence that it is a sign of ignorance to be surprised or puzzled by anything'.

► *Time control.* Instead of being bound by time, deadlines and schedules, creative individuals use time as a resource—morning, noon and night—years, decades—whatever it takes, unbound by the clock.

► *Dedication.* The unswerving desire to do something, whatever it may be and whatever the obstacles to doing it.

▶ *Willingness to work.* The willingness to continue to pursue a project endlessly, in working hours and so-called free hours, over whatever time might be required. Roger Sessions[4] said, 'Inspiration, then, is the impulse which sets creation in movement; it is also the energy which keeps it going'.

Additions from Arieti
In 1976, psychiatrist Silvano Arieti thoroughly reviewed what was known then about creativity[5]. From his study, several additional characteristics can be included:

▶ *Fluency of thinking.* Word fluency, the ability to produce words containing specified letters or combinations of letters; associational fluency, the ability to produce synonyms for given words; expressional fluency, the ability to juxtapose words to meet the requirements of sentence structure, and ideational fluency, the ability to produce ideas to fulfill certain requirements— to offer solutions to problems.

▶ *Flexibility.* The ability to abandon old ways of thinking and initiate different directions.

▶ *Originality.* The ability to produce uncommon responses and unconventional associations.

▶ *Redefinition.* The ability to reorganize what we know or see in new ways.

▶ *Elaboration.* The capacity to use two or more abilities for the construction of a more complex object.

▶ *Tolerance for ambiguity.* The capacity to entertain conflicting concepts for periods of time without the need to resolve uncertainties.

Csikszentmihalyi's Polarities
Mihaly Csikszentmihalyi, an anthropologist at the University of Chicago, sees the creative individual in terms of 'pairs of apparently antithetical traits that are often both present in such individuals and integrated with each other in a dialectical tension'[6].

▶ *Generalized libidinal energy and restraint.* 'Without eros, it would be difficult to take life on with vigor; without restraint, the energy could easily dissipate.'

▶ *Convergent and divergent thinking.* Divergent thinking to generate ideas; convergent thinking to tell a good one from a bad one.

▶ *Playfulness and discipline—or irresponsibility and responsibility.* Exploring ideas widely and lightly, but surmounting obstacles and bringing ideas to completion with doggedness, endurance and perseverance.

▶ *Fantasy and reality.* Breaking away from the present without losing touch with the past; finding originality in which novelty is rooted in reality.

▶ *Extroversion and introversion.* Seeing and hearing people, exchanging ideas, and getting to know other persons' work to extend interaction; working alone to fully explore and master abstract concepts.

▶ *Humility and pride.* Humility in the awareness of those who worked before, the element of luck involved with achievement, and the relative unimportance of past achievements in comparison with a focus on future projects; pride in the self-assurance associated with accomplishment.

▶ *Masculinity and femininity.* Psychological androgyny enabling the best traits of bold, assertive masculinity to be combined with the best traits of sensitive, aware femininity.

▶ *Traditional conservatism and rebellious iconoclasm.* Being able to understand and appreciate a cultural domain and its rules, while at the same time being willing to take risks to break with its traditions.

▶ *Passion and objectivity.* Passion in the attachment and dedication to the cause or work; objectivity in the ability to stand apart, detached, to evaluate quality impartially.

▶ *Suffering and enjoyment.* The heightened highs and lows that come with intense involvement and sensitivity, both to observed quality and to what others think.

Csikszentmihalyi notes that these conflicting traits are difficult to find in the same person, but 'the novelty that survives to change a domain is usually the work of someone who can operate at both ends of these polarities—and that is the kind of person we call creative'.

Many of these characteristics, especially among those listed by Csikszentmihalyi, are not qualities to be taught. At best these are natural personality traits that can be recognized where they exist or noted in their absence, but many of the others can be developed or encouraged, and this should be done overtly.

