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The Future of Design: When You Come to a Fork in the Road, Take It

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Design started out as a craft, primarily focusing upon the creation of beautiful objects to become a powerful force in industry. Today, design has gone far beyond its simple origins as a craft to develop powerful new ways for people to interact with the world, emphasizing experience, not technology. Moreover, it has evolved into a way of thinking, of problem discovery, and of enhancing the lives of individuals, the experience of the workforce, and even the health of the planet. Are these new developments compatible with the craft traditions of the old? Is this a fork in the road, with some continuing the craft tradition of enhancing the emotional experiences of our products and others taking the other path, moving design thinking into all endeavors, but far removed from the history and mainstream practice of today. What is the future of design? We are at a fork: Which path should we take?

Comments prepared for the tenth anniversary of the University of the Republic of San Marino's offering the degree of Bachelor in Design.

Design as a Craft

Design as a skilled craft creates useful and beautiful items. The field of Industrial Design helps industry produce commercial products. In schools and universities across the world, considerable time is spent on mastering the craft skills of drawing, construction, materials, manufacturing, and finishing. Indeed, in many schools, there is little time spent outside of these crafts: little time on social

issues, philosophy, world events, or general literature. Little or no training in the fundamental STEM components of Science, Technology, Engineering, or Mathematics.

To me, these gaps are strange. Design is the interface between technology and people, yet there is little study of either. No deep appreciation of people or the social sciences, no deep understanding of science, mathematics, or engineering – the essential backbones of technology. The training is that of a craftsperson, mentored by skilled craftspeople. It is design, design, and design.

The result is brilliant crafts capable of making the many pleasurable objects we use today in our homes, schools, and workplaces. This is all very excellent, but with the 21st century's increasing sophistication of the technologies for home, business, education, and entertainment, the skills of the craft no longer suffice. As long as designers remain craftspeople, they can add value, but they cannot take the lead. Engineers and business people decide what is to be done: designers help enable the results, but they are seldom the leaders. Design as a craft is an admirable profession, but one that is limited in both aspiration and capability.

The world of technology is undergoing rapid change driven by the fundamental advances in the science and technology of computation, sensors, communication, and displays along with a growing understanding of the large social and environmental impact of modern technology. Natural resources are being depleted, the environment suffers from heavy, unhealthy pollution in many parts of the world, and social unrest affects all of us. Even the climate is changing, impacting living conditions across the world. A craft education does not suffice to deal with these issues.

Design as an Evidence-Based Discipline

Traditional craft-based design had no need for formal evidence: the proof of their efforts was visible to all who viewed it. The designs were guided by the finely-honed intuitions of the designer and could be appreciated by any discerning viewer. This approach worked as long as the designs were of relatively simple things such as watches, home appliances, and furniture. The introduction of computers, communication networks, powerful sensors and display, even our most common everyday devices became more complex. People became confused and frustrated: a new form of design was needed to cope with these issues. Intuition was no longer sufficient: the design had to be informed by technical knowledge of the technology and an appreciation of the limits and capabilities of the ordinary people who were expected to master the devices. Because the

underlying operation is invisible to people. It falls upon the designer to make the device understandable and usable. Traditional design training was not up to the task.

The solutions came from developments outside of design. The result, variously called "interaction design," "experience design," or "human-computer interaction," came primarily through the efforts of the disciplines of psychology, human factors, ergonomics, and computer science. The Xerox Palo Alto Research Center along with various universities around the world played important roles. I myself entered design through psychology and computer science. Many of the basic concepts in use were today being developed as early as the 1940s-70s, with a rapid expansion in the 1980s as computers started to become accessible to the research community and then to the everyday person.

Service design was yet another area that represented a shift in design practice, for services are not physical objects: they are interactions with people and systems. A service is about psychology and business, not materials, shapes, and forms. It requires a different set of knowledge to design and a formal method of testing to evaluate. In fact, service design originated in marketing and management, not design, and only later did it migrate to design.

