not contradiction. The most successful leaders, Martin finds, "embrace the mess." They allow complexity to exist, at least as they search for solutions, because complexity is the most reliable source of creative opportunities. The traits of management leaders, in other words, match the traits I have ascribed to design thinkers. This is no coincidence, and it does not imply that the "opposable mind" is the reward to those who won the genetic lottery. The skills that make for a great design thinker—the ability to spot patterns in the mess of complex inputs; to synthesize new ideas from fragmented parts; to empathize with people different from ourselves—can all be learned.

One day, perhaps, neurobiologists will be able to plug us into an MRI scanner and determine which parts of the brain light up when we apply integrative thinking. That may make it easier to devise new strategies for teaching people how to do it better. For the moment, at least, our task is not to understand what is going on in our brains but to find ways of getting that thinking out into the world, where it can be shared with others and, ultimately, translated into concrete strategies.

CHAPTER FOUR

building to think,
or *the power of prototyping*

Lego launched me on my career as a design thinker. In the early 1970s, when I was nine or ten, England was going through yet another of its periodic recessions and the coal miners had waited until winter to go out on strike. This meant no coal for the power stations, which meant not enough electricity to meet demand, which meant regular blackouts. Determined to do my bit, I marshaled my entire inventory of Legos and built a great big flashlight using some fancy light bricks that glowed in the dark. I proudly handed the flashlight to my mother so that she had enough light to cook my dinner. I had built my first prototype.

By the age of ten I had learned the power of prototyping based on years of intensive study. As a younger child I had spent hours using Legos and Meccano (known to Americans as Erector Sets) to create a world full of rocket ships, dinosaurs, and robots of every imaginable size and shape. Like every other kid, I was thinking with my hands, using physical props as a springboard for my imagination. This shift from physical to abstract and back again is one of the most fundamental processes by which we explore the universe, unlock our imaginations, and open our minds to new possibilities.

Most companies are full of people who have set aside such childish pursuits and moved on to more important matters such

as writing reports and filling out forms, but one thing strikes the visitor to an organization that uses design thinking: as in any child's bedroom, there are prototypes everywhere. Peek inside a project room, and you will see prototypes on every surface. Walk the halls, and you will see prototypes being used to tell stories about past projects. You will see prototyping tools ranging from X-acto knives and masking tape to $50,000 laser cutters. Whatever the budget and whatever the facilities, prototyping will be the essence of the place.

Frank Lloyd Wright claimed that his early childhood experience with Froebel kindergarten blocks—developed by Friedrich Froebel in the 1830s to help children learn the principles of geometry—ignited his creative passion: "The maple-wood blocks . . . are in my fingers to this day," he wrote in his autobiography. Charles and Ray Eames, one of the greatest prototyping teams of all times, used prototyping to explore and refine ideas, sometimes over many years. The result was nothing short of the reinvention of twentieth-century furniture. Asked by a curious admirer whether the iconic Eames lounge chair came to him in a flash, Charles replied, "Yes, sort of a thirty-year flash."

Since openness to experimentation is the lifeblood of any creative organization, prototyping—the willingness to go ahead and try something by building it—is the best evidence of experimentation. We may think of a prototype as a finished model of a product about to be manufactured, but that definition should be carried much further back in the process. It needs to include studies that may appear rough and simple and encompass more than just physical objects. Furthermore, it's not necessary to be an industrial designer to

adopt the habit of prototyping: financial services executives, retail merchants, hospital administrators, city planners, and transportation engineers can and should participate in this essential component of design thinking, as we shall see. David Kelley calls prototyping "thinking with your hands," and he contrasts it with specification-led, planning-driven abstract thinking. Both have value and each has its place, but one is much more effective at creating new ideas and driving them forward.

quick and dirty

Although it might seem as though frittering away valuable time on sketches and models and simulations will slow work down, prototyping generates results *faster.* This seems counterintuitive: surely it takes longer to *build* an idea than to *think* one? Perhaps, but only for those gifted few who are able to think the right idea the first time. Most problems worth worrying about are complex, and a series of early experiments is often the best way to decide among competing directions. The faster we make our ideas tangible, the sooner we will be able to evaluate them, refine them, and zero in on the best solution.