Characteristics of Design Thinking
Creativity is of major importance to design thinking, as it is to science thinking and thinking in any field. But as is true for each field, characteristics other than creativity are

also important. From personal experience, I would nominate for design thinking the following characteristics and ways of working:

▶ *Conditioned inventiveness.* Creative thinking for designers is directed toward inventing. Designers tend to be more interested in the 'what' questions than the 'whys' of interest to the scientist. Design creativity, thus, complements scientific creativity. Design creativity, however, must cover more than just invention. Design brings to invention a concern that what is produced not only be inventive, but be so within the frameworks of human-centered and environment-centered measures governing the designer's efforts.

▶ *Human-centered focus.* Science and, to a slightly lesser extent, technology have few built-in governors. That is to say, as in the arts, exploration proceeds where discoveries direct. Design, on the other hand, is client-directed. Design thinking must continually consider how what is being created will respond to the clients' needs.

▶ *Environment-centered concern.* In recent years, design thinking has acquired a second, omnipresent and meta-level client: the environment. Present-day thinking puts environmental interests at a level with human interests as primary constraints on the design process. Sustainable design is one very noticeable result, The ultimate value of human- and environment-centeredness is a guarantee that the best interests of humankind and environment will be considered in any project.

▶ *Ability to visualize.* All designers work visually. Designers can visualize ideas in a range of media, bringing a common view to concepts otherwise imagined uniquely by everyone in a discussion. Designers can reveal the whole elephant that the blind men can only partially and imperfectly conceive.

▶ *Tempered optimism.* It is difficult to work—and especially to work creatively—in a pessimistic, critical mood. Designers are taught to recognize this and to establish optimistic and proactive ways of working. Pronounced mood swings are not unusual among creative individuals, but designers learn to control these to level out both lows and highs in the interests of professionalism—designers must be able to turn on enthusiasm on demand.

▶ *Bias for adaptivity.* In recent years, the emergence of adaptive processes in manufacturing and information technologies has greatly reinforced a practice histori-cally followed by some designers: the design of adaptive products able to fit their users' needs uniquely. Design thinking today has accepted that concept, approaching problems with the view that, where possible, solutions should be adaptive—in production, to fit the needs of users uniquely; throughout their use, to fit users' evolving needs.

▶ *Predisposition toward multifunctionality.* Solutions to problems need not be monofunctional. Designers routinely look for multiple dividends from solutions to problems. This would seem to be an obvious way to proceed, but it is not so. In a recent issue of *Popular Science* magazine[7], the cover story was six new technologies to stop global warming. The story reported proposals made by the science community at a special invited meeting with White House officials. All six science proposals were serious proposals for macroengineering projects. Five of the six proposed single-minded means for relieving global warming—at considerable cost, and with no additional benefits. The sixth, as an extension of a technology already used for increasing natural gas production, had that benefit, but no other. In contrast, the three macro design projects proposed in the Institute of Design's prize winning Project Phoenix (also reported in Popular Science 14 years earlier) all had major economic benefits in addition to their global warming benefits[8]. Design thinking keeps the big picture in mind while focusing on specifics.

▶ *Systemic Vision.* Design thinking is holistic. In the last forty years, roughly since the computer began to influence design thinking, designers have moved to considering problems more broadly. Modern design treats problems as system problems with opportunities for systemic solutions involving mixes of hardware, software, procedures, policies, organizational concepts and whatever else is necessary to create a holistic solution.

▶ *View of the Generalist.* Common wisdom today holds that the trend of expertise is to greater and greater specialization and, therefore, success will come more readily to those who choose to specialize early and plan their training accordingly. Design thinking, to the contrary, is highly generalist in preparation and execution. In a world of specialists, there is real need for those who can reach across disciplines to communicate and who can bring diverse experts together in coordinated effort. For inventive creativity, the wider the reach of the knowledge

base, the more likely the creative inspiration. A designer is a specialist in the process of design, but a generalist in as wide a range of content as possible.