All these developments have been incorporated into modern design activities. And as design changed, so too did the fundamentals change. New, non-design societies, conferences, and journals formed to fill the void left by conventional design, with many of the new groups doing design but unaware of the existing design community. Soon we had human-computer interaction (HCI) and its many societies, conferences, and journals, computer support of collaborative work (CSCW), and new procedures and frameworks, such as "Human-Centered Design" (HCD) and "Design Thinking." The result was the development of new forms of design. Some came from groups outside of the design community, some from within, but today, more and more by the joint work of designers and non-designers (most commonly cognitive and computer scientists).

Human-centered design is perhaps the most important of these new developments. It is a process, one that requires a deep understanding of people. It starts with observations and then a rigorous attempt to use those observations to determine the true underlying issues and needs, a process that might be called "Problem Defining" (as opposed to problem solving). Then, these needs and issues are addressed through an iterative, evidence-based procedure of observation, ideation, prototyping, and testing, with each cycle of the iteration

going deeper and deeper into the solution space. The result is a form of incremental innovation, optimizing the solution through a hill-climbing process.

Human-centered design, at least the way I define and practice it, has at its core several fundamental principles.

- The end product is intended to enhance the quality of life of the people who will use it.

- It does not rush to a solution. Given a problem, it stops to observe and study the issues to ensure that the correct problem is being address, namely, the fundamental causes and needs, not surface symptoms.

- It is evidence-based, using careful observations and analyses to determine needs and experimental deployment of potential solutions in an iterative cycle of observation, ideation, prototyping, and testing.

- It is action-oriented, learning by doing, through repeated iterations of making, testing, and observation.

Modern HCD applies the findings of many fields. It is the bridge between technology and people, applying the findings of the cognitive, behavioral and social sciences through a process of doing and making, testing and probing, experimenting to make things better, working with the specialists from the relevant disciplines as well as the people for whom the designs are intended. HCD designers do their research by continual designs, carefully analyzing the situation, using each design as a way to test their ideas in small, controlled ways, using the resulting evidence to guide further, continual refinement.

Human-centered design moves us away from designer as guru. It moves us into an important profession where we have systematic methods for discovering true needs of people and society, for developing proposed solutions, testing and refining them. We used to be an opinion-based field: today we are an evidence-based field. We have become human-centered.

Design Thinking

The phrase "design thinking" is controversial. Designers have talked about design thinking for at least half a century. It has recently been revived, in part as a marketing slogan by the company IDEO, but also to designate the use of human-centered principles in the application of design to whole new domains. The definition of design thinking varies considerably: Here, I use it to mean the use of HCD as a method of reframing the problem. Perhaps the most important

contribution of Design Thinking to those outside the design profession is the ability to step back and reconceptualize the issues, to take a very different perspective upon the issues.

I find the concepts and the phrase useful in distinguishing the new era of design from the more traditional, craft-based era. When we speak of designers as "design thinkers," we make it clear to the audience that we are not focusing upon the development of pretty things but rather adding value to any activity, bringing a new framework upon which to view the world. In business, this means replacing the time-honored emphasis upon productivity, efficiency, and profits with that of maximizing the experience of all people involved. Clerks and laborers, lower, middle, and upper management, sales and delivery people, and, of course, customers and clients. In the field of healthcare where I have been working, this point of view is surprisingly revolutionary.

When design thinking is applied to a wide, diverse set of activities, ranging from the structure of a city, to the design of healthcare, transportation, or educational systems, what is the role of the traditional craft training?

Design Education

Do current modes of education work for the future of design?

Consider the complex issues of healthcare, for example, structuring the procedural operations of a clinic so as to enhance the productivity while optimizing the experience of all people involved: Patients and their families, physicians of many specialties, nurses of various categories, technical and administrative staff. Do the traditional design courses help? The closest would be courses in service design, but traditional service design treats much simpler problems than those of complex systems such as healthcare.

