



Designing

AN INTRODUCTION

KARL ASPELUND

B L O O M S B U R Y

DESIGNING:
AN INTRODUCTION





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Julia, Karl, Colin, and Brenda.

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PREFACE

D*esigning in the early 21st century* inhabits a vast terrain. We live in a world of design, by design: interiors, fashionable apparel, accessories, architecture, computers, Web-based applications, and on and on. This book is an introduction to the concepts, history, methods, and practices required for a working knowledge of the profession of design. It allows the student and teacher to explore and examine the basic structures involved before branching out into designing or working with designers in any of the numerous fields available. The discussion is wide-ranging, touching on large and small, industrial and artisanal, high-tech, virtual, luxe, and mundane. Functionality and problem solving are highlighted, as well as showing design in an artistic light. All the chapters reflect a view of design and designing as seen in the present day of global markets and instant communications. As a result *four-dimensional design* and experience as a design element are added to the discussion and highlighted. Observing the practice as a whole is also emphasized, as is creating an awareness of designed objects in the students' everyday environment.

ORGANIZATION OF THE TEXT

The content of this book is modular, with well-contained chapters and sections. This should allow for efficient course planning for instructors as well as nonlinear use of sections for reference by students in workshops and seminars. By addressing both functional and aesthetic needs over a broad range of applications, the book encourages the student's perception of design to develop in both two and three dimensions. The first section introduces the profession of design, its nature and history, and the elements and principles of design. The second tackles the problems of planning and presentation. The third section then considers the different approach and stance in designing for two, three, and four dimensions by considering user interface, environments, and experiences over time.

PART 1: THE NATURE, ELEMENTS, AND PRINCIPLES OF DESIGN

The first section introduces the current profession of design as it evolved in the industrialized world. Designing is defined as a practice, its history

presented, and the elements and principles of design introduced. Chapter 1 provides a description of the nature of the designer and of designing: What does it mean to *design* something, and what are the basic steps of the process? After demonstrating the nature of design and designing, by showing it in various guises, the chapter ends with a step-by-step description of what a designer *does*, in practice, during the span of one project. Then the chapter closes with a discussion and demonstration of how constraints and needs define a design solution.

Chapter 2 anchors the present day in history, by examining the most impactful design movements of the 19th and early 20th centuries. Their theories, methods, influence, and ultimate fading are discussed, leading to practical discussions and definitions of the Modernist movement and designing in the Postmodern condition of the late 20th century.

Chapter 3 is a heavily illustrated demonstration and discussion of the basic elements of design. They are defined as the classic group of line, shape, color, texture and pattern, and space, but time is also presented as an element in order to involve the user experience at the beginning stage of conceptual thinking.

A demonstration and discussion, also heavily illustrated, of the basic principles of design follows in Chapter 4. As with the elements of design, these are defined by the classic headings. Following the inclusion of time as an element, *usability* is included as a principle to further discuss the user experience and bring home the concerns of present-day markets and technology.

PART 2: INFORMING DESIGN

The second section presents the practical aspects of conceptualizing, researching, planning, and presenting designs. With many illustrations, the two chapters are intended as a guide and reference for novice designers that show the very practical and multifaceted nature of the designer's profession. Chapter 5 focuses on how an idea may become a fleshed-out and clearly defined concept. The chapter takes a very practical slant, showing the designer's concerns from finding and identifying the idea to expanding it, relating it to the world around, and considering the constraints of time and production. Chapter 6, on the other hand, considers the techniques, modes, and methods of creating and presenting designs to an audience of either collaborators or clients. Different media is discussed, as well as different situations, and the chapter wraps up by considering the designer's dual role as a performer and salesperson when presenting.

PART 3: THINKING DESIGN

The third section is devoted to the methods and practices of professional designers. The four chapters it contains identify and discuss the modes of thinking involved for two-, three-, and four-dimensional design, as well as designing for onscreen applications. This is approached in each case from the practical considerations involved in materials, ergonomics and user experience.

Chapter 7 is a discussion of the nature of graphic design and its relationship to fine art composition. The mechanics, elements, and inherent meaning of graphic design elements are also discussed from a very practical standpoint. In Chapter 8 the nature of three dimensions as a design challenge is discussed, followed by a presentation of the application of three dimensions in design and the need to understand 3D as a physical sensory experience. Time and experience arrive in Chapter 9, where design as an element of culture is considered through such issues as human perception and memory, among other things. The chapter also introduces experience over time as a design problem, by contemplating practical aspects of time and perception relating to usability and user satisfaction. Concluding the section, graphic design, three-dimensionality, and four-dimensional design then come together in Chapter 10, which considers designing for on-screen applications.

TEXT FEATURES

Designing: An Introduction is heavily illustrated with more than 250 images providing constant visual inspiration to the reader. Numerous sidebars and end-of-chapter review questions, exercises, and assignments should prompt in-class discussion and allow the forming of research projects, both in and in-between classes.

DISCUSSION AND REVIEW QUESTIONS AND EXERCISES AND ASSIGNMENTS

The chapters conclude with discussion and review questions and activities and exercises, which reinforce the instructional material and key concepts. The discussion questions encourage engaging with design problems and prompt discussion.

SIDEBARS

Each chapter includes several sidebars. A quotation or two from a designer has been chosen to illuminate the matter under discussion in each chapter. Considering these should prompt thought and discussion and can be the basis for a home assignment or *thought experiment*. Networking sidebars provide information on websites to peruse for further information on the chapter material. The websites were chosen for a high likelihood of permanence, but relevant keywords are also provided to use in search engines. Ergonomics sidebars use that term in the widest sense by relating the design issues of each chapter to human constraints and needs. This can prompt thoughts and discussions on the user experience and four-dimensional design in each case. Timeline sidebars highlight historical moments relevant to the discussion of the chapter to encourage thinking about continuity and connectivity with culture and history. Finally, Sustainability sidebars highlight an example or case study related to the chapter material and a related quotation from literature or periodicals.

ACKNOWLEDGMENTS

T*his book is*, despite the solo-author name on the cover, a group effort. It would never have happened without the students, colleagues, clients, collaborators, and family that assisted, inspired, and provided for the material herein over many past years. I am indebted to them all, named and unnamed, near and far, in space and time.

My Department Heads and Deans of the Textiles, Fashion Merchandising and Design Department at URI's College of Human Science and Services deserve many thanks for their willingness to hand me the reins and develop courses and curricula from which this book grew. Thanks to Dr. Linda Welters, Dr. Martin Bide, Dean Lori E. Ciccomascolo and her predecessor, Dean Lynn McKinney. Thanks to the hundreds of students whom I have enjoyed meeting in TMD327 and TMD126 for their patience and willingness to experiment and contribute. I am also grateful for the constructive criticism of proposal and manuscript and reviewers: Rose Castlerline, Valencia College; Dawn Sealy, Art Institute of Jacksonville and Daytona Beach Community College; Cecilia Mandrile, University of New Haven; Jeff Boshart, Eastern Illinois University; Michael Kroeger, College of Mount St. Joseph; Barbara Arlen, the Fashion Institute of Technology; Barry Underhill, Art Institute of Austin; Linda Johnson, Florida Atlantic University; Diane Sparks, Colorado State University; Christine David, The Art Institute of Fort Lauderdale; Beverly Kissinger, University of Alabama; Richard Withem, The Art Institute of Charlotte; Joey Manson, Clemson University; Diane Zatz, The Art Institute of Philadelphia; Norton Young, The Art Institute of Portland; Linda W. Wood, The Art Institute of Atlanta; Tamara Peterson, Columbus College of Art and Design; Andrew Furman, Ryerson University; Joseph Cory, Judson University; James Housefield, UC Davis; and, Janet Hethorn, University of Delaware.

This would have been a far rougher journey without my wonderful editor, Julie Vitale, whose cheer, patience and guidance have sustained the project through both rocky terrain and smooth sailing (and an actual hurricane or two.) This is mirrored in the entire team at Fairchild/Bloomsbury, who have been as fun to work with and as magnificent as ever, they include Priscilla McGeehon, publisher; Olga Kontzias, former executive

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PART I

THE NATURE, ELEMENTS, AND PRINCIPLES OF DESIGN

Part I introduces the profession of design as it evolved in the industrialized world. Designing is defined as a practice, its history presented, and the elements and principles of design introduced. Chapter 1 considers the nature of design in modern industrialized society, what it is, what the process is, and how to approach it. Chapter 2 gives a brief historical overview of the modern movements that led to our current condition in design. Chapter 3 takes a look at the basic elements of design and explains their use and how they connect, adding *time* to the traditional list. Chapter 4 subsequently explains the principles within which these elements are applied and further develops the addition of time by considering the user experience.

OPPOSITE
Wallpaper design from 1885 by William
Morris. The debt owed by Mucha and
others to the romantic nostalgia of the
Arts and Crafts Movement is clear:
The floral swirls and asymmetries,
contrasting colors and vivid patterns
all continue.

DESIGNERS SPEAK

“People think it’s this veneer—that the designers are handed this box and told, ‘Make it look good!’ That’s not what we think design is. It’s not just what it looks like and feels like. Design is how it works.”

—STEVE JOBS, quoted in Rob Walker, “The Guts of a New Machine,”
New York Times Magazine, November 30, 2003.

“It’s important not to overstate the benefits of ideas. Quite frankly, I know it’s kind of a romantic notion that you’re just going to have this one brilliant idea and then everything is going to be great. But the fact is that coming up with an idea is the least important part of creating something great. It has to be the right idea and have good taste, but the execution and delivery are what’s key.”

—SERGEY BRIN, quoted in Jemima Kiss, “Secrets of a Nimble Giant,”
The Guardian, June 17, 2009.