▸ *Ability to use language as a tool.* Language is usually thought of as means for communication. For design thinking, it is also a tool. Visual language is used diagrammatically to abstract concepts, reveal and explain patterns, and simplify complex phenomena to their fundamental essences. Mathematical language is used to explore 'what if' questions where feasibility may be established by approximation—by calculations not exact, but close enough to support an idea or change a line of reasoning. Verbal language is used in description where explanation goes hand in hand with the creative process, forcing invention where detail is lacking and expressing relationships not obvious visually.

▸ *Affinity for teamwork.* Because designers work for clients, it is natural that good interpersonal skills become part of the professional set of tools they develop. An additional impetus toward teamwork has been a movement in the professions over the last forty years toward team-based design, spurred by developments in industry. Design thinking today is highly influenced by this, and designers routinely work closely with other designers and experts from other fields. On multi-discipline teams, designers are a highly valuable asset because of their characteristic abilities to generalize, communicate across disciplines, work systematically with qualitative information, and visualize concepts.

▸ *Facility for avoiding the necessity of choice.* The job of the decision maker is to choose among alternative proposals, usually the products of different problem-solving approaches. Design thinking takes the view that making that choice is a last resort. Before moving to choice-making, the designer looks for ways to 'have your cake and eat it too'—a seeming paradox (exactly what you cannot do, as pointed out in the old English proverb). The optimistic, adaptive designer, however, searches the competing alternatives for their essential characteristics and finds ways to reformulate them in a new configuration. When this process is successful, the result is a solution that avoids the decision and combines the best of both possible choices.

▸ *Self-governing practicality.* Design is a field in which inventiveness is prized. In very few fields is there the freedom to dream expected in design. The best design thinkers understand this and learn to govern flights of fantasy with a latent sense of the practical. The flight is to the outer reaches of what can be conceived; the tether is to ways that the conceivable might be realized. This is embedded in a style of thinking that explores freely in the foreground, while maintaining in the background a realistic appraisal of costs that can be met and functionality that can be effected.

▸ *Ability to work systematically with qualitative information.* As design research has matured and design methodology progressed, design processes with component methods and tools have been developed and refined. As one such process, Structured Planning[9] contains a tool-kit of methods for a complete range of planning tasks covering ways to find information, gain insights from it, organize it optimally for conceptualization, evaluate results and communicate a plan to the public and follow-on teams in the development process. Methods such as this are qualitative information handling techniques applicable to many kinds of conceptual problems where complex, system solutions are desirable. They are also usable by anyone working on a planning team, enabling systematic aspects of design thinking to be made accessible to all.

DESIGN EDUCATION TO SERVE NEW CLIENTS

The characteristics enumerated above are not those normally listed in a catalog for a design course. These are special ways of design thinking, almost implicit in the nature of the design process and usually taught tacitly in today's design education programs. For most of the characteristics, this works because design education programs are several years in length and directed toward a career in design. There is ample opportunity to acquire the skills and nuances of design thinking, and a predisposition to do so exists on the part of students because they have chosen to become designers. For some of the characteristics, though, particularly those that have developed more recently, tacit assimilation is not enough, and more progressive schools can be expected to institute formal courses to teach them.

We can expect problems to appear, moreover, when the context is changed. Teaching design thinking, formally or tacitly, is one thing when the context is a traditional design career in industry or a consulting office. It will be quite another when the context is institutional or governmental policy planning. And our problem is just that: to train a new kind of student for that new context. To train students

for roles as policy design synthesis advisors, it will be necessary to create a new kind of design program. Some of the factors that will need to be considered are:

▷ **How long should the program be?** Can it be taught in one, two or three years? Should it be full-time or part-time—or either? It is unlikely that a long program will be acceptable. Just as business schools have crafted one and two year programs for executives seeking MBA degrees, a program for policy design synthesis will in all likelihood have to be relatively condensed and, perhaps, packaged in unusual time blocks and delivery means accessible to potential students already working in design or planning fields.