Gyrus ACMI is on the cutting edge of surgical instrumentation and a leader in developing techniques for minimally invasive surgery. In 2001 IDEO began to work with Gyrus to develop a new apparatus for operating on delicate nasal tissues. Early on in the project the team met with six otolaryngology surgeons to learn how they performed the procedure, the problems with existing instruments, and what characteristics they

might be looking for in a new system. One of the surgeons, using imprecise words and awkward hand gestures, described how he might prefer a device with a pistol grip. After they departed one of our designers had grabbed a whiteboard marker and a 35 mm film canister and taped them to a plastic clothespin that was lying nearby, and squeezed the clothespin as if it were a trigger. This rudimentary prototype catapulted the discussion forward, put everyone on the same page, and saved countless meetings, videoconferences, shop time, and airplane tickets. Cost of the prototype in labor and materials: $0 (we were able to rescue the marking pen).

Just as it can accelerate the pace of a project, prototyping allows the exploration of many ideas in parallel. Early prototypes should be fast, rough, and cheap. The greater the investment in an idea, the more committed one becomes to it. Overinvestment in a refined prototype has two undesirable consequences: First, a mediocre idea may go too far toward realization—or even, in the worst case, all the way. Second, the prototyping process itself creates the opportunity to discover new and better ideas at minimal cost. Product designers can use cheap and easy-to-manipulate materials: cardboard, surfboard foam, wood, and even objects and materials they find lying around—anything they can glue or tape or staple together to create a physical approximation of ideas. IDEO's first and greatest prototype was created when the company consisted of eight scruffy designers crowded together in a studio above Roxy's dress shop on University Avenue in Palo Alto. Douglas Dayton and Jim Yurchenco affixed the roller ball from a tube of Ban Roll-on deodorant to the base of a plastic butter dish. Before long Apple Computer was shipping its first mouse.

enough is enough

Prototypes should command only as much time, effort, and investment as is necessary to generate useful feedback and drive an idea forward. The greater the complexity and expense, the more "finished" it is likely to seem and the less likely its creators will be to profit from constructive feedback—or even to listen to it. The goal of prototyping is not to create a working model. It is to give form to an idea to learn about its strengths and weaknesses and to identify new directions for the next generation of more detailed, more refined prototypes. A prototype's scope should be limited. The purpose of early prototypes might be to understand whether an idea has functional value. Eventually designers need to take the prototype out into the world to get feedback from the intended users of the final product. At this point the surface qualities of the prototype may require a bit more attention so that potential consumers are not distracted by the rough edges or unresolved details. Most people, for example, will find it difficult to visualize how a washing machine made of cardboard will work.

Some pretty amazing technology is available today for designers to create prototypes quickly and at an extremely high level of fidelity, including ultraprecise laser cutters, computer-aided design tools, and machines that function as 3-D printers. Sometimes they are too good, as we discovered when a Steelcase executive, mistaking an expertly detailed foam model for the real thing, destroyed a $40,000 prototype of the Vecta chair by sitting on it. But all the technology in the world will come to naught if it is used to create prototypes too refined, too detailed, and too early. "Just enough prototyping" means

picking what we want to learn about and achieving just enough resolution to make that the focus. An experienced prototyper knows when to say "Enough is enough."

prototyping things you can't pick up

Most imaginable prototypes up to this point refer to physical products—stuff that hurts when you trip over it or drop it on your toes. The same rules apply when the challenge is a service, a virtual experience, or even an organizational system.

Anything tangible that lets us explore an idea, evaluate it, and push it forward is a prototype. I have seen sophisticated insulin injection devices that began life as Legos. I have seen software interfaces mocked up with Post-it notes long before a line of code was written. I have seen new concepts for neighborhood banking acted out before clients as a skit, against a backdrop of "counters" made of flimsy foam core—a kind of cardboard material that is very strong, very light, and very cheap—held together with masking tape. In each case an idea has been given expression through an appropriate medium to show to others for feedback.

The movie industry has long used this practice. Once upon a time, when film was little more than a recorded version of theater, it was feasible to go from a script straight to shooting the movie. But as directors grew more ambitious—and audiences more demanding—they began to include multiple cameras and special effects. The storyboard emerged as a way of mapping out the movie before it was shot to make sure that all the scenes were thought through and that the director wouldn't get to the

editing room only to find a vital angle or crucial shot flawed or missing. As filmmaking grew ever more sophisticated, especially pioneered by Walt Disney Studios' animation, the storyboard took on an even more important role. It became a prototyping tool that enabled animators to assure themselves that the story hung together before the detail work began. Today, with sophisticated, expensive digital special effects dominating so much of Hollywood, filmmakers have moved to computer-based storyboards and "animatics" to test the motion in a shot before they commit to the real thing.