OBJECTIVES

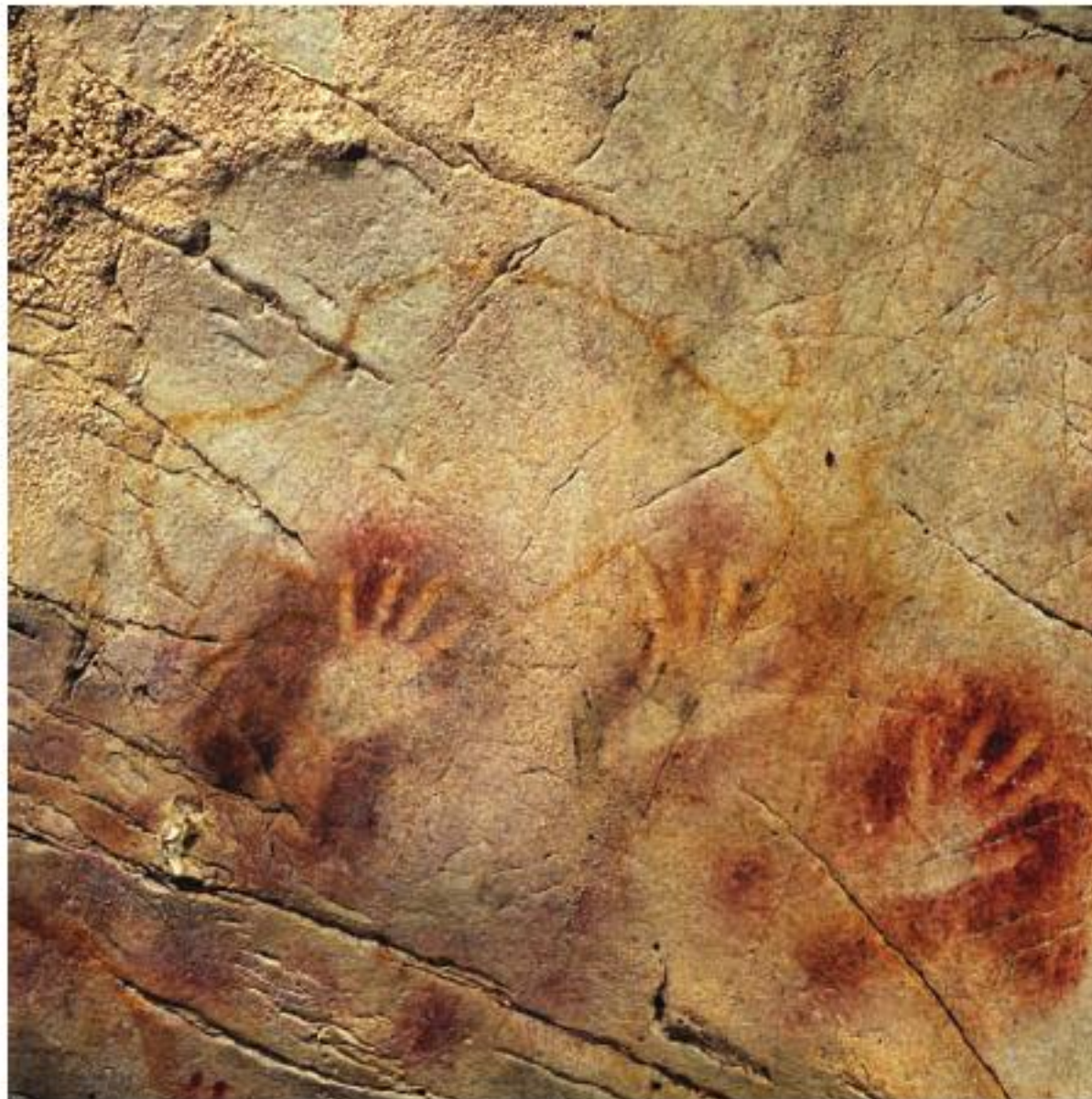
- Identify the place of designing in human society.
- Recognize the significance of designing as a basic human activity.
- Identify the stages of the process that designers work within.
- Understand the distinct demands of each stage of the design process.
- Detect the importance of defining the constraints and needs involved in a design project.

Designing is a basic component of human experience and culture through history that has become a globalized profession dedicated to the needs defined by modern, urban, industrialized society. It has a process involving several stages, and bringing an idea from the world of imagination to the world of objects requires touching on each of these stages with an awareness of the needs and constraints involved and a well-defined goal in sight. The designer’s job is to guide the project throughout the entire journey, creating a new product or system that fulfills all the apparent needs within the given constraints.

THE DESIGNED WORLD: WHERE IS DESIGN?

1.1 The oldest cave art yet dated is estimated to be around 40,000 years old. Located in the El Castillo cave in northern Spain, it places art and design at the very beginnings of human culture (if not even earlier). The act of deliberately decorating or symbolically marking the environment shows a culture operating by design.

Source: Pedro Saura/dapd



Humans are a designing species. If the basic definition of **human culture** may be said to be the things we do and the things we do them with over time, then practice of designing lies at the core of our nature and has been essential to human culture from its very beginnings. We have designed ourselves and our societies into various shapes and cultures by continually reshaping ourselves by the careful construction of apparel, tools, environments, habitats, and systems. The creating of an object with form that is more elaborate or beyond the needs of the basic function (e.g., carefully shaping a stone axe, beyond just making it sharp) is often considered a criterion of the “modern human.” The ability to combine symbolic thinking with the utilitarian has been interpreted as a criterion of distinctly human “culture.”¹

We may not be the only species that creates habitats and uses tools, but we may be the only one that decorates them. The tradition of decorating caves with symbols and images, for example, extends back at least 40,000 years, with the clear use of stencils to create “cave art” arriving on the scene at least 37,000 years ago (Fig. 1.1).² However, the creation of tools and even “jewelry” of some kind, with imposed (and therefore designed) forms appears even earlier, at least on the cusp of Neanderthal and *Homo sapiens* cultures 50,000 to 60,000 years ago. This inclination may well have also been a trait of Neanderthal and other early-hominid species predating the biologically “modern” human, *Homo sapiens*, by tens of thousands of years. The ability to design a better way of getting by would likely have been a deeply rooted and early addition to the traits that eventually became common human behavior. Whether carried out of Africa and adopted by Neanderthals or developing independently in several places and species at once, something sparked this “designing” mode 50,000 to 60,000 years ago. Therefore, at some particular point in the evolution of the species, a shift occurred and the species was headed for organized culture. We, as a species, have since deliberately, repeatedly, and systematically modified our surroundings and equipment to shape our own behavior.

By the Late Stone Age (50,000 years ago), the pace of innovation and the general skill level had both increased. The level of craft knowledge had also improved dramatically, and different groups of early humans formed their own cultural identity and developed their distinct ways of making things. The designing of better and better tools, over thousands of years, allowed for the development of human environments and more efficient habits. Habitats became villages and towns that then grew into cities, and these increasingly needed planning. The structures these imposed, in turn, led to societies that demanded services and industries and required distinction among groups and classes.

Eventually, **mass production**, the standardization of the production goods in large quantities, replaced hand-craft practices, and the design of more efficient technology both led and followed in a wave of **industrialization** among the colonial powers, when machine technology

BOX 1.1
SPEAKING OF
DESIGNING . . .

HOW TO SPEAK OF “DESIGNING”? The objective of this book is to provide a broad introduction to it, and this first chapter begins appropriately by addressing the question, “what *is* designing?” The beginning of the answer lies in the wording of the question itself. The choice of the word “designing” as opposed to “design” is deliberate and significant. We will be looking at what a designer *does*, at the actions and events involved, rather than the resulting products. “A design” is a *result*, and “the design of . . .” is the style, feel, or system arrived at by the “designing” involved.

To clarify, designing is about working with ideas: finding, examining, planning, defining, and explaining ideas. These are ideas about the creation of things, environments, systems, or even events. Designing is solving problems that we perceive in our environments and existence—problems of comfort, practicality, and aesthetics; problems of individual and collective behavior—as well as the definitions and methods involved in the solving of these problems. The world is not as we would have it, and so we will fix it. We have a vision to fulfill, or we need a solution to a particular problem, or a need must be fulfilled.

Designing is the actions within a *process* that produces a formalized system. The system thus created is the solution to a problem. The design that fulfills the need. The system can be any combination of materials, techniques, and orderings of operations that creates a solution. In this sense, a shirt is a system, and so is a car, a chair, a neighborhood development, the “look” of a rock concert, a book cover, and a travel mug.

Referring in this way to “designing” (the doing) rather than “design” (that which has been done, or the style, form, or mode resulting) reminds us that we are looking at a thoroughly integrated human *action* that, in being constantly active, transcends human eras, artistic movements and political philosophies. Introducing designing involves the analysis of *processes* of thought and action, as well as the *elements* and *principles* involved in those thoughts and actions. Understanding the *historical and cultural structures* that have prompted—and been created by—this systematic manipulation of human experiences and existence is also necessary, as it shows *how* designing is a constant feature of human society and possibly even *why*. With the *how* and the *why* clarified, an understanding of *what* should follow close behind.

expanded the production capabilities in a number of industries and economic sectors. Better looms, for example, led to large-scale textile production, factories increased output of all goods, better roads led to faster transportation, and better vehicles accelerated the movement of goods, people, and ideas. All this led to increased commerce at every step along the way (Fig. 1.2). The oversight and planning required gradually resulted in a profusion of designers in an enormous variety of fields. Their work subsequently became a social and political force in modern society. Design became a function of civic life in high-fashion and social events as well as in the myriad objects required for the new standards of living among the moneyed classes in the growing



ABOVE LEFT
 1.2 From The Great Exhibition of 1851 in London. As the commercial industrialized society became the reigning system and political expediency began to revolve around imports, exports, production, and consumption, the problems facing manufacturing became greater and greater. The *designer* as a profession was established in service to the marketplace. New products needed to be brought to market in order to produce demand and keep the wheels of commerce going (literally keeping the factories in motion).

Source: The Granger Collection, NYC- All rights reserved

ABOVE RIGHT
 1.3 The Avenue de l'Opera in Paris, France, 1900. In the mid-1800s during the height of the reign of Napoleon III, Baron Haussmann redesigned the center of Paris, creating large, wide boulevards and uniform streetscapes. These reflected the needs of the new modern society, but also the political necessities of a regime that needed to display its power and maintain control over its cities. City planning and design began to reflect the desire for order and regimentation of industrial society.

Source: Courtesy of Claudio De Grano collection

cities. Furniture and flatware, carpets and wall hangings, clothing and accessories, gardens and carriages—all needed to be produced in styles demanded by status and fashionable display. (See Box 1.1.)

From its contribution to official architecture and city planning, design was also very soon a force in the service of prevailing powers and dominant groups. The idea that a society could be designed into a shape desired by the ruling class is seen in the application of design to the shape and size of city streets, government buildings, places of worship, and communal housing (Fig. 1.3). It also has been effectively applied in the field of fashionable apparel, especially in the creation of codes of socially acceptable and non-acceptable fashions (Fig. 1.4). The message “this is who we are” is encoded in the environment, showing ourselves how *we* live. The code embedded in the buildings, furniture, clothing and goods is there to be read to determine who belongs within and who is outside the circle of society. This allows the ruling classes to include and exclude members by simply switching the rules at will. The development of design as a profession in Europe in the 19th century has its roots in empire building and colonial

BELOW

1.4 From *The Ladies Gazette of Fashion* 1860. The mid-1800s saw an explosion in the capabilities for production of fashionable apparel. Social acceptance and the signaling of social position began to require the wearing of the “correct” and acceptable designs. The designing of high fashions therefore both reflected and directed the social order.