▷ **Who are the best candidates for the program?** Should candidates be recruited from institutional/governmental positions? Should experienced senior designers be recruited? It is not clear yet whether planners turned design thinkers or designers turned planning practitioners would be better. The correlated question whether senior designers or policy staff members would benefit more than young professionals in either field is also open. Perhaps, analogous programs for policy planning will be instructive.

▷ **What levels of experience and schooling should be required for entrance to the program?** Must candidates have one or more design degrees? What kind of experience is valuable? Should special experience be required? Some level of experience will almost certainly be necessary and training in both design and planning must be undertaken, either prior to entry or during the period of education. Experience can be built up through internships within the program, and varying degrees of foundation education can be offered as additional required studies for deficient candidates who otherwise would be highly qualified.

▶ **What is the ideal mix of design tools and thinking and tools and thinking from other fields to best prepare students for their working environment?** What tools from the available design inventory are suitable? What modifications should be sought? What tools from other fields could be refined for this new use? What wholly new tools would be desirable? Design research will have some new fields to probe. Tools will have to cover at least three sectors of policy design synthesis. First, tools for design advisors to work with other planning advisors. These will probably be information handling tools, much like

Structured Planning, where all can work together under guidance by someone trained in using the tools. Second, tools for design advisors to work for other planning advisors. These will be tools that require more design expertise, but whose use is for crystallizing concepts for the planning group. Third, tools for design advisors to work away from other planning advisors. These will probably be tools for specialized design simulation and modeling work whose results will be important for the planning process, but whose workings require more specialized knowledge and time use than is reasonable for team members working directly on the planning problem.

▷ **What mix of academic and internship experience should be planned?** What form should the educational process take? Should elements of the program be on-site at an institutional location? Packaging of the program will be crucial to its success. If it achieves a high level of attention at executive levels, many otherwise highly effective, but costly, forms of education may become possible. Very low student-to-teacher ratios complemented with learning settings optimally suited to the education process are an example. The mix of experiences and forms of involvement should be planned for maximum effect in minimum time to appeal to a potential student population (and clients desiring to hire them) in position to expect—and sponsor—the best. How should successful completion of the program be judged? Course completion? Thesis or dissertation? License? Should examiners include internship advisors from relevant institution?

The opportunity may be here for new forms of evaluation. Design thinking is almost never evaluated well by testing, and almost all design is taught by 'project-oriented' learning methods. Final research work as typified by theses and dissertations is probably also inappropriate for the kind of program that most likely will evolve for policy design synthesis. A project-like demonstration of proficiency that could take a range of possible forms might be an answer. Such a demonstration could involve other students and have evaluators from both the university and the institution where the student is serving his or her internship.

The task of creating a Policy Design Synthesis program will be difficult. Governmental and institutional organizations must be convinced that policy design synthesis is a valuable addition to the advisory skills they rely upon. For that, our professional design societies can carry the cam-

paign. New tools will have to be created to bring the skills of design thinking to bear on policy problems. For that, our design research institutions and university programs can lead the way. The problem is greater than the capabilities of any single university. Cooperation will be essential—to convince leaders, to create tools, and to train students in numbers significant to have impact—while there is still time.

Summary and Conclusions

The problems induced by a growing population are becoming major with virtual certainty that their number and seriousness will increase. Global warming, as one of the latest manifestations, adds levels of complication and uncertainty almost impossible to anticipate. Decision making at the policy level must avail itself of the best advice it can find to at once confront disasters on increasingly grander scales, and benefit from the emergence of extremely powerful new technologies.

To interpret the problems and possibilities of impending changes, science thinking must be solicited and heard. To explore and conceptualize ways to proceed, design thinking must receive equal attention. Among the many kinds of advice available, the creative voices of discovery and invention as embodied in the insights of scientists and the ideas of designers are critical.