Techniques borrowed from film and other creative industries suggest how we might prototype nonphysical experiences. These include scenarios, a form of storytelling in which some potential future situation or state is described using words and pictures. We might, for example, invent a character who fits a set of demographic factors that interest us—a divorced professional woman with two small children, for instance—and develop a believable scenario around her daily routine in order to "observe" how she might use an electric vehicle charger or an online pharmacy.

When Wi-Fi communications were in their infancy, Vocera developed a video scenario to demonstrate how employees might use a wearable, voice-controlled "communications badge" to stay connected with coworkers anywhere within a company's network. The short movie followed the rounds of a fictional IT support team and was far more effective in explaining the concept to potential investors than a technical brief or a deck of PowerPoint slides. Sony used the same technique when it was developing its first online concepts in the early 1990s. A design team created scenarios around the lives of teenagers in

Tokyo to show how they might use new kinds of online gaming parlors to play interactive video games or sing karaoke songs together. In the early years of the Internet these plausible fictions helped management visualize how it might become the basis of new services and business models.

Another considerable value of scenarios is that they force us to keep people at the center of the idea, preventing us from getting lost in mechanical or aesthetic details. They remind us at every moment that we are not dealing with things but with what the psychologist Mihaly Csikszentmihalyi calls "*transactions between* people and things." Prototyping at work is giving form to an idea, allowing us to learn from it, evaluate it against others, and improve upon it.

A simple scenario structure useful in the development of new services is the "customer journey." This structure charts the stages through which an imagined customer passes from the beginning of a service experience to the end. The starting point may be imaginary, or it may come directly from observations of people purchasing an airline ticket or deciding whether or not to install solar panels on a roof. In either case, the value of describing a customer journey is that it clarifies where the customer and the service or brand interact. Every one of these "touchpoints" points to an opportunity to provide value to a firm's intended customers—or to derail them for good.

Some years ago Amtrak began studying opportunities to improve transportation on the East Coast by offering a high-speed train service between Boston, New York, and Washington, D.C. By the time Amtrak invited IDEO to participate in what would become the Acela project, the focus had narrowed to the trains themselves and, in fact, to the design of the seats.

After spending countless days riding trains with customers, the team created a simple customer journey that described the entire travel process. The journey, for most customers, had ten steps, which included getting to the station, finding parking, buying tickets, locating the platform, and so on. The insight that proved most striking was that passengers did not take their seats on the train until stage eight—most of the experience of train travel, in other words, did not involve the train at all. The team reasoned that every one of the prior steps was an opportunity to create a positive interaction, opportunities that would have been overlooked if they had focused only on the design of the seats. Admittedly, this approach made the project far more complex, but that is typical in the move from design to design thinking. It may not be easy to reconcile the many interests that come into play in getting from Washington to New York, but Amtrak managed to do so and has created a more complete and satisfying experience for its customers. Despite its numerous and well-publicized problems with tracks, brake systems, and wheel sets, Acela has proved to be a popular service. The customer journey was the first prototype in that process.

acting out

If playing with Legos is a child's way of "learning with your hands" and foam core and computer-driven milling machines are the equivalent for grown-up product designers, what does it look like for service innovation—the experience a person may have at a bank, a clinic, or the Department of Motor Vehicles? Our most reliable consultants, here as with so many other prod-

ucts, are kids. As soon as two or three children get together, they start to role-play: they become doctors and nurses, pirates, aliens, or Disney characters. Without prompting, they begin to perform lengthy enactments full of complex plots and subplots. Research suggests that this form of play is not only fun but also helps establish internal scripts by which we navigate as adults.

TownePlace Suites, an extended-stay hotel brand owned by Marriott, serves business travelers, such as consultants with long-term contracts, who may be required to be away from home for more than just a few nights and want to feel more at home than is usually the case in hotels. They are likely to work in their rooms more regularly, they stay over on weekends, and they may spend time on their own exploring the neighborhood. Marriott wanted to rethink the highly specific experience of these travelers.