Source: New York Public Library Picture Collection/Digital Gallery



TIMELINE

Each chapter contains a sidebar labeled “Timeline” addressing matters relevant to the chapter’s material from a historical perspective. It may be an actual timeline with dates and events, or it may contain a historical discussion. Despite the forward-looking and often fashion-oriented aspects of the designer’s profession, a connection to—and awareness of—history and tradition is an absolutely vital part of a designer’s toolkit.

They may address a trend or fashion-oriented concern, or they may explore a question of tradition, methods, and knowledge of paths taken in the past. Knowing how one connects to the world and the past can be a very powerful inspiration and a motivation to move forward with one’s own work.

Use these timelines as prompts to investigate the history and traditions involved in your interests in design, whatever they may be. As you will see in Chapter 2, the story of design is deep and multilayered.



1.5 *The Arnolfini Portrait*, 1434, by Jan van Eyck. We define and present ourselves as individuals, societies, and cultures by the objects and surroundings we design, own, and inhabit. Even in the earliest portraits of the new urban upper class, such as this one, we see the display of material goods as a way of defining status and identity. All the items surrounding the couple—their clothes, bedding, and even the dog and pieces of fruit—are items of value that show them to be people of significant means.

Source: Jan van Eyck: *The Arnolfini Portrait* (1434)

domination. The representation of power and display of wealth was fueled by conquest, and the wealth and valuable materials taken from the conquered colonies flooded the economic systems of Europe with ostentatious materials and designed goods. In a society of spectacle, where appearance is everything, the class with the money and means of production can encode its message in buildings, clothing, and goods, and then manipulate, edit, and tailor the result as long as it remains in control of the way the designs are created.

Designing is, however, about much more than creating products on shelves—it is also the forming of the shelves themselves, the building the shelves are in, the lighting in the building, the building’s layout and surroundings, the layout of the streets and neighborhoods, and the theories and practices involved in city planning. Design can encompass the systems of factories that create the products, the transportation methods of getting the products to the shelves, and the advertisements and the layout of the pages the ads are on. It also encompasses the machines in factories; cars, highways, and bridges; ships; aircraft; satellites and navigation systems; and on and on. Human culture is defined not only by the things around us, but how those things are used over time and to what end. In fact, the act and art of designing is so completely entwined with human experience it is fair to say that if we are defined by what we do and how we do it, for a large part of humanity the sum of our designing *is* the world in which we live (Fig. 1.5).

THE PROCESS: WHAT DOES A DESIGNER DO?

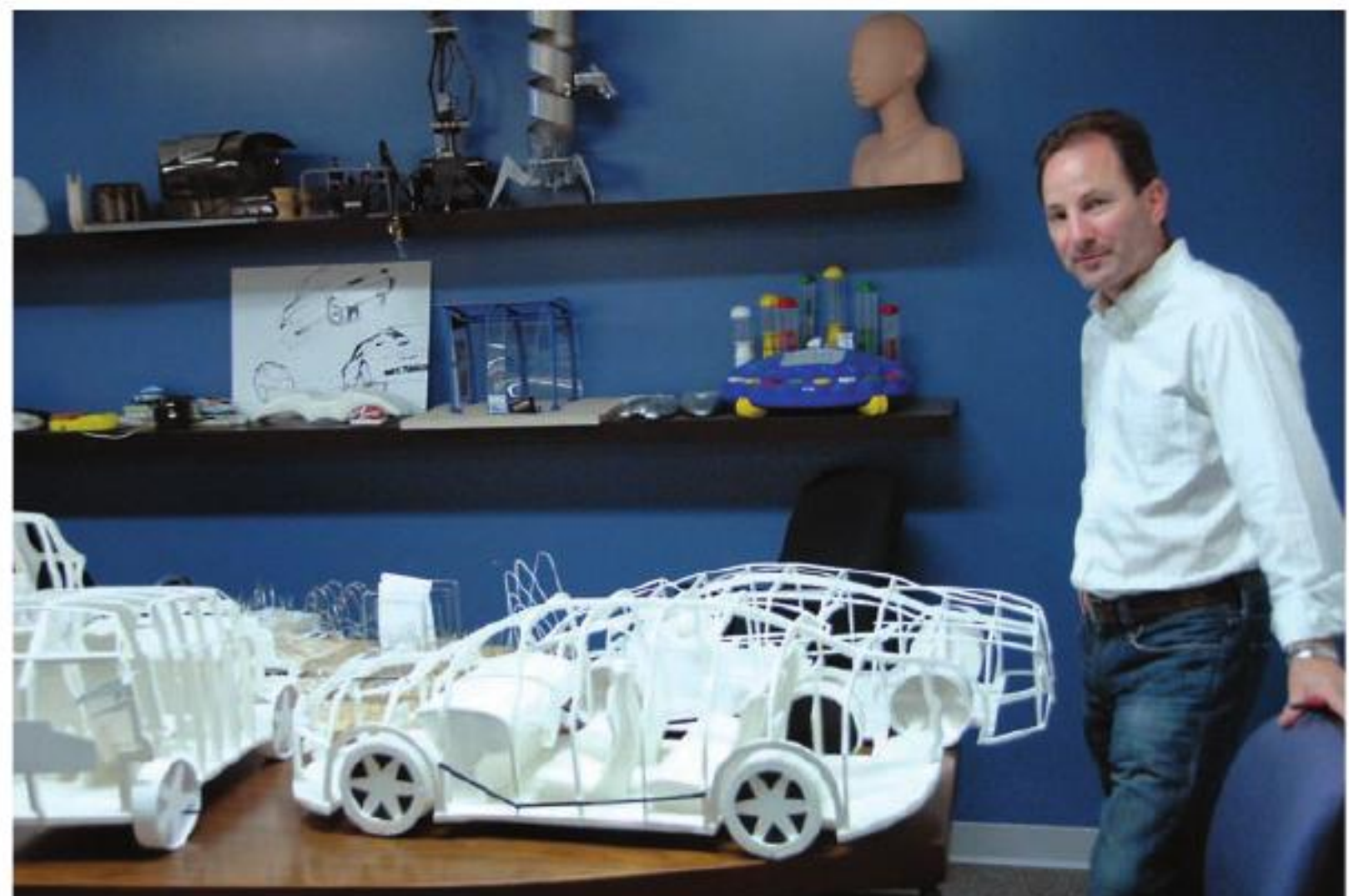
1.6 A designer of high-fashion dresses and a designer of cars may, for example, be dealing with many of the same elements and principles, but the techniques, needs, and constraints of different disciplines of design also vary wildly. Both designers consider shape, volume, materials, colors, and so on, but the construction methods, industry standards, and collaborative methods are vastly different, to name but a few.

Sources: L: Courtesy of WWD;
R: Photo by Clover Sterling; ©2010
Humber ITAL

Designers are as different as their jobs are many, and there is no standard environment in which they may be found. A designer has a command of the technical as well as the sensual and emotional. A designer knows enough about materials and techniques to recognize what is needed and how to head toward the correct solution. A designer has enough knowledge of the history and tradition of the field to know how to follow rules—and how to break them. Finally, a designer has an unending interest in the field but also develops trains of thought that allow the field to expand and be altered.

In general, the job description of a designer is pretty straightforward: Create a concept, specifications, and plan of production for a new product, within a budget, before a deadline. But depending on the product involved, once the day-to-day operations begin, one designer's job may be wildly different from another. A designer of clothing, for example, and a designer of cars are dealing with extremely different sets of materials, methods, engineering, and client needs. Designers must be trained in the various technical abilities specific to their discipline. A good designer of clothing may not necessarily be a good designer of furniture or cars; the knowledge of techniques, needs, and constraints of the product is too variable. Yet the basic principles and elements are the same, the traditional tools of sketching and illustration are the same, they may use some of the same software, and their vocabulary and sources of inspiration can overlap. For example, many of the concerns of design have to deal with size, shape, and tolerances of the human body, but how designers can and must incorporate these into their designs is very different (Fig. 1.6). Designers can be working on technical aspects of a project, considering structures or diagrammatic solutions, or they can be working on entirely conceptual or decorative aspects. Each of these aspects is a function of the design problem involved: Fulfill the needs of the project as defined by the prospective client (or whoever has requested the design). The project then has to be completed inside the time frame allotted, within the given budget, and in accordance with the manufacturing parameters.

With so much variation in scope and style, one would think a definition of the designer's role would be tricky, but in fact it is fairly easy to frame: The designer's main





1.7 Designing is about improving a current situation or developing something new and useful, sometimes focusing on beauty, sometimes on function, sometimes both. Sometimes function is beauty, and sometimes the beauty is the function. The room, the furnishings, the products, the lighting are all designed for a need.

Source: Courtesy of Kyle Ericksen/WWD

objective is to make sure everyone involved in the production of the design has the practical, aesthetic, and technical information they need. The designer places this information in context and solves any problems that may appear to stand in the way of a solution to the design problem. The designer is also an *intermediary* between the client and the production side, and then between both of these and the marketing group. Finally, the designer also can be seen as the most familiar avatar of the profession—an *illustrator* that provides information by creating images of the final design.

The process of designing can vary depending on the intention of the design. Sometimes design is concerned with developing something new and useful—sometimes focusing on beauty, sometimes on function, and sometimes on both (Fig. 1.7). At times function *is* beauty, and at other times the beauty is the function. In addition, design often involves rethinking the nature of our interaction with everyday objects and environments.

So, what are the basic steps of the process? If designing is what is done “by design,” what *is* that precisely? An introduction to the nature of design and designing must show it in its various guises, along with a step-by-step description of what a designer actually *does* in practice. This requires a discussion and demonstration of how constraints and needs define a design solution, as most of the time a designer is making choices and decisions based on predefined parameters of a specific problem. In such cases, designing quickly encompasses more than the basic elements of the product involved; it comprises knowledge, technology, aesthetics, methods, budgets, time, and capabilities applied in a process containing a series of stages: inspiration, identification, conceptualization, exploration, definition, communication, and production.

INSPIRATION

The first stage, **inspiration**, the infusion of creative energy, might be the most difficult to pin down, but understanding its importance is vital to the successful completion of a project. The first step in any creative project should be the inspiration of the

SUSTAINABILITY

The problems of sustaining human culture and “life as we know it” are bound up with the problems of sustaining our methods of production, manufacturing, commerce, and use of goods. It is fairly clear to most people that current practices are headed toward a crisis in the near future as the number of humans on the planet demanding resources for a industrialized middle-class lifestyle increases exponentially. Each chapter in this book also contains a sidebar, highlighting (all too briefly) issues relating to sustainable practices that can be considered in parallel with one or more of the chapter’s topics. This reflects the view that designers in today’s globalized

economy hold a great deal of power over the environmental impact of the life cycle of the goods we use. Designers can influence the choice and amount of materials, production methods, style, durability, and recyclability of the product. Designers are also the link in the production chain that probably has a dialogue with most other links—suppliers, manufacturers, retailers, and clients, to name a few. Consider this your responsibility if you are involved with design: You can make a difference to the health and well-being of future generations by basing choices on the environmental impact of your work.