Design thinking, less well known than science thinking, has characteristics of great value to teams dealing with complex, ill-formed problems. Together, the characteristics of design and science thinking form a set of complementary thought processes able to add considerable strength to the advisory task.

Providing design thinking in an advisory capacity to governmental and institutional leaders will require an evolution in design education, design research and design professional activities. For design education, new programs must be designed that bring the best of design thinking into the new context of policy planning. New content will be necessary; new processes must be developed and taught; and new ways of working will have to be learned. It will be worth doing.

Charles Owen

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Wonderground and Forward
Closing remarks: Wonderground Conference, Lisbon, Saturday 4th November

Chris Rust
Chair, Design Research Society

I must thank the whole team from IADE, led by Eduardo and Martim, for the impressive amount of very hard work they have done to make the conference a success. Things may go wrong, they always do, but I'm sure we all agree that we had a wonderful time this week in this beautiful city.

It has been a great social experience, we have made new friends and new colleagues and I hope that some fertile collaborations have been formed. I remember particularly one talk in this room where a member of the audience rose to make a pointed response that amplified the speaker's point of view, I watched a third colleague walk across the back of the hall to engage him in discussion and by the end of the morning the three of them were plotting new work.

Of course we are here also to disseminate new knowledge. One can never see everything in a big event like this but I adopted a strategy of picking a session at random and joining it, I was surprised by how many new ideas and interesting debates I encountered.

Not everybody is a master of the art of conferencing but I would like to pick out two speakers from today's final sessions that are examples for us all. Richard Buchanan gave the last talk of the conference and, given his experience and standing we expect him to be worth hearing. Nevertheless. it was instructive to observe how he constructed his argument to explain the important points of his paper in a short time and with great effect. As I say, we expect nothing less from Richard and he was speaking in his native language, but the very first speaker, Yukari Nagai, of the day had a much bigger challenge.

She and her colleagues must be commended highly for the care with which they compiled their presentation. They made excellent use of visual aids to take us through the main points of a complex scientific paper and Yukari's performance was well rehearsed to convey their message clearly. We have seen some presenters (including plenty of anglophones) finding it difficult to convey their message so it is great to see an example of how careful professional preparation can help us all to do a better job and get attention for our research.

This conference was also an opportunity for some of us to think about future plans for the Design Research Society and we had a lot of good ideas put forward. Over the next year we will be working on a range of ways to make the society more relevant to its growing international membership, and I hope we will be able to bring proposals to the next Annual General meeting. That may be in Hong Kong at the IASDR conference (International Association of Societies of Design Research) where DRS is playing a part. We will certainly be using the IASDR event to connect with our members and discuss new developments even if the AGM is elsewhere.

I don't wish to speculate about how our plans will develop since most of the ideas we have need some consultation and careful thought before we can be confident about them, however one theme was put forward very clearly by many of the people that I have spoken to so I think we should decide to act on it. A lot of you have said that Special Interest Groups or SIGs would be a great way to get people involved and advance the different interests of the members and I agree so I'll be making that one of my personal priorities this year with a view to getting some SIGs going in good time to affect our next biennial conference.

And on that subject, I feel this is a good time to reflect on where we are going with our main conference series. This has been the third of the present programme of biennial events, started in 2002, and now feels like the right time to reflect on how they are going and use the experience of the past three conferences to set the pattern for the next six years. We will be asking you for your feedback and ideas to help with this and I hope we will announce the main plans and location of the 2008 conference before too long.

But before that I hope to see many of you in Hong Kong in 2007. As I referred to Clive Dilnot's ideas (Design - The Science of Uncertainty) in my remarks at the start of Wonderground, I'll finish with a reference to his talk today and urge you to not let your actions be shallow ones.