Traditionally, one of the problems with architectural design is that full-scale prototyping is virtually impossible because it is just too expensive. Instead, an imaginative team of "space designers" rented an old warehouse in a dicey part of San Francisco's Bayview district, where they built a full-scale mock-up of the entrance lobby and a typical guest suite of foam core. Their mock-up was not intended to showcase the aesthetic qualities of the space. Rather, it served as a stage on which designers, the client team, a group of hotel owner-operators, and even "customers" could act out different service experiences and explore in real space and real time what felt right. All the visitors were encouraged to add Post-its to the prototype and to suggest changes. This process yielded a host of innovations that included personalized guidebooks with local information tailored to repeat clients and their specific needs as well as a

huge wall map in the lobby where guests could use magnetic tiles to mark interesting restaurants or other landmarks—a sort of "open-source guestbook." This full-scale space for acting out whatever occurred to them gave the design team a rich set of ideas for further testing. Moreover, they had a much better sense of how good the ideas were. No amount of survey work or virtual simulation would have achieved the same result,

Learning to feel comfortable acting out potential ideas is obviously important for anyone contemplating an experiential approach to prototyping—Mattel's Ivy Ross went so far as to teach new recruits to the Platypus program how to use improvisational acting techniques in the first couple of weeks of the session. Knowing some of the basics, such as how to build on the ideas of one's fellow actors and being willing to defer judgment of them, increases the likelihood that collaborative, real-time prototyping will be successful. The amateur theatrics of an experiential prototype can look foolish. It takes a certain confidence for individuals to loosen their ties, slip off their heels, and explore an idea through improvisation.

prototyping in the wild

Most prototyping takes place behind closed doors, for obvious reasons. It is often necessary to protect the confidentiality of ideas and limit their exposure so that the competition (and sometimes management) doesn't know what's up. Traditional companies may arrange focus groups or customer clinics, and edgier companies such as Electronic Arts regularly bring in gamers to test their games during development. Controlled

environments such as these work well enough in evaluating a product's functional characteristics: Does it work? Will it break when dropped? How well do the parts fit together? Will an average person be able to find the on/off switch? In fact, these are often aspects of a product that can be tested by the project team members themselves. Things become more complicated with services, however, and particularly with services that rely on complex social interactions. Mobile telephony, for example, draws on intangible interactions of users with one another and with the system itself. Today's complex ideas require prototypes to be released into the wild to see how they survive and adapt.

When the German mobile phone company T-Mobile began exploring ways of creating social groups via mobile phones, the company believed that networks of like-minded individuals could use phones not just to stay in touch but to share pictures and messages, make plans, synchronize schedules, and facilitate a hundred other interactions in a much more immediate way than with a PC. It would have been possible to create scenarios and storyboards to describe T-Mobile's ideas, and even to create simulations to run on phones. But the *social* dimension of the problem would have been overlooked. The only way to achieve this was to launch a prototype service. The design team loaded two prototypes onto some Nokia phones and handed them out to small groups of users in Slovakia and the Czech Republic. In less than two weeks it was clear which of the two prototypes was more compelling and why. The winning idea—helping users build social networks around events in their calendars—surprised the team, which had favored the alternative idea—helping people to create shared phone books. By launching prototypes, the team not only gathered real evidence of how

the new service might be used but avoided chasing after its own less promising idea. There was only one flaw in the innovative methodology: at the end of the trial, several of the users refused to give back their phones.

Another emerging form of "prototyping in the wild" involves the use of virtual worlds such as Second Life or social networks such as MySpace and Facebook. Companies can learn from consumers about proposed brands or services before they invest in the real thing. One successful example is the Starwood hotel chain, which launched a 3-D, computer-generated prototype of its planned Aloft brand inside the virtual world of Second Life in October 2006. Over the next nine months virtual guests inundated Starwood with suggestions on everything from the overall layout down to putting radios in the showers and repainting the lobby in earth tones. When enough feedback had been collected, Starwood shut down the virtual hotel to "renovate." When it reopened, a gala cyberparty erupted in which hip avatars danced in the lobby, flirted in the bar, and hung out around the pool. And what do you do with an expensive virtual prototype once real construction begins? Starwood donated its abandoned "sim" to the online youth empowerment group TakingITGlobal.