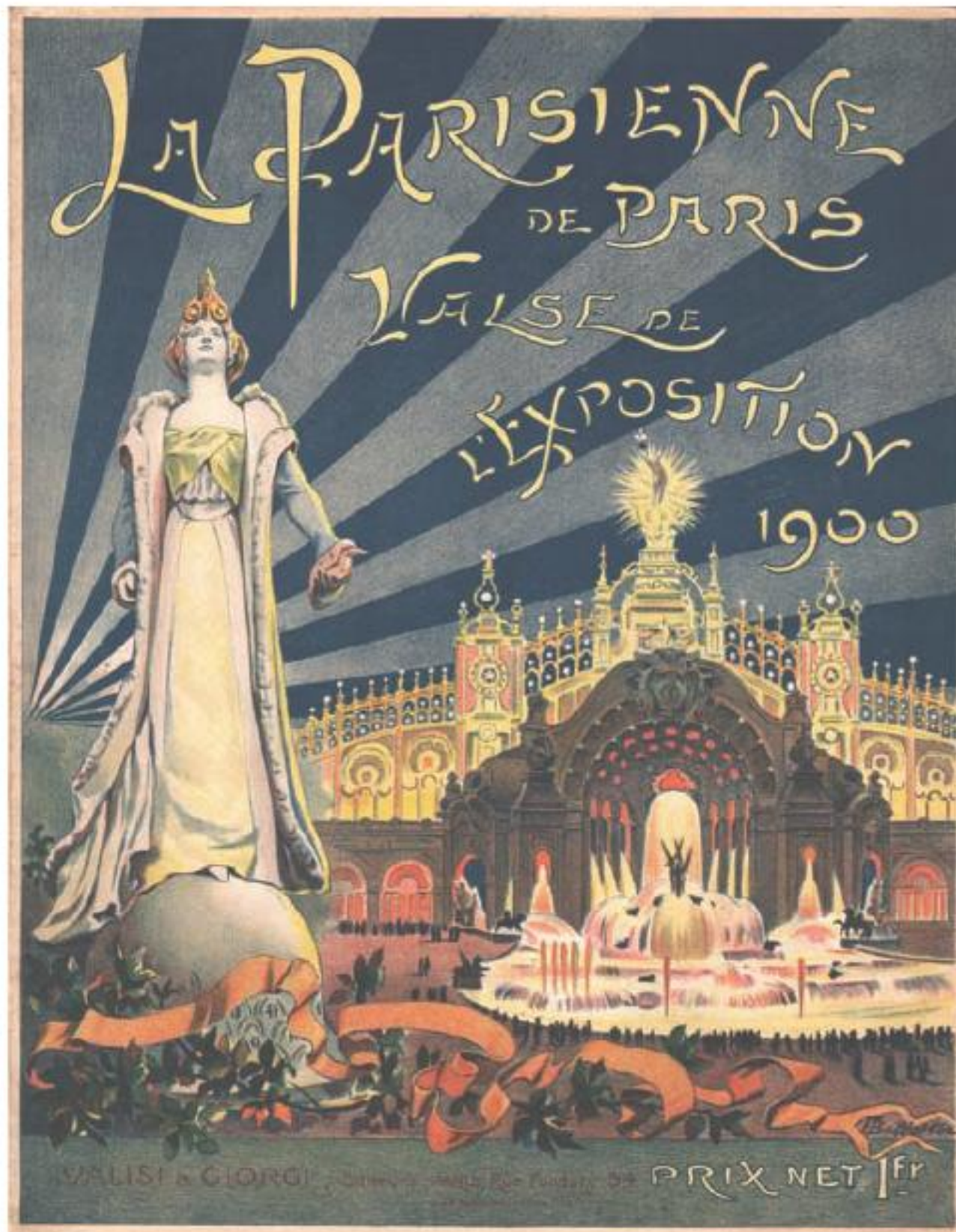
participants. Inspiration is the fuel that keeps the designers and collaborators engaged and willing to work on the project, even when the going is rough. It is what drives the creative person to take on a project even when the next steps are completely hidden from view.

The designer’s initial task is to consider what might inspire engagement with the project. Is there an aesthetic excitement? A personal goal? The thrill of achieving something no one has before? The satisfaction of creating something that meets a need in a way that is wholly new? Perhaps the inspiration is simply the thought of creating a moneymaker for the company, or perhaps it is the lift to the morale of the team by including them in a project’s success. The project might have gains that are their own end, in that they lead toward a larger goal, and solving one objective might bring the next one closer.

So, what can inspire a designer? Answering the question by saying “anything at all” is actually accurate but ultimately unhelpful. We must look closer. Inspiration for a design project can come from a creative side; it can be technical, emotional, or situational. Technical inspiration might, for example, be stirred by the designer being intrigued by a material or a method and how it will be used to solve a design problem. For example, creating a pattern for a fabric might be inspired simply by the mechanics of making a certain rhythm work within a set of shapes and colors. A solution to a technical problem of how to build something more efficiently may contain its own reward, and the inspiration comes from the satisfaction of a puzzle solved.

But inspiration may be a purely emotional drive involving the desire to see something come to fruition—that is, having an initial vision of how things should be in the design of an environment or in the appearance of an object and then making that a reality. Nostalgia and the emotionality of revisiting familiar ground and reliving the past through one’s own creativity might play a part. All of this is part of the human experience. Emotions *do* count and are not trivial or indulgent.

The modernist technical view of design and architecture that defined the profession in the late 19th and early 20th centuries tended to sideline the emotional side of creativity. After the emotionality of the romantic movement of the early 19th century, the



1.8 As the 20th century arrived, modern style rid itself of the romanticism of the 19th century, as seen in these two posters, both typical of their time. The soft curvature of Art Nouveau style on the left has become the high modernist angularity on the right. (The flowing style of Art Nouveau would return in the 1960s when “flower power” tempered the edges of modernism.) (Posters left to right: 1900—Sheet music cover, *La Parisienne De Paris [Valse De L'exposition 1900]*; 1922: Chrysler ad, part of a European series.

Sources: L: Courtesy of <http://exposition-universelle-paris-1900.com/>; and R: © Lordprice Collection/Alamy

technical masculine-oriented society that was developing turned toward an enforced seriousness and allowed little space for frivolity. Emotion was relegated to “the feminine” and considered at best evidence of overwrought “artistic” sensibilities and at worst weakness. In design, emotion was largely expressed in a romantic emotionality in the 19th century, but this was answered by a shift toward a more controlled emotionless style as the 20th century demanded a modern technical approach. This pendulum would swing back and forth several times during the 20th century. (Fig. 1.8).

However, whatever emotion is required is that which grows from *care*. If the designer cannot display care for the project, it is unlikely that anyone else will feel inspired to do so. Without caring, there is no anger or humor; there is also little joy at the successfully completed project. Without care, the idea that finishing the project somehow solves a problem, overcomes a constraint, or fulfills a need becomes a technical question rather than an emotional investment.

IDENTIFICATION

The first practical step in a design project, beyond a sense of inspiration, is to identify the problems involved. What exactly (to the extent that precision is possible at the beginning of a project) is being asked of the designer or design team? What are the needs that the design must fulfill? What are the constraints that bind the project to a certain range of possible solutions? Budgets will play a part, but so will the nature and



1.9 How designers approach one problem may solve another: The revolutionary design of the 1926 “Wassily” Chair (bottom) by Marcel Breuer was said to have been inspired by the hollow metal tubing Breuer used when designing the “Adler” bicycle (top).

Sources: Top: Mary Evans/Retrograph Collection; Bottom: © G. Jackson/Arcaid/Corbis

personality of the clients, the geographical situation of the project, its projected longevity, and any number of other factors.

Identification often takes place through research and investigation of the needs and constraints of the client and the situations involved, but it also comprises brainstorming and imagining, as the actual situation may leave plenty of room for the creative spirit to inject ideas. Identifying a design project properly is key to its success, and doing so creates a safe place where objectives can be delineated, parameters established, and risks determined beforehand.

A designer in the identifying stage may be seen as a connector who identifies how concepts can be brought together in a new way. This is the core of innovation: the ability to connect two or more known ideas in a new way to bring something into the world that has not been seen or done before or that performs better than anything so far. Creating connections between ideas also may involve creating connections among disciplines where the way something is approached in one place may be the solution of how it is done elsewhere. For example, lightweight frames developed for bicycles were found to be excellent for furniture in the 1920s, and methods from the space program have supported thinking about design for a number of more earth-bound products (Fig. 1.9).

Making connections requires that a designer be versed in more than one area, and these skills are vital not just in training but in maintaining abilities. A constant curiosity and willingness to step outside the comfort zone of one’s own discipline will always serve a designer well. It is not only helpful but necessary.

Finally, being a connector also may be about connecting people, where skills as a people manager must come into play in recognizing how members of a design team will work together and who will benefit from working with whom.

CONCEPTUALIZATION

The image that often emerges is the designer as problem solver. Every design project is a problem requiring a solution. The solution encompasses methods, uses, approaches, materials, costs, weights, contexts, moods, and emotions, but in the end, a solution—that is, a *concept*—begins to emerge

of the direction that must be followed. The concept can be entirely mundane, such as how to improve a simple kitchen gadget. Or it can be large and profound, such as a vision for the future of an entire city or a life-changing, culture-evolving device that changes everyone’s method of engagement in daily life.

In dealing with **conceptualization** as well as the application of technical solutions and precise definitions, the designer’s mind overlaps with the scientist’s mind, the artist’s mind, and the philosopher’s mind: Here is a problem of existence . . . here is a problem of interaction with people and things . . . here is a problem of day-to-day living . . . here is a problem of societal existence and operation . . . a specific need . . . a strict constraint . . . a need for materials . . . a precise measurement—all of these may

1.10 Designer's mind, artist's mind, scientist's mind, philosopher's mind. . . . Here we see the British fashion designer Vivienne Westwood in Africa working with the United Nations Ethical Fashion Initiative, focusing her designer's mind on problems of social and ethical significance.

Source: Courtesy of Chloe Mukai, The Ethical Fashion Initiative, International Trade Centre



require a solution by design, and the designer brings in and presents the information, the connection, the context, and the technical know-how to solve this particular problem. The designer may bring in visuals, diagrams, writing, artwork, and any number of references to previous solutions. How this approach evolves over time also is a way of looking at the development of civilization itself and the human experience, as will be discussed in Chapter 2. (Fig. 1.10.)