Postscript:

Since I made these remarks the DRS Council has reflected on the many ideas and insights that were collected at Wonderground through our policy workshop and informal discussions with members. At the moment we are looking for a suitable venue for the next conference with the main aim that it should be under direct control of the council to provide a vehicle for developing our conference policy and format for the next few years.

Now that the council is a more international group, we are also experimenting with ways of making decisions that do not depend on regular physical meetings and, as I said at Wonderground, I expect that we will be bringing forward some interesting proposals at the next AGM to ensure that members around the world have a full voice in the society. As promised we now have a working party setting up the first special interest groups and there are a number of other initiatives that are drawing people in to active roles in the society, so look out for announcements over the next year, it promises to be an exciting time for new developments.

Seven New Fellows of the Design Research Society

The Fellows to have their appointments confirmed are:

- **Professor Rachel Cooper** University of Lancaster, UK
- **Professor Alpay Er** Istanbul Technical University, Turkey
- **Professor Jack Ingram** University of Central England, UK
- **Professor Judith Mottram** Nottingham Trent University, UK
- **Professor Vesna Popovic** Queensland University of Technology, Australia
- **Professor Keiichi Sato** Illinois Institute of Technology, USA
- **Professor Martin Woolley** University of the Arts, UK

In March 2006, the Design Research Society's Council instituted a new grade of membership—Fellow of the Design Research Society—to acknowledge an individual as having an established record of achievement in design research and attainment of peer recognition as a researcher of professional standing and competence, with:

- a research qualification or equivalent (normally a Doctorate or a Masters degree by research)
- at least seven years experience of working at postgraduate level in research related to design, or research-based design practice
- significant record of achievement in design research, as evidenced by, for example, publications of international standard, and/or conducting successful research projects, and/or successful education of postgraduate research students.

The first appointments arose from nominations made by DRS Council members. The appointment procedure was carried out by Professor Nigel Cross, President of DRS and holder of a DRS Lifetime Achievement Award, with the support of three other distinguished and experienced members of the DRS Council: Prof Bob Jerrard, Prof John Langrish and Prof Sue Walker. Past-President Prof Richard Buchanan advised the panel.

A general procedure for applications and appointments, open to all DRS members, is now being implemented, and will shortly be announced on the DRS web site. A Fellows Election Committee, appointed from amongst the existing Fellows and chaired by Nigel Cross, will consider applications. The aim of the scheme is not to reward only the most exceptional people, but to provide a measure of consistent professional contribution to design research. In time there may also be ways in which the 'College' of Fellows can contribute to the Society and our discipline as a distinct body.

In the first round of invited applications, fourteen Fellows were appointed. With this round, there are now twenty-one Fellows of the Design Research Society.

International Corresponding Member Report

The 7th P&D – Brazilian Conference on Research and Development in Design
Daniela Büchler

This August, the 7th Brazilian P&D Conference (http://www.design.ufpr.br/ped2006/) on research and design was held in Curitiba, capital of the southern state of Paraná. This is the largest conference on Design in the whole of Latin America, where research in this area is still new. In Brazil, however, this area is already recognized by major research funding bodies who aim to strategically develop national competitiveness. The event is geared toward the discussion of design research and education in Brazil. It has increasingly presented itself as the main vehicle for dissemination and discussion of issues that are pertinent to the advancement of knowledge, from applied to fundamental research in the design area. Five national universities and education institutes—UTFPR, UNICENP, UTP, and PUC–PR—joined together to organize the conference with the main objective of producing an event of high academic standard.

The initial call attracted 1094 abstracts, which following the peer review, resulted in the submission of 650 full papers. Intense marketing of the event pull the number of registered participants up to over 900. This was primarily a national event where most of the submissions came from major states such as São Paulo, Paraná, Rio de Janeiro, Santa Catarina e Rio Grande do Sul, in this order. These are the southern and southwestern regions of Brazil, which have experience and a tradition in design education and research. Of the 26 themes that were established in the beginning of the submission process, ergonomics, graphic design and sustainable design were the most popular, followed by Design and education, design management and design and culture.