Starwood's Aloft brand wanted to capture a youthful, urban, stylish, and tech-savvy clientele—just the types likely to be found cruising the neighborhoods of Second Life. But the advantages of virtual prototyping make it likely that other, more conservative businesses will begin to experiment with it. Virtual prototyping allows companies to reach prospective customers quickly and get feedback from people in numerous locations. Iterations are easy, and as more of them begin to explore

the prototyping potential of online social networking, we will become increasingly adept at evaluating them. Like any prototyping medium, however, there are limitations. Virtual worlds such as Second Life rely upon avatars that represent customers, but we have no idea who they really are. This can be risky, as things are not always as they appear.

minding your own business

It is one thing to talk about prototyping material objects and even intangible services, but there is also a role for prototyping more abstract challenges, such as the design of new business strategies, new business offerings, and even new business organizations. Prototypes may bring an abstract idea to life in a way that a whole organization can understand and engage with.

HBO, famous for bringing us shows such as *The Sopranos* and *Sex and the City*, had by 2004 come to realize that the TV landscape was changing. It had earned its dominance in cable TV by delivering premium content, but the company could see that new delivery platforms such as Internet TV, mobile telephony, and video on demand were destined to become more important. HBO wanted to understand what the impact of these changes might be.

After a lengthy process of research and consumer observation, a strategy emerged based on creating seamless content that would spread across all of the emerging new technology platforms: desktop PCs, laptops, mobile phones, and Internet protocol television (IPTV). HBO, we concluded, should be willing to loosen its identification with cable TV and become

"technology agnostic," bringing content to customers whenever they wanted it and wherever they were. Instead of making a TV program and then thinking about what to do with DVDs or mobile content, shows should be created with these other channels in mind from the outset. We understood that this ambitious agenda challenged some fundamental premises. It required HBO not only to gain a deeper understanding of how audiences relate to media but also to break down some of the entrenched silos that existed within the company itself.

To create a compelling vision of the customer experience, the project team built prototypes and installed them in a walk-through experience on the fifteenth floor of HBO's New York headquarters. This enabled senior executives to see firsthand how customers might interact with TV content that they could access from different devices. For technical and analytical grounding, they constructed a future road map that ran the entire length of a wall and displayed the elements of technology, business, and culture that the company would confront as the program moved forward. Touring the fifteenth-floor environment we'd created, Eric Kessler, vice president for Marketing, got it: "This isn't about the future of HBO On Demand. It's about the future of HBO."

The prototype projected HBO management into the future in a compelling, realistic way, helping them visualize both the opportunities and the challenges to come. When HBO entered into discussions with Cingular (which is now AT&T Wireless) to put premium TV content onto a mobile platform, the fifteenth-floor prototype helped them to reach a common understanding.

phase shift: prototyping an organization

HBO illustrates the need to think with our hands even when working at the level of business strategy, and the same is true for the design of organizations themselves. Institutions must evolve with changing environments. Though the company "re-org" has become a cliché in business culture, it is nevertheless one of the most fateful and complex design problems any company may face, though it is rarely accompanied by any of the basic characteristics of good design thinking. Meetings are called in which there is no brainstorming; organizational charts are drawn up with little evidence of any thinking with the hands; plans are made and directives are issued without the benefit of prototyping. I don't know if IDEO could have saved the American auto industry, but we would have started with foam core and a hot glue gun.

To be sure, prototyping new organizational structures is difficult. By their nature, they are suspended in webs of interconnectedness. No unit can be tinkered with without affecting other parts of the organization. Prototyping with peoples' lives is also a delicate proposition because there is, rightly, less tolerance for error. But despite this complexity, some institutions have taken a designer's approach to organizational change.

The implosion of the dot-com supernova at the end of 2000 created a black hole whose epicenter was the San Francisco Bay Area. Designerly lofts were abandoned throughout San Francisco's "Multimedia Gulch," leaving only Aeron chairs and colorful iMacs; the $100,000-a-month billboards along Highway 101, the main corridor through Silicon Valley, fell empty; would-be entrepreneurs returned to college to finish

their degrees. IDEO, which had been working with new start-ups while helping more established companies navigate the passage into the Internet age, was hit hard. For the first time in our history, we experienced a forced belt-tightening. I had been summoned back from the United Kingdom, where I was heading up IDEO's European operations to take over the reins of leadership from David Kelley, who, with his exquisite sense of timing, had decided to step down just minutes (or so it seemed) before the e-bubble burst, to focus on his academic life at Stanford. It fell to me to oversee the transition to IDEO 2.0.