EXPLORATION

Eventually the conceptual phase must lead to exploration of the practical matters at hand and a “kicking around” of the concept to see what it actually contains. Here **exploration** begins. The idea as fleshed out in brainstorming is conceptualized and outlined. What is its nature? Where does it fit into a previously existing scheme? Where does it break out and create new areas for the end users to experience? The idea is explored for hidden possibilities and new perspectives. Various techniques and exercises have been developed, such as the very powerful SCAMPER method developed by engineers at NASA to move a project out of a corner (see Box 1.2).

The turning of raw material into an object requires precise definitions and technical specifications. Technical diagrams, prototypes, mock-ups, testing, and planning are either performed or directed by the designer to test functionality and to try out new materials. Connecting is one thing. Putting it in context is another. A good designer must find where things fit. How does a material belong? How does a shape “speak of” a concept? What is the space in which a designed object will fit in the life of a person, a city, a society, a culture? Thinking in terms of context requires much more than knowledge of materials and techniques. It also requires knowledge of cultures and people, beliefs and behaviors, ways, structures, and methods of people's lives. The designer must be able to place him- or herself within a situation. What is (or will be) the context of the design? How does it fit into the life, into the system, into the prevailing trend of

ERGONOMICS

In each chapter there is a sidebar concerned with *ergonomics* as it relates to the chapter's material. From the Greek *ergon* (work) and *nomos* (laws), ergonomics is literally the “science of work.” Following is the definition of ergonomics as approved by the Council of the International Ergonomics Association (www.iea.cc) in 2000:

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data, and methods to design in order to optimize human well-being and overall system performance.

Practitioners of ergonomics, ergonomists, contribute to the planning, design, and evaluation of tasks, jobs, products, organizations, environments, and systems in order to make them compatible with the needs, abilities, and limitations of people.

As a discipline, ergonomics applies to all activity: physical, cognitive, social, environmental, and organizational. It

is therefore extremely important that designers understand and apply its methods. *Physical ergonomics* is the primary of these in traditional design, as it is concerned with human anatomy and physical activity. This might involve considering posture, materials, repetitive movements, work-related musculoskeletal disorders (such as carpal tunnel syndrome and muscle strains), workplace layout, and safety and health in general. *Cognitive ergonomics*, on the other hand, is concerned with mental processes that relate to people's interactions as well as people as elements of a system. This may involve considering issues of perception, memory, reasoning, and motor response. In human system design, there may be issues of mental workload, decision making, skilled performance, human–computer interaction, human reliability, work stress, and training. Finally, *organizational ergonomics* is concerned with the optimizing of systems in terms of their organizational structures, policies, and processes. It may involve designers in the application of technical aspects of systems or the effects of physical layout on a system or process.

how things are done? The structures and habits of people—the schemes within which they operate—must be brought into focus.

DEFINITION

Designers have to adhere to deadlines. Like it or not, the time arrives when the SCAMP-ER-ing must end and the decision must be made to go with one or another of the possible solutions. Now designing becomes about precise choices and confirmation of these choices: this color and not that, these textures, that equipment, this finish, and on and on until the concept is delivered as closely as possible to the desired form. In the **definition** stage, the thinking tends toward the technical as the elements of design have to move from overall concepts and abstract notions of color schemes, line, and space to definite measurements, color codes, and tolerances. It is here that the production team may show up to weigh in on the best solutions for constructing the designed object.

COMMUNICATION

Although the **communication** skills of the designer factor heavily toward the end of a project when the design is taken to production, the need for communication is vital throughout the process. The designer must provide material for inspiration, identify the design problem to the team, explore the concepts and consider all possibilities, and determine technical solutions and specifications, communicating as much as possible with everyone during the process.

BOX 1.2
SCAMPER:
A BRAIN-
STORMING
TECHNIQUE

IN THE EARLY STAGES OF A PROJECT, designing is about exploring ideas in order to find out what they contain and what constrains them. The best way to evaluate the constraints in all directions is to isolate the idea's components and deliberately change things around to find the limits of the total concept. Push and prod the intended design to see what it's capable of and whether there are other directions in which it might go. Once it's gone too far, there's your limit.

Brainstorming usually refers to a group getting together to examine a situation with the express purpose of solving a problem. This is not limited to designing but is found in any structured planning or systematic creativity where a solution must be found by generating new ideas. In a brainstorming session, everyone's voice must be heard and no ideas are to be dismissed or criticized during the discussion. Critical analysis takes place after a predetermined period of when a certain number of ideas have been generated.

A number of good brainstorming techniques have been developed to assist in a creative process dialogue. The SCAMPER technique is an excellent example of how designing can be systematically approached. It is a very good way of exploring the possibilities of idea, as it can easily be applied to any kind of creative venture and is easily done as either a solo activity or as a prompt for group brainstorming. The technique was formally defined by Robert F. Eberle, an educational administrator who wrote on creativity for both children and teachers. SCAMPER is an acronym for:

Substitute

Combine

Adapt

Modify (*minimize or magnify*)

Put to other use(s)

Eliminate or elaborate

Reverse or rearrange

Taking an initial idea and running it down the list allows a team or individual designer to examine the project from various angles, considering various elements and aspects, without getting hung up on any one particular element of the design or even on the nature of the design itself. SCAMPER-ing simply provides a way to rearrange the existing concept and attack it from various levels to get as much out of it as possible. By not binding the discussion to any individual aspect, it allows the idea as a system—to be taken outside habitual frames of reference and possibly be improved in unexpected ways.

Take an idea and do as many of the following as you can. The results may overlap; some may be silly. This is normal and means that you have found a boundary to examine. Consider individual parts of your design, but also think of it as a *system* (you might even be designing an actual system):

SUBSTITUTE

Take something out; put something else in its place. For example, swap colors or components. Substitute a technique or a method of construction. If there's a process, isolate a step. Then consider doing something else at that point. Where does this lead?

COMBINE

Take two or more components of your idea and combine them. For example, make two pieces into one piece, or several steps into one operation. Combine your entire concept with another idea. Combine styles. Now what?

ADAPT

How can your design be adapted to another situation, or for another purpose? For example, a design for a specific climate is adapted to another, or a system directed at one situation is modified to work for another. Note that adapting involves change, as opposed to *putting to other uses* (below) where the unchanged idea is directed to another purpose.

MODIFY (MINIMIZE OR MAGNIFY)

This step is probably the most open-ended, as *modification* can have a variety of meanings. In any case, begin, without adding new elements, by changing the *quality* of one or more elements of the design. Make something bigger or smaller, lengthen or shorten a process, make something angular curvy, and so on. Then consider modifying the *functionality* of your design; make it do something differently. Finally, consider modifying the overall design by adding a component to the object or a step to the process.

PUT TO OTHER USE(S)

How could your idea be applied to another problem? How could your design be used elsewhere? What would happen if it were used by someone entirely different than the end user you imagined?

ELIMINATE OR ELABORATE

Is everything necessary? All the components? Every step in the process? What if you randomly remove an element or function? ("Can't have color," or "mustn't move.") How much can you remove before your idea is no longer what you intended? Conversely, did you leave any thought half-finished? What can be increased or made more complex? What can be taken further? At what point is there "too much"? (When is "too much" "just right"?)

REVERSE OR REARRANGE

Reverse in whole or in part: put the back in the front, the end at the beginning, the left on the right, and so on. What does "inside-out" mean in the context of your idea? Is there an order to things that can be rearranged or broken up? Is there an assumption or belief about the order of things that can be challenged out of existence?

The art of communication lies largely in clarity and trust. All the information must be completely clear, and even when it is not, the unknowns must be delineated (“This we know. This we *don’t* know. This we have to find out.”). The ability to evaluate the talents and knowledge of a production team and to speak of problems without embarrassment and hesitation is often the difference between a successful production and one that winds up being an awkward compromise.

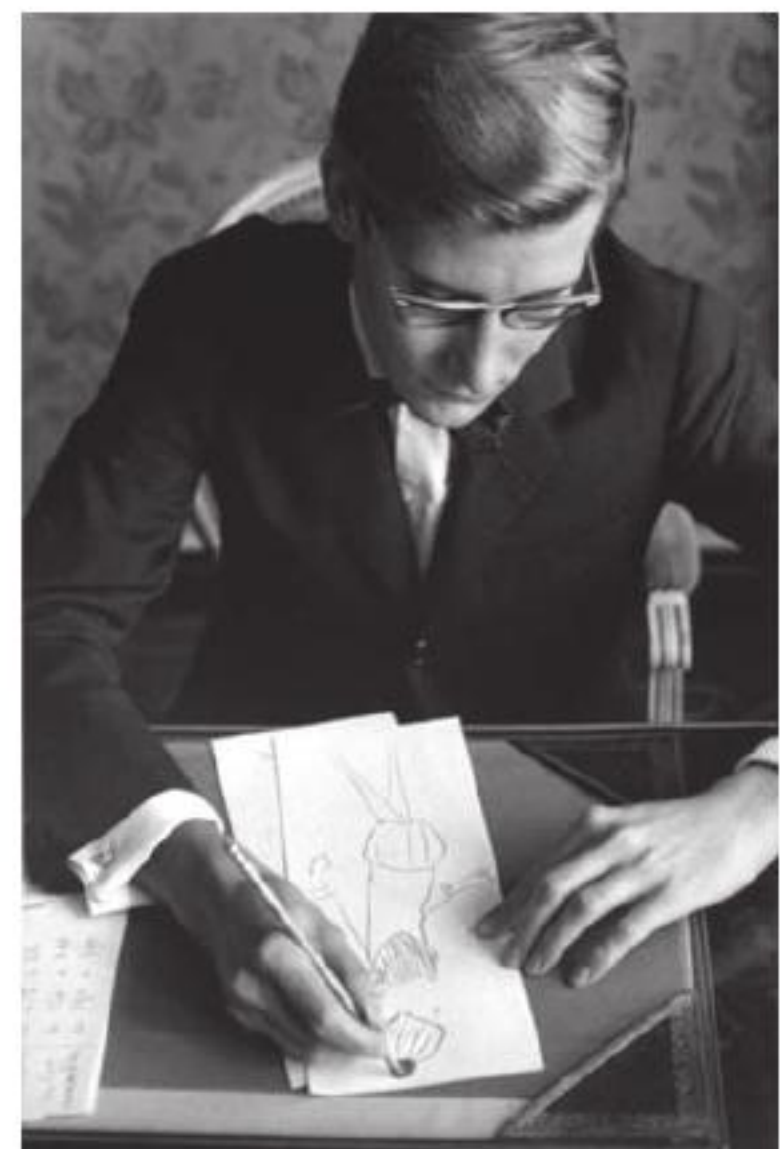
Communication is on more than one level. The communication of strictly practical information is one thing. The other is inspiring communication of the care and aesthetic sense involved. Lining up specifications clearly and thoroughly is perhaps the easier of the two. The key to inspiring a crew is to be inspired yourself. After all, an uninspired person cannot inspire anyone else.