All the countries of the world are facing crises in their healthcare, education, and transportation systems. Moreover, there are energy and conservation issues, the treatment of refugees, the design of security systems that allow for rigorous screening without being oppressive and degrading to all those involved, including the screeners and the people being screened. The environment is a critical issue, as is design for the impact of global change, despite the reluctance of many countries, politicians, and businesspeople to acknowledge the magnitude of the issues.

Design educators that continue to conform to the traditional skills and crafts can

be proud of their accomplishments, proud of the fine craftspeople they continue to produce. The world will always need these skills, so these schools will continue to be proud of the accomplishment of their graduates. But they will represent the past.

To transform itself to be a leader for future designers, educators must encourage students to explore and learn more of technology, social sciences, and the complexities of the world, of economic, political and environmental issues. The next several decades will see growing transformation of design to a field that promises a new mode of thinking, a human-centered approach to the solution of complex problems, an approach that moves us from the tyranny of technology to the empowerment of people. Human-centered design of the future puts people first in addressing the major problems of society.

Modern design differs from most disciplines in academia by being a field of makers and doers rather than of analysts. Designers are practitioners. This makes design unique within the university, for it builds upon all the knowledge of all the specialized fields within the university to construct, develop, build, and shape the world. It combines technology with human endeavors. As a field of practice, doing, and making, design must work within the structures, rules, regulations, laws, and customs of the real world of politics and business. Design is the practical application of the knowledge from the entire university.

Design today is much more than a craft, with technically trained people producing beautiful objects. This form of design plays an essential part in our lives, producing wonderful, emotionally satisfying products for even our most basic everyday lives. We do not want to lose this component of design. But design can be much more than the construction of pleasurable objects. Design can be the foundation for the entire university, teaching system thinking, bridging across all the specialized departments of a modern university.

The Fork in the Road: Design as Craft or Design as a Way of Thinking?

The move from craft-based to evidence-based design, from simple objects to complex sociotechnical systems, and from craftspeople to design thinkers suggest that we are now faced with a fork in the road with two different possible futures for design:

1. A craft and practice;

2. A mode of thinking.

It is as if we are traveling along a road when we come to a fork with two possible routes forward. One, the traditional role of design as a craft, creates beauty and pleasure in our lives, using the ever increasing powers of technology to create wonderful experiences. The other, that of design thinking, becomes a method of thought and discovery, approaching the major issues of the world with new eyes, addressing the fundamental root causes, not the symptoms, but always with primary focus and attention to the people: human-centered design. No more should the focus be on economic productivity, on monetary measures. Instead, the new design philosophy with its focus upon people puts the long-term health and happiness of people as the major item of concern, which also means addressing the major issues of our time: health, famine, environment, inequity, and education.

Which fork will design take? What is the proper path for design? Yogi Berra, the great American baseball player provides the answer. His advice to this dilemma is simple: *"When you come to a fork in the road, take it!"*

Yogi Berra was giving instructions to his home, located in the countryside. There was a fork in the path toward his home, but in fact, either choice would lead to the destination. Hence, "when you come to a fork, take it." In the case of design, the choice of direction at the fork leads to somewhat different outcomes. Nonetheless, I still believe that the correct answer is to say: "take it." We need people who take each path, but for any individual, Whichever direction is taken will be correct.

Two Futures for Design

The fork in the road does not have to be a choice between two options: this is an opportunity to pursue both. Design as a craft has a long history of providing great value to humankind. Design thinking is as yet unproven, but it has the potential to provide a different kind of value to the world. Both are essential, so let us take

the fork in both directions. As Yogi Berra advised: A fork? Take it.

Design as a Craft in a World of New Tools, Materials, and Manufacturing Methods

The path toward design as a craft is already well explored. Design schools across the world have developed studio classes, workshops, and ways of mentoring that produce brilliant results.

But the future of the craft of a craft has many new areas to be explored and developed. There will be new forms of manufacturing, new materials, new types of companies and communities. All sorts of new opportunities for design will appear, some exotic forms of interaction, some brand new forms of experience, and some a rethinking of existing activities and services.