Each of the three days started with a choice of 18 mini courses or workshops, followed keynote speeches and parallel tracks. There were eight keynote speakers from Brazil and abroad: Carlo Vezzoli (Italy), Bernard Burdek (Germany), Cheng-Neng Kuan (Taiwan), Philip Heikdamp (Germany), Wan-Ru Chou (Taiwan), Lorenzo Shakespear (Argentina) e Marcelo Soares (Brazil) e Wilson Kindlein (Brazil). Eight books were launched during the event, addressing areas of Design. The academic discussion centered on design research issues. There were also commercial stands, and promotions of services and national design higher-level courses. The 8th P&D is scheduled for 2008 at SENAC/São Paulo.

Daniela Büchler

Daniela Büchler is a Brazilian architect with an MA in architecture from the Faculty of Architecture and Urbanism, São Paulo University, Brazil, where she is a visiting lecturer. She is currently sponsored by the CNPq to work on a PhD in Design at the Faculty of Arts, Media & Design at Staffordshire University, UK, where she is a part-time lecturer. Her research interests span from corporate design and marketing strategies to visual analysis of consumer products.

Upcoming Events

Design Conferences Worldwide
Artemis Yagou

2007
8-10 Jan. **Cardiff**, **UK**
Creativity or Conformity? Building Cultures of Creativity in Higher Education.
http://www.creativityconference.org/

2-4 Apr. **London**, **UK**.
Include 2007: Involving the Consumer - International Conference on Inclusive design.
http://www.hhrc.rca.ac.uk/programmes/include/2007/cfp/index.html

11-13 Apr. **Izmir**, **Turkey**
Dancing with Disorder: Design, Discourse and Disaster. 7th International Conference of the European Academy of Design.
http://fadf.ieu.edu.tr/ead07/

28 Apr-3 May
San Jose, **U.S.A.**
CHI2007 - Annual ACM/SIGCHI Conference: Human Factors in Computing Systems.
http://www.chi2007.org

13 May **Toronto**, **Canada**
Workshop, Pervasive Computing & Design: Designing and Evaluating Ambient Information Systems.
http://informatics.indiana.edu/subtletech/main.html

17-18 May **Kingston**, **UK**
Fashioning the Modern Interior - The Dorich House Annual Conference.
http://www.kingston.ac.uk/design/mirc/conference07.html

27-30 May **Stockholm**, **Sweden**
Design Inquiries: The Second Nordic Design Research Conference.
http://www.nordes.org

11-13 Jun. **Wrexham**, **UK**
The Narrative Practitioner: Developing Excellence in Research, Education and Practice.
a.carson@newi.ac.uk

11-13 Jun. **Tokyo**, **Japan**
14th CIRP International Conference on Life-Cycle Engineering.
http://cirp-lce2007.jspe.or.jp/

13-15 Jun. **Washington DC**, **USA**
Creativity and Cognition 2007 – Seeding Creativity: Tools, Media, and Environments.
http://www.cs.umd.edu/hcil/CC2007/

18-20 Jun. **Helsingborg**, **Sweden**
First European Conference on Affective Design and Kansei Engineering.
http://www.kansei.eu/

20-23 Jun. **Thessaloniki**, **Greece**
3rd International Conference on Typography and Visual Communication.
http://afroditi.uom.gr/uompress/3rd_int_conference/introduction.html

26 Jun. **De Montfort**, **UK**
In theory? Encounters with Theory in Practice-based Ph.D. Research in Art and Design.
e.rooney@lboro.ac.uk

29 Jun. **Hatfield**, **UK**
The Experiential Knowledge Conference 2007: New Knowledge in the Creative Disciplines.
http://www.art-design.herts.ac.uk/ekc/ekc1.html