From a company that had once boasted that it would never grow beyond forty employees (so that we could lock the front door, jump onto a school bus, and drive to the beach), we had now expanded nearly tenfold, and although we worked hard to preserve a flat organizational structure, that growth translated into 350 careers, benefits packages, and dreams to fulfill. The stakes were high and there was no safety net, so I decided to do what designers do: I put together a team, and we launched a project. The brief? To reinvent the firm.

Having spent the previous two decades creating a human-centered design process for our clients, it would have been odd indeed if we had not applied it to ourselves. That is precisely what we did. During "Phase One" the project team fanned out across the landscape, talking to designers in each of our offices, our clients, our network of collaborators, and even our competitors to gain insight into how the field was evolving, where we were weak, and where we were strong. These discussions led to a series of workshops and our first prototypes, which took the form of a cluster of "Big Ideas" that captured the future as we saw it. One of these was the idea of "design with a small

d"—using design as a tool to improve the quality of life at every level, as opposed to creating the signature *objets* that grace the pedestals of art museums and the covers of lifestyle magazines. Another was the idea we called "One IDEO," the notion that our future depended on our acting not as independent studios but as a single interconnected network. A third idea was to abandon our original "studio" model—which reflected the way designers are organized—and replace it with a new, untested structure of "global practices" intended to reflect the way the world itself is organized: the "Health Practice" would focus on projects from precision medical equipment for Medtronic to educational packaging for GlaxoSmithKline; "Zero20" on the needs of kids from early infancy through late adolescence; other practices would be focused around interactive software, consumer experiences, the design of "smart spaces," and even organizational transformation. At this point we felt that we were ready to take our prototypes out into the field. Or, to be more precise, we took the field to the prototypes.

We decided to stage a global event that, for the first time since we had expanded beyond our base in Silicon Valley, would bring together every employee of IDEO in one place: senior mechanical engineers from Boston, newly hired graphic designers from London, model makers from San Francisco, human factors specialists from Tokyo, and even our beloved receptionist Vicky in Palo Alto converged upon the Bay Area to jump-start what we soon began to call IDEO 2.0. Standing up in front of that audience of 350 peers, colleagues, and mentors to launch the event remains the high point of my career. Little did I know that the kickoff was the easy bit.

The launch—three days of lectures, seminars, workshops,

dancing, and a mass version of the old computer game Pong with 350 simultaneous players—was a huge success. The following year, however, was one of the toughest I have ever experienced. As the prototypes unfolded, we learned that a story needs to be repeated many times before people understand how it applies to them and many more times again before they change their behavior. We learned that leadership teams that had been successful with small local groups might not easily project their ideas across seven locations. We learned that visionary designers who had been accustomed to complete creative autonomy did not happily adapt to the idea of market-driven practices.

We redesigned IDEO because we wanted the organization to remain flexible, nimble, relevant, and responsive to the new global environment that was taking shape. Five years on, two of the original seven practices no longer exist, a new one has been added, and one has refashioned and renamed itself twice to find better resonance with its intended clients. When it comes to organizations, constant change is inevitable and everything is a prototype. At the most challenging times we reminded ourselves that a successful prototype is not one that works flawlessly; it is one that teaches us something—about our objectives, our process, and ourselves.

There are many approaches to prototyping, but they share a single, paradoxical feature: They slow us down to speed us up. By taking the time to prototype our ideas, we avoid costly mistakes such as becoming too complex too early and sticking with a weak idea for too long.

I wrote earlier that all design thinkers, whether or not they happen to have been trained in any of the recognized design disciplines, inhabit three "spaces of innovation." Since design thinkers will continue to "think with their hands" throughout the life of a project—aiming toward greater fidelity as it advances toward completion—prototyping is one of the practices that enable them to occupy all three realms simultaneously.

Prototyping is always *inspirational*—not in the sense of a perfected artwork but just the opposite: because it inspires new ideas. Prototyping should start early in the life of a project, and we expect them to be numerous, quickly executed, and pretty ugly. Each one is intended to develop an idea "just enough" to allow the team to learn something and move on. At this relatively low level of resolution, it's almost always best for the team members to make their own prototypes and not outsource them to others. Designers may require a fully equipped model shop, but *design thinkers* can "build" prototypes in the cafeteria, a boardroom, or a hotel suite.

One way to motivate early-stage prototyping is to set a goal: to have a prototype ready by the end of the first week or even the first day. Once tangible expressions begin to emerge, it becomes easy to try them out and elicit feedback internally from management and externally from potential customers. Indeed, one of the measures of an innovative organization is its average time to first prototype. In some organizations, this work can take months or even years—the automobile industry is a telling example. In the most creative organizations, it can happen within a few days.