With the powerful drawing and tools for fabrication, many self-trained people will start designing. This provides an opportunity to teach workshops, to mentor, and to be ready to take over when professional help is needed. Commercial projects will always need skilled designers, but with the emergence of a maker's society, where many untrained people design things for their own use, I can imagine a thriving network of designers who offer assistance. Much as interior designers help people furnish their homes, sometimes offering advice, sometimes taking on the entire job, designers will also find new opportunities to practice their craft in new ways.

Note that the traditional style of education now practiced in colleges and universities across the world is undergoing revision. Education is transforming from an intensive, full-time, multi-year experience into a set of smaller offerings of individual courses and workshops that can be taken any time during a person's lifetime. Life-long learning is now possible through the emergence of on-line courses and, for the design community, the emergence of makers' communities, where the modern tools of design and fabrication are available for all, with a wide variety of educational workshops, tutorials, and mentoring. Designers can provide lectures, workshops, and coaching sessions. Formal grades and degrees are no longer necessary. Some courses and workshops will have certificates, but these are not always needed. People will take them to learn.

These courses and workshops offer a good opportunity for designers to demonstrate their professional skills and abilities, which will invariably give rise to a demand for more services, for full-time work on all sorts of projects, some small, some large. What better way to find new clients than to demonstrate the

style of work through workshops? Workshops and certificate courses are not just for the amateurs in marker's communities: they will be in demand inside the company as well as a fundamental part of corporate education.

Design as a Way of Thinking

The path of design as a method of thought is less developed. It is being taught in only a few places, each of which struggles to determine how best to do it. It is probably most successful in schools of management, where numerous senior designers now teach. Why has it found a home here? Because people in management already struggle with the problems of the world, so for them, design thinking offers a powerful new tool. But design thinking deserves a different home, one divorced from the primary economic emphasis of today's schools of management and business.

Design thinkers can move upward within organizations helping form company strategy and helping select new directions of effort. Designers as thinkers can start playing senior roles in management, far beyond what designers as craftspeople can do.

Design as Both Craft and a Way of Thinking

As the future of design unfolds, as both forks in the road are explored, it may not be necessary to choose one or the other. Many people already are comfortable in both roles. After all, many of today's most prominent design thinkers started off as professionally trained craftspeople.

Some may prefer the craft route, some may prefer the design-thinking route. And many will go back and forth, sometimes taking on one role, sometimes taking the other, but also developing a role that merges both approaches.

Designers are action-oriented. Today's world of academia produces deep, thoughtful thinkers. Today's world of design producer deep, thoughtful doers. We need both thinkers and doers, but just as we must take both paths from the fork, designers do both doing and thinking: the design philosophy is to think by doing. Designers do their research by designing. Instead of long periods of deep analysis, thought and planning, designers move rapidly to experimentation, to construction of artifacts or new procedures which they use to probe the world relevant to the issue at hand, using the responses as evidence on how to proceed. Instead of deep, abstract thought, it is deep embodied thought, embodied in action, in physical structure, and informed not by abstract principles but by the real evidence of the responses to the probe.

External representation has long been a powerful tool to thought. Notational systems have allowed great advances in thinking, starting with the written word, continuing through notations for mathematics, chemistry, physics, music, dance, and engineering.

Designers too use external representations to aid in their thinking, but their representations are more concrete than abstract. Designers think by drawing, using the spatial layout of the drawing to enhance their ideas. Designers also build and construct, the better to visualize and develop ideas. These methods derive from the craft part of design, but they are common to many fields that have evolved from crafts, such as architecture, construction diagrams, electronic circuit design, and dance. Learn and think by drawing and doing.

These core principles underlie the power of all design, whether it is design as a craft or design as a way of thinking. It is appropriate to all the multiple sub-disciplines of design as well.

When you come to a fork in the road, take it.

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