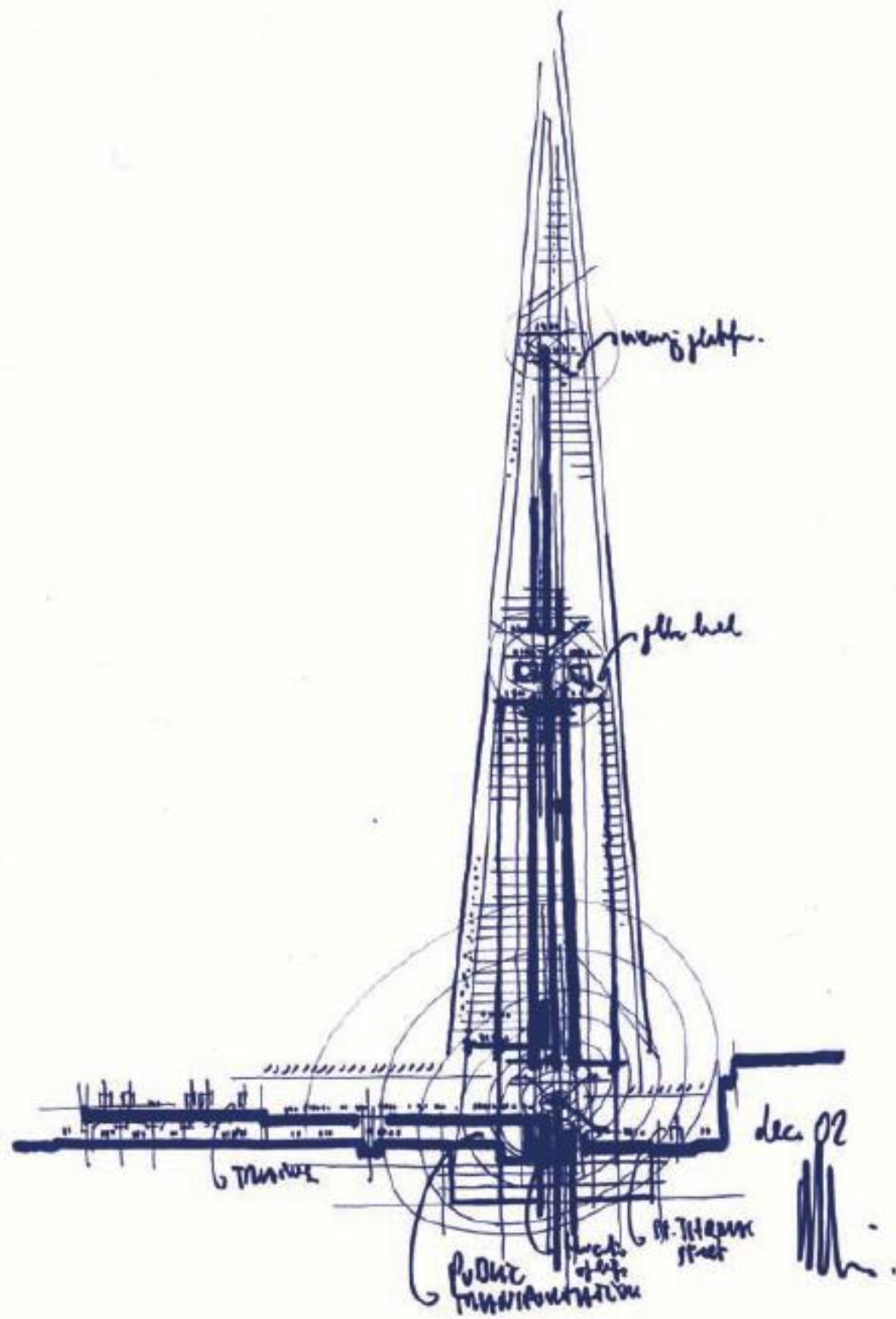
Finally, in terms of communication, there is the image of the designer that seems to hold the most sway in popular imagination: that of someone sketching away on a pad with a marker or pencil, quickly drawing the shape of whatever the object is with a few lines on a page. The designer as “illustrator” has come to us through such popular mythmaking as that which took place around fine art in the early 20th century, where the sense of immediate inspiration being placed onto a canvas or sketchpad with no preparation or investigation beforehand was the mark of a “true” artist.

This was affirmed during the renaissance of high-fashion design in the 1950s, when authoritative designers, such as Dior or Saint Laurent, were frequently shown with sketches in hand next to the finished models of their designs (Fig. 1.11). It is still seen today in the frequent stories of iconic buildings and new concepts being designed on a napkin.³ It happens all the time: a design has to begin somewhere—every journey begins with a first step. The sketch on the napkin, however, is probably itself a result of work that has already taken place. A designer may have researched the client’s needs, thought about materials, and looked at tradition and history before picking up that napkin (Fig. 1.12).

1.11 The designer as illustrator: With so much of the designer’s job being intangible, cerebral, and piecemeal, the popular image of the designer as sketch artist was solidified through staged photographs such as these in the heyday of high fashion. Christian Dior in 1948 (left); Yves Saint Laurent in 1957 (right), shortly after being named as Dior’s successor.

Sources: L: © Everett Collection Historical/Alamy; R: © Photos 12/Alamy





1.12 The architect Renzo Piano’s “The Shard” in London. It is said to have begun as a sketch on the back of a napkin in a Berlin restaurant in 2000. True or not, this kind of myth reveals the instinctive and impulsive beginnings of design ideas. Sketch from 2002 (left); “The Shard” (right), nearing completion 10 years later.

Sources: L: The London Bridge Tower, Renzo Piano Building Workshop Architects; R: © Justin Kase z12z/Alamy

The sketching-image makes the designer’s craft into an artistic image and thus continues to romanticize it. This, however, does not (and must not) take away from the fact that a large part of a designer’s craft revolves around creating visuals of the concept and the idea in its various stages.

PRODUCTION

In the **production** phase, the biggest challenge to the designer may be to actually let go of the project and let the production process take over. Possibly this may be as easy as seeing the project sent off to being manufactured in a far country. However, production also may involve hands-on supervision throughout a long process, such as watching a building go up or an interior being assembled.

The difficulty lies in having to compromise the design vision with the reality of physical objects and tactile, organic materials that are by their very nature flawed and imperfect. A surface is never quite as flawless as it is imagined, a color perhaps not quite as intense as it looks on a computer screen or marker sketch, and the fit of a garment not quite as perfect on the model in motion as it seemed to be on a static mannequin. But these are all overcome by experience, and a designer learns when to push for “perfection” and when to give in to the imperfections of the world.

NETWORKING

To obtain an idea of what design is in human society, visiting a design museum might be a good start, before heading out into the streets, stores, and public spaces.

Here are twelve major design museums:

DESIGN MUSEUM DANMARK (COPENHAGEN)

designmuseum.dk

VICTORIA AND ALBERT MUSEUM (LONDON)

www.vam.ac.uk

DESIGN MUSEUM (LONDON)

designmuseum.org

THE RISD (RHODE ISLAND SCHOOL OF DESIGN) MUSEUM

risdmuseum.org

DESIGN MUSEUM BOSTON

designmuseumboston.org

SMITHSONIAN COOPER-HEWITT, NATIONAL DESIGN MUSEUM IN NEW YORK

www.cooperhewitt.org

VITRA DESIGN MUSEUM (GERMANY)

www.design-museum.de

MUSEUM OF MODERN ART (NEW YORK)

www.moma.org

DESIGN MUSEUM GENT (BELGIUM)

www.designmuseumgent.be

DESIGN EXCHANGE (CANADA'S DESIGN MUSEUM)

www.dx.org

RED DOT DESIGN MUSEUM (SINGAPORE)

museum.red-dot.sg

MUSEUM OF AFRICAN DESIGN (SOUTH AFRICA)

www.moadjhb.com

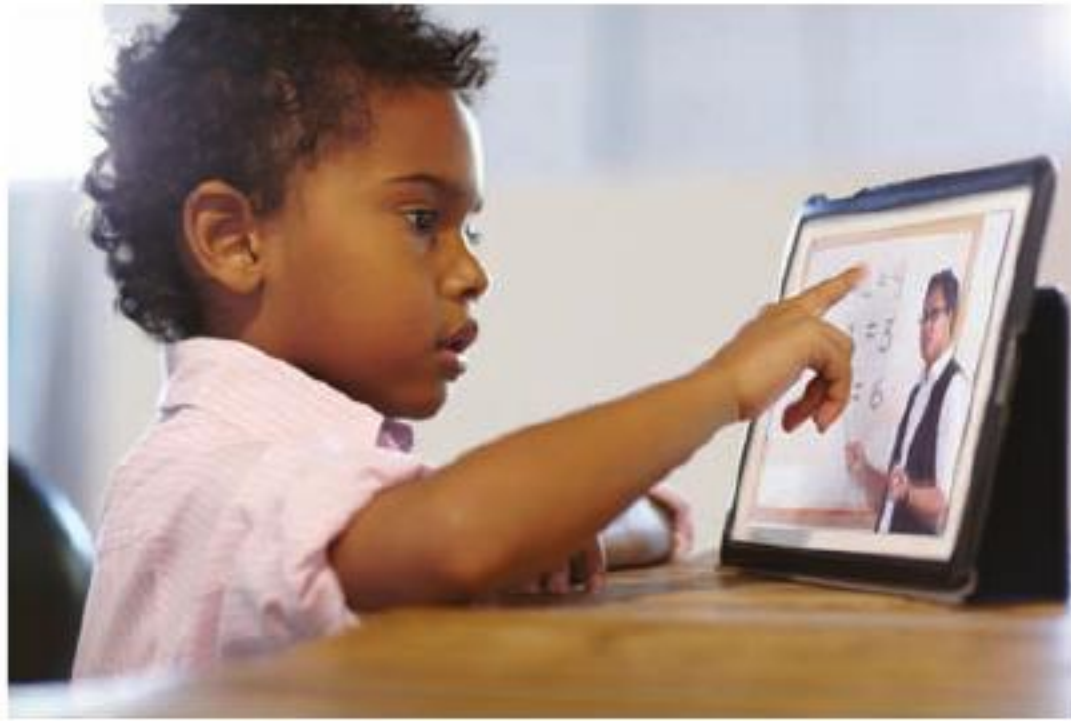
DESIGNING: A HUMAN EXPERIENCE

We are surrounded by products that have all been thought through in a design process (i.e., to varying degrees of artistic and aesthetic sensibilities). The building, the interiors, the furniture, the objects, and clothing, the handheld gadgets and computers that have become ubiquitous—themselves containing virtual environments that are heavily designed.