In the *ideation* space we build prototypes to develop our

ideas to ensure that they incorporate the functional and emotional elements necessary to meet the demands of the market. As the project moves forward, the number of prototypes will go down while the resolution of each one goes up, but the purpose remains the same: to help refine an idea and improve it. If the precision required at this stage exceeds the capabilities of the team, it may be necessary to turn to outside experts—model makers, videographers, writers, or actors, as the case may be—for help.

In the third space of innovation we are concerned with *implementation*: communicating an idea with sufficient clarity to gain acceptance across the organization, proving it, and showing that it will work in its intended market. Here too, the habit of prototyping plays an essential role. At different stages the prototype may serve to validate a subassembly of a subassembly: the graphics on a screen, the armrest of a chair, or a detail in the interaction between a blood donor and a Red Cross volunteer. As the project nears completion, prototypes will likely be more complete. They will probably be expensive and complex and may be indistinguishable from the real thing. By this time you know you have a good idea; you just don't yet know how good it is.

McDonald's is a company famous for applying the prototyping process throughout each of the spaces of innovation. In the *inspirational* space, designers use sketches, quick mock-ups, and scenarios to explore new services, product offerings, and customer experiences. These might be kept under wraps or shown to management or consumers to get early feedback. To nurture the *ideation* space, McDonald's has built a sophisticated prototyping facility at its headquarters outside Chicago where

project teams can configure every type of cooking equipment, point-of-sale technology, and restaurant layout to test new ideas. When a new idea is almost ready for *implementation*, it will often be tested in the form of a pilot deployed at selected restaurants.

CHAPTER FIVE

returning to the surface,
or *the design of experiences*

I fly between San Francisco and New York too often, but it's a trip I enjoy making. Coming from Britain, New York represents iconic America for me. It was the first U.S. city that I visited, and I always experience a twinge of excitement at the prospect of a return. Not so long ago, however, the flight was something that just had to be tolerated. The sum total of old airplanes, cramped space, miserable food, poor entertainment systems, inconvenient schedules, and indifferent service stripped away what should be the incomparable magic of flight.

In 2004, still reeling from the aftermath of 9/11, United Airlines introduced a new service on the San Francisco–New York route called p.s. (for "Premium Service") that attempted to solve some of these issues. In a stroke, United leapfrogged its competitors. Most of the cabin of the 757s was converted to business seats, since the vast majority of the customers on this route are business travelers. Legroom was increased measurably, but the new configuration also created a feeling of roominess in the cabin. United introduced better food service and provided personalized DVD players to its business passengers.

These improvements helped set United p.s. apart from its competitors, but there was one aspect of the new service that particularly transformed the experience for me as a passenger:

the added floor space altered the boarding experience. Not only did I now have plenty of space to stow my gear without getting in the way of fellow passengers, but that deadly twenty- or thirty-minute interval between boarding and takeoff became a *social* experience. On almost every flight I would find myself chatting with my neighbors without impatient passengers trying to squeeze past. Even before the doors closed and our tray tables were "returned to the upright position," United had managed to make boarding the aircraft a social experience that set my expectations for the remainder of the flight. The net effect reinforced the sense of excitement and anticipation I feel when I travel. The experience makes a connection to my emotions and not just to my schedule.

Buried in my experience with the corporate jet set is one of the most complex challenges facing any organization committed to the principles of design thinking: when we sit on an airplane, shop for groceries, or check into a hotel, we are not only carrying out a function but having an experience. That function can be compromised if the experience attending it is not designed with the same mindfulness a good engineer brings to a product or an architect to a building. This chapter turns to the design of experiences, examining three themes that make experiences meaningful and memorable: First, we now live in what Joseph Pine and James Gilmore christened an "experience economy" in which people shift from passive consumption to active participation. Second, the best experiences are not scripted at corporate headquarters but delivered on the spot by service providers. And third, implementation is everything. An experience must be as finely crafted and precision-engineered as any other product.

a good idea is no longer enough

Innovation has been defined as "a good idea executed well." This is a good start. Unfortunately, too much emphasis falls on the first half of that proposition. I have seen countless examples of good ideas that never gained traction for the simple reason of poor execution. Most of them never reach the market, and those that do end up littering the stockrooms of electronics stores and supermarkets.