19-23 Jul. **Leeds**, **UK**
Things that Move: The Material Worlds of Tourism and Travel.
ctcc@leedsmet.ac.uk

14-18 Aug. **Copenhagen**, **Denmark**
Fashioning Technology: Design from Imagination to Practice.
The International Committee for the History of Technology Symposium, 2007.
http://www.icohtec2007.dk/

22-25 Aug. **Helsinki**, **Finland**
UE+/User Experience Plus, Designing Pleasurable Products and Interfaces, 2007.
http://designresearch.uiah.fi/dppi07/

28-31 Aug.	**Paris**, **France**
	16th International Conference of Engineering Design.
	http://iced07.org

5-7 Sep.	**Kingston**, **UK**
	Design/Body/Sense: Design History Society Annual Conference.
	http://www.designbodysense.co.uk/

12-14 Sep.	**London**, **UK**
	Designs on eLearning.
	http://www.designsonelearning.net/index.php?section=1&item=3

13-14 Sep.	**Newcastle upon Tyne**, **UK**
	EPDE07 - The 9th International Conference on Engineering & Product Design Education: Shaping the Future?
	http://www.cfdr.co.uk/epde07/

19-21 Sep.	**Montreal**, **Canada**
	EuropIA.11: 11th International Conference on Design Sciences & Technology.
	http://europia.org/EIA11

29-30 Oct.	**Farnham**, **UK**
	Sustainable Innovation 07 - Global Building and Construction: Systems, Technologies, Products and Services 12th International Conference.
	http://www.cfsd.org.uk/

Artemis Yagou

Livenarch III
5-7 July, 2007 — Trabzon, Turkey

Contextualism in Architecture:
Contextualism as the resolution of the identity-creativity dilemma

Call for Papers   **January 31**   **Abstracts deadline**
March 15   Full paper due

This conference will critically examine ways of mediating the totalizing and homogenizing effects of globalization, especially on urban form and architecture-city relationships. The goal is for scholars and professionals to discuss modes of interventions which do not retreat to imitation, dissimulation or minimalism, but rather to argue for creative solutions emerging from geographical and cultural locale.

1. Theories and Fictions:
▸ Theoretical foundations, frameworks, and concepts
▸ Philosophical, ethical & social implications (In relation to designing for social/cultural/contextual particularities and extremes-climate, geography, devastated cities, specially protected areas, the underprivileged, the peripheral and the marginal, etc.)

2. Creative design methods and tools:
▸ Design guidelines, methods, and processes
▸ Narratives, myths and fantasies

3. Innovative solutions: cases of socially appropriate solutions, style and appearance:
▸ Urban transformations
▸ Contextual architecture
▸ Building elements, furniture and objects

Poster Session
Poster submissions in line with the congress theme are encouraged. Two standard sheets [50X70cm] are welcome.

Forum
The Turkish scene which is open to Turkish architects mainly. Lecturers, keynote speakers and referees' contributions are encouraged.

http://www.livenarch2007.org

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Our members are from diverse backgrounds, not only from the traditional areas of design, ranging from expressive arts to engineering, but also from subjects like psychology and computer science.

We:
▶ Recognize design as a creative act common to many disciplines
▶ Understand research and its relationship with education and practice
▶ Advance the theory and practice of design
▶ Encourage the development of scholarship and knowledge in design
▶ Contribute to the development of doctoral education and research training
▶ Share knowledge across the boundaries of design disciplines
▶ Facilitate networks to exchange and communicate ideas, experience and research findings among members
▶ Disseminate research findings
▶ Promote awareness of design research
▶ Organise and sponsor conferences, and publish proceedings
▶ Encourage communications between members internationally
▶ Respond to consultative documents
▶ Collaborate with other bodies
▶ Lobby on behalf of members' research interests
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▶ Organise and sponsor conferences, and publish proceedings
▶ Encourage communications between members internationally
▶ Respond to consultative documents
▶ Collaborate with other bodies
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