Has this always been so? Perhaps not in the mass-manufactured way that we now live our lives, but human society in general is very far away from a non-designed state (and as implied earlier, any human society by its very nature is always designed). It is an inherent part of human condition to alter, adapt, and improve upon nature—even though the nature of the improvement often is hotly debated, especially in recent years, as the destructive impact of human technology and systems on the natural world is becoming ever clearer.

The Canadian social theorist Marshall McLuhan is well known for his statement “**the medium is the message.**” This statement finds a meaning in the study of designing. Our communication and distribution technologies have developed to the point where to a large portion of human beings’ connectivity to each other and the world is instantaneous and without pause. The content of these communications are beside the point, as McLuhan pointed out. It is not what is *on* the screen (McLuhan was writing about television, before the advent of the Internet), but the fact that we get the majority of our information about the world *from* a screen in a constant stream of broken-up imagery and information. We are increasingly reliant on the design of systems and the design of gadgets that steer our understanding of the world into bytes and bits of information that we cannot access without electronic devices (Fig. 1.13).

Therefore, the design of the gadgets we use matters. The size of the screen, the interactivity of the hardware and software, the websites or program involved—all



ABOVE

1.13 We increasingly get our information about the world from a screen. The design of the delivery system changes how we interact with the world. Children growing up with new communication technology incorporate it very quickly and develop a worldview based on the information flow it affords them.

Source: © Ron Royals/Corbis

BELOW

1.14 The audience for an incessant stream of digital material becomes habituated to the fragmentation, variation, and appeal of the constant new thing. As the number of options increase, instead of becoming overloaded, the audience alters its way of viewing. Attention spans altered and multitasking with multiple streams of information began to be observed as television channels multiplied. Now blogging and texting have become the reigning mode, and a room of multiple TVs (as seen here behind David Bowie in *The Man Who Fell to Earth* in 1976) seems almost a quaint image.

Source: STUDIOCANAL Films Ltd.

influence our worldview. More than ever, social interaction is restricted to the communication of isolated thoughts, packaged into small messages—short notices, tweets, statuses, and headline-style phrases or images. The disembodied state of online communication and presence may make us forget that environments are more than just the physical manifestation of things. In worrying about the effects of all this messaging and virtual interaction, we may have forgotten that all human interaction requires environments and we will create them if they are not there already. We are never without a world to be in, be it imagined on a cave wall, built as a city of gleaming skyscrapers,

inhabited by people wearing designer labels, or a collection of bursts of information and images on a small handheld screen.

The constant flow of information through multiple channels creates a fragmented worldview of multiple streams of text, images and sound, that had already begun with the increase in information delivered by accelerating publication, radio, television, and film. Design as a whole has therefore less of a total feel than was the case in the early decades of the 20th century. This may be a self-perpetuating culture, as the consumers who are the audience for the incessant stream of online material are habituated to the fragmentation, variation, and appeal of the constant new thing. The online reposting and blogging creates a totality of its own, reinforcing the image of a world of assorted combinations (Fig. 1.14).

The structures of early 21st century design are those defined by media that is global, non-localized, largely geared toward a consumer identity that is not bound to place or specific national culture, and the offspring of late 20th-century corporate culture and marketing. As the speed of ideas compounded by the sheer mass of information available to consumers makes trends far harder to spot, much less predict or create, designers are followers more often than leaders. Style cultures tend to feed on



themselves in a loop: A culture creates its own structures and is in turn perpetuated by its own structures, such as in the dress codes of a subculture, or the rules of high-society etiquette. Communications technologies, such as print, radio, film, television, and the World Wide Web, simply speed up the process by facilitating the delivery and the reach of the information needed by the participants in order that they may adhere to the correct behavior.

It is very important to remember the context in which these issues are being discussed and from what vantage point a book, such as this, is written. The placing of design as a subject of study and analysis in a classroom is part of a modern tradition that is a product of—and embedded in—a culture that can be traced back for centuries and spans a large portion of the globe. But it is not the *entire* culture of the globe, nor does it encompass *all* of human history and experience. Despite the fact that humans are the designing species, the idea of design as a formal and important element of society is not everywhere, and there are certainly a number of places on the globe where designer creations are of minimal importance. Design is approached differently in different places, just as it was approached differently in different historical eras and cultures all around the world. Even in a globalized market and corporate world, people's needs and constraints on the ground are still extremely different from one part of the world to the next.

CONSTRAINTS AND NEEDS

To Igor Stravinsky, composing music was a process of solving musical problems, problems that he insisted on precisely defining before he started to work. “The more constraints one imposes, the more one frees one's self,” he said. “And the arbitrariness of the constraint serves only to obtain precision of execution.” Before beginning to write a ballet, for example, he wrote to ask for the exact dimensions of the hall in which it would be performed, the number of seats, and the direction in which the orchestra would be facing.⁴

Just as in Stravinsky's musical creativity, constraints place limits on the designer's mobility. To have to navigate around an obstacle requires a solution, and restrictions on a creative process create in this way a basis for interaction and dialogue. Placing arbitrary obstacles may well spark thoughts that would not appear otherwise. Courting constraints in a systematic way is therefore a way to move through a design project, by solving one problem at a time, or to find a way out of a dead end, by forcing the idea to go in another direction.

A design will have both **inherent** and **imposed constraints**. On one hand, the *inherent* qualities that make the object into the very thing that it is: What are the specific qualities and elements that make a table a table and a chair a chair? When is a shirt a shirt and not something else? What needs to happen to something for it to be called a “jacket”? These particular qualities and elements that are necessary for the thing to be what it is meant to be are the inherent constraints involved. What it *must* be (Fig. 1.15).

On the other hand, there are the constraints of the designing itself: the qualities and elements that can be *imposed* to make it the thing we would like it to be—this type of chair, table, shirt, or jacket, defined by its materials, colors, desired textures or patterns, and other elements that the designer has control over and can choose rather than be forced into. The initial work of a designer is often in the choosing of these



1.15 “The more constraints one imposes, the more one frees oneself of the chains that shackle the spirit” said the composer Igor Stravinsky, seen here at his desk. “The arbitrariness of the constraint only serves to obtain precision of execution.” By framing the problem precisely, the design problem becomes a clearly defined puzzle with a set of clearly indicated areas that need solving. The freedom arrives from knowing exactly how far one can move and where to at each point.

Source: © Marvin Koner/Corbis

THE HIERARCHY OF DESIGN NEEDS

imposed constraints (“I will only use recycled materials”). In some cases, navigating the imposed constraints defines most of the work on a design project.

The inherent constraints tend to be given. The constraints that arrive from the client or end user are more often of the imposed kind. The end user requires a chair. But what kind? For what purpose? Made of what materials? To what tolerances? What colors? What kind of decoration (if any)? Is there a price point? And so on. The fact that the end user needs or wants a chair (and the wanting can itself be a “need”) is not so much in question.

However, there is a side to designing where the inherent nature of the proposed project needs to be the first thing questioned. The client wishes for a chair. But is it really the chair that is needed? Perhaps what the client really needs is a couch? Or not precisely this kind of chair but another one altogether (the client wants a chaise, but what she really *needs* is a rocking chair). It becomes the designer’s mission to investigate the need itself, to determine if the inherent constraints are the correct constraints involving the end user’s need. Once that is established, the imposed needs can be considered.

Once the design is in hand, there are further hurdles of constraints to consider. There may be constraints that arrive from the manufacturing process itself. The producers may not be able to handle the materials, may not have the technical expertise to produce the required solution, or may not be able to perform the required operation on time or within the given budget.

The constraints inherent in manufacturing are equally as weighty as any other, but in any innovative project, they will sneak up on the process. The best way to tackle this is to involve the manufacturers in the process as it is underway or at least consult with knowledgeable manufacturers regarding any unsolved or vague elements. Often if the solutions are new or untried methods are involved, prototyping must take place, and it is there that previously unknown or at least unexpected constraints will present themselves.

The constraints of a design project will tend to become stricter as the design is pushed further up the **hierarchy of design needs**, which is defined by the levels a design must reach to satisfy—and then eventually transcend needs.³

These needs include (in rising levels of fulfillment):

- *Functionality*. The design must function as intended.
- *Reliability*. It must do so reliably.
- *Usability*. It must be easy to use, or at least once one has learned how, one must not need to learn again.
- *Proficiency*. The design allows us to do things better than before.
- *Creativity*. The design changes the approach to a problem to the degree that the norms change even to the degree that there is a cultural shift.



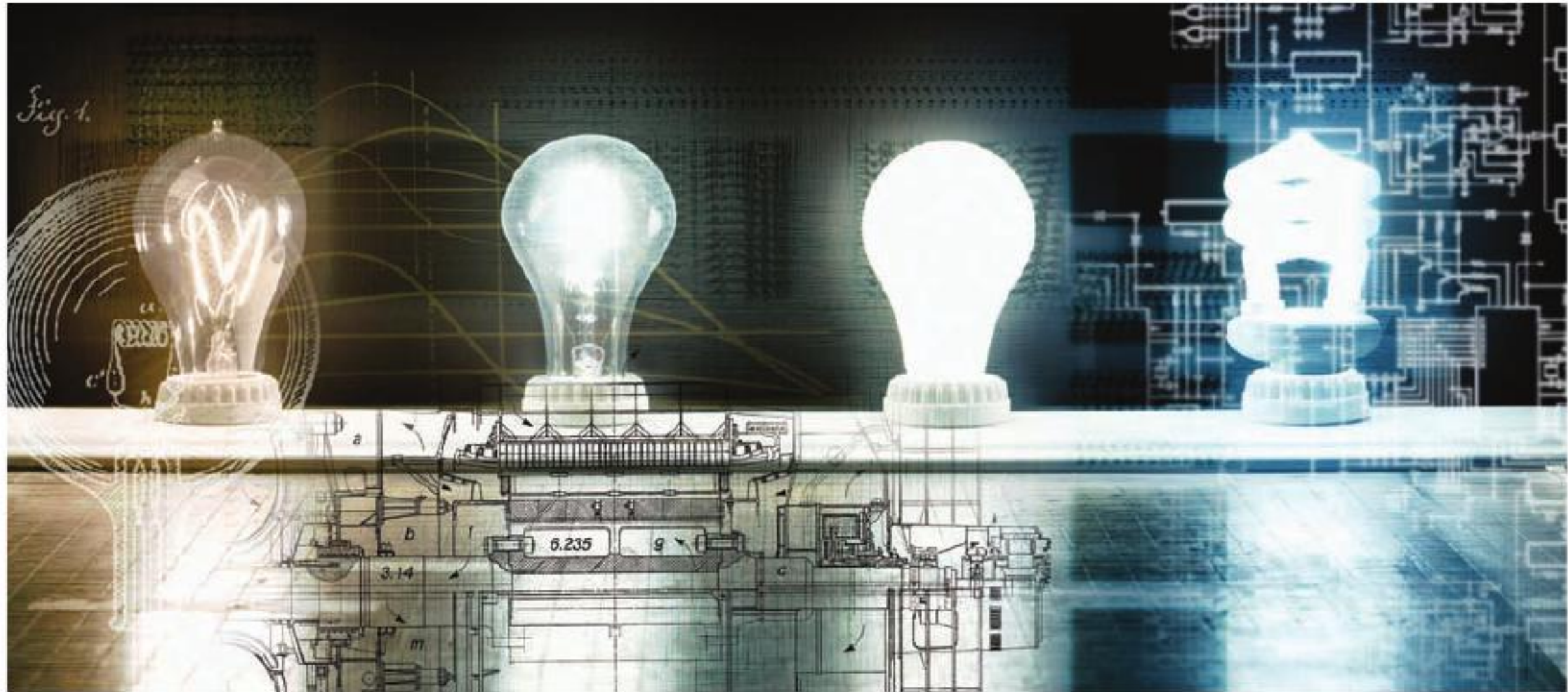
1.16 Considering functionality: What does the design do? What are the technical specifications? Is visual appeal a function? How much of the function of these designs lies in their fulfilling of practical needs, such as support (chair) and shelter (dress), and how much in the sense of visual stimulation and satisfaction?

Sources: L: Bel Air arm chair designed by Peter Shire (1982), V&A Images, London/Art Resource, NY. R: Dress by Issey Miyake (Spring/Summer 1994), Image copyright © The Metropolitan Museum of Art. Image source: Art Resource, NY

The designer's role in ensuring the positioning of the design's solution in the hierarchy's levels becomes more involved and complex as it moves on up the hierarchy. To ensure the *functionality* of the object in question, a certain basic knowledge of the designed object's history and methods and mechanics is necessary and a technical know-how is required in order to make it do what it is supposed to do (Fig. 1.16). The *reliability* also comes from technical know-how and perhaps collaboration with manufacturers on choosing the right components or methods. The designer's challenge when confronted with the desire for *usability* or user-friendliness becomes more involved. Now the designer must become aware of the practices and habits of the end user as they relate to designs of this sort and if none exist (perhaps it is a totally new kind of design), then to imagine and perhaps prototype this knowledge into existence. The designer must be able to consider various scenarios of interaction between the end user and the design and respond to each of them with a good solution, so that in each case the end user is well served.

Much discussion of user-friendliness arose out of the changes that interactive designs created with the advent of computer interfaces, desktop technologies, and eventually handheld devices, touch screens, and so on. The mantra for good program design became usability: The user needed to be able to *intuit* the use of the product without wading through instructions. Clearly this cannot always be the case. But the idea is that once the user achieves a certain level of knowledge, the operations proceed smoothly and with minimal effort.

Proficiency in a design takes us out of the realm of the usual and brings us a design that allows us to do things in a way that is better, is more efficient, is more productive, or in general has a better outcome than any design of this kind has done before. New technologies have a way of allowing such proficiencies on a generational basis. The idea that we can constantly be better at something drives productivity and the marketplace of a consumer society. Each successive design must be perceived to be better than the one before in order to capture our attention (Fig. 1.17).



1.17 Proficiency: Each successive design must perform better—that is, allow us to have a better experience than before. Successive technical modifications to the simple lightbulb have not only changed the design, but altered our experience of lit spaces and our relationship with our surroundings. Ecological benefits result from more efficiency and our experience of a well-lit space is enhanced.

Source: © Alamy

The truth of the matter may be different, and it is perhaps less often so than the marketers would have us believe. But that aside, a design that does allow us to be better at things is a delight. To accomplish this, a designer also must be an innovator of the kind that pushes the boundaries of the possible. This requires knowledge of materials, technology, manufacturing processes, user interaction, and methods. This also means that the designer must recognize the limitations that are to be overcome. This can only be done by thorough investigation and an intimate knowledge of the problem, needs, and constraints involved and turning them to the design's advantage.

There is finally the point of *creativity*, where a design is created that changes the way things are done. Not only do we do things better, we also do them differently. Examples of this abound in computing and communications technologies in recent years, but more hands-on and physical moments of creativity in design were equally numerous in, say, the early 20th century as technologies allowed all manner of new products to be designed and improve day-to-day living. Examples abound in relation to electric motors and switches: Power tools, kitchen appliances, medical devices, and office machinery, to name a few.

Recent times have been less optimistic about the continued success of such evolutionary design. The early 20th century optimistic vision of constant improvement through technology was seen to be flawed. The two World Wars and subsequent arms race showed, for example, that modern technology and systems design could lead to massive death and destruction. It also became apparent that much of the modern designs and systems were massively harmful to the environment. However, there is much to be done and learned still. Designers who wish to go to the truly creative route must understand the human behavior and interaction that guide the nature of the product. They must know how people will respond to a new way of behaving with technology, new materials, and new ways of doing.

A designer must therefore be a student of human nature. How do people behave? How do they interact with the design and with each other? It is in the doing of things



1.18 We hammer away without thinking of the hammer; the tool is transparent to us. If it breaks or ceases to function, it becomes apparent to us again. The awareness of a designed object and its importance is highlighted this way, when it is repurposed, put into a new context, or otherwise improved. You see it again and in a new way. You and the object are reoriented in the world. You *know* it now.

Source: © Caspar Benson/fstop/Corbis

that we prove our humanity. The impact of our actions on our fellow human beings is a yardstick by which we may measure the meaning of our existence. To design for changed action by enabling our fellow humans to have better lives and perhaps improve in turn that of those around them, is to change human society in a subtle but perhaps permanent way. A truly creative designer therefore aims to understand human behavior and the structures within which it develops and evolves in order to understand the relationship of human beings, their designs, their environment, and their basic ways of being. With this understanding a designer can become truly influential.

TRANSPARENT AND APPARENT OBJECTS

To understand how humans encounter a new design, let us consider how we actually approach using things in our day-to-day existence and how things, environments, and objects shape us, even as we use them. The philosopher Martin Heidegger used an example of a carpenter and his hammer. While all goes well with the work and the hammer, a proficient carpenter does not actually think about the hammer. Only when there is a problem with the hammer itself—say it is not the right type of tool or it has some defect, or it breaks—that attention is called to it. The hammer becomes prominent in the carpenter’s conscious thought. Suddenly the hammer is *obvious*: It ceases to be (as Heidegger puts it) *transparent*. Otherwise, the carpenter simply continues hammering away at whatever needs hammering (Fig. 1.18).

The things of our daily existence are in this way generally transparent. A new design, if it reaches the level of creativity in the hierarchy, must become obvious for a while, until we incorporate it into our normal way of doing things and it disappears again and normalizes. Then the next design must move in to the space that is left for the new and apparent. What this means is that the designer must recognize where these limits are, in order to force the nontransparency of the design by advancing the concept up the final two steps on the hierarchy of designs into proficiency and creativity.

This also can be done by pulling the design into a new context by repurposing it, recontextualizing individual elements, or making us look at it in a way that we have never seen before. As an old friend with a new look, the design is now a new thing, perhaps even more exciting, but it still remains within the identity of the old concept.

Changes in technology can also force the issue, making it inevitable that the design will become new. For example, in laptop computers, new materials, new manufacturing methods, and miniaturization of components all make for a new experience, even though the *object* itself essentially is the same.

Cultural shifts can do the same: A new way of looking at the design—or something that was not acceptable—becomes acceptable in society. This changes our underlying perception of the design and our behavior around it. Styles and manners that seemed inconceivable are suddenly the norm. For example, tattoos and piercings used to belong to a very specific set of society throughout most of the 20th century, but at the end of the century, they became commonplace in one generation.

CONCLUSION

Finally, each cultural experience builds on—or reacts to—all that have come before, and the gradual layering of knowledge and experience makes even the most radical changes themselves eventually seem routine. We become inoculated to change itself,

and a constant state of change becomes normal. We begin to feel we have seen it all before, and to accept the impermanence of styles, ideas, and cultural norms. This expectation of change has, for example, become the norm in the world of designer fashion. This place of constant flux, as we will see in the next chapter, is where the modern history of designing has brought us.

KEY TERMS		
Human culture	Stages of design	Constraints and needs
Mass production	project: inspiration,	Inherent and imposed
Industrialization	identification,	constraints
Urban living	conceptualization,	Hierarchy of design needs
Consumerism	exploration, definition,	Transparency in
Capitalism	communication, and	experience
Modernity	production	

DISCUSSION AND REVIEW QUESTIONS

1. Consider how your daily existence is structured by your own design. How do you order things around you? How do you decorate your surroundings? How do you choose your clothing and accessories? What does the designing of your daily existence have in common with early humans from 40,000 years ago? What is different?
2. Consider how the design of your environment influences your behavior. Consider rooms, buildings, streets, shops, restaurants, and public spaces. How does your behavior change from one to the other? How much of this do you suppose is “by design?”
3. Look around the room you are in. How much of what you see is normally *transparent* to you? Why do you suppose this is? What would it take, design-wise, to change this?

EXERCISES AND ASSIGNMENTS

1. Pick an object that you consider to be a good design (for any reason at all).
 - a. What would inspire such designing?
 - b. How would you communicate what is especially important about the design to someone who had to make it?
 - c. How would you describe it to a prospective end user who has never seen it before?
 - d. Make a list of the inherent and imposed constraints, and consider how they influenced the outcome.

2. Choose three objects in your immediate surroundings: an item of clothing, a kitchen utensil, and a piece of furniture.
 - a. Where does each stand in the “hierarchy of design”?
 - b. If it is not at the highest level, what keeps it from going higher?
 - c. If you feel it is at the highest level, what makes it so?
 - d. How do the three compare? If one achieves a higher level than the others, how could its qualities be translated to the others?
3. For the one of these three that you consider the best design, list the inherent and imposed constraints that a designer would have considered in its designing.
 - a. Find three objects you on that are normally transparent to you.
 - b. What change in their design would cause them to not be transparent for a while?
 - c. Why would these changes work?
 - d. Do these changes improve the design or not?

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