New products or services may be doomed for all sorts of reasons: uneven quality, unimaginative marketing, unreliable distribution, or unrealistic pricing. Even when all the metrics and mechanics of business are in place, however, a poorly executed idea will most likely fail. The problem may lie with the physical design of the product—too big, too heavy, too complex. Likewise, the touchpoints for a new service—the retail space or software interface—may not connect to consumers. These are failures of design, and they can usually be fixed. Increasingly, however, ideas fail because people demand more of them than reliable performance in an acceptable package. The components of a product need to come together to create a great experience. This is a much more complicated proposition.

There have been many explanations for this new level of heightened expectation. Among the most compelling is Daniel Pink's analysis of what might be called the psychodynamics of affluence. In *A Whole New Mind*, Pink argues that once our basic needs are met—as they already have been for most people in the affluent societies of the West—we tend to look for meaningful and emotionally satisfying experiences.

We need only note the disproportionate growth of the service—entertainment, banking, health care—economies relative to manufacturing. Moreover, these services themselves have gone far beyond the support of basic needs: Hollywood movies, video games, gourmet restaurants, continuing education, ecotourism, and destination shopping have grown dramatically in recent years. Their value lies in the emotional resonance they create.

The Walt Disney Company may be the clearest example of an experience business, and we should not assume that it is only about entertainment. Experiences are deeper and more meaningful. They imply active participation, not passive consumption, which can happen on many different levels. Sitting with your three-year-old daughter as she sings along with *The Little Mermaid* is an experience that goes well beyond entertainment. A family trip to Disney World may be quite stressful—the food is terrible, the lines are too long, and the youngest sibling will melt down when she's told that she's too short to go on Space Mountain—but most visitors remember it as one of the great experiences of family life.

The real meaning of the "experience economy," then, is not primarily entertainment. The hierarchy of value they describe in their influential book—from commodities to products to services to experiences—corresponds to a fundamental shift in how we experience the world, from the primarily functional to the primarily emotional. Understanding this shift, many companies now invest in the delivery of experiences. Functional benefits alone, it seems, are no longer enough to capture customers or create the brand distinction to retain them.

from consumption to participation

The industrial revolution created not just consumers but a consumer society. The sheer scale required to sustain the economics of industrialization meant that not only did products become standardized but so did the services associated with them. This brought tremendous benefits to society, including lower prices, higher quality, and improved living standards. The downside was that over time the role of consumers became almost entirely passive.

The English reformers who invented modern design at the end of the nineteenth century were acutely aware of this. They foresaw a world in which the torrent of cheap goods pouring out of Britain's factories no longer held any connection to the workers who made them or meaning for the public that purchased them. William Morris, the larger-than-life force behind the English Arts and Crafts Movement, was the most articulate spokesman for the view that the industrial revolution had ushered in a world of unimaginable riches but one drained of feeling, passion, and deep human engagement: "Think of it!" he thundered at the end of his life. "Was it all to end in a counting house on top of a cinder-heap?"

An unapologetic romantic, Morris believed that industrialization had severed art from utility, had opened up a gulf between "useful work and useless toil," had contaminated the natural environment in the pursuit of goods, and had degraded what ought to have been a celebration of the human capacity to enjoy the fruits of our labor. Morris died in 1896, feeling that he had failed in his mission to reconcile the seemingly contradictory claims of objects and experiences. He la-

mented that his fellow craftsmen had become little more than "a tiresome little aristocracy working with high skill for the very rich." Almost in spite of themselves, however, they set the agenda that would drive design theory in the twentieth century.

Today we still wrestle with creating meaningful experiences out of the sheer glut of products—informational, now, as much as industrial—that threaten to consume us even as we consume them. Lawrence Lessig, a professor of law and the founder of the Stanford Center for Internet and Society, might be surprised to see himself compared to William Morris, but in his efforts to wrest control of our creative energies in the age of Big Media, he is continuing Morris's campaign against Big Industry and partaking of the same great tradition of using design as a tool of social reform. In a steady stream of books, lectures, and online discourses, Lessig has shown how we moved from a preindustrial world in which most of us were producers to an industrial world in which we have mostly become consumers of mass-produced media—a reversal traceable in many industries. Unlike his Victorian predecessor, however, who gazed backward toward a hopelessly idealized vision of the medieval craftsman producing his own goods, Lessig looks forward to a postindustrial digital age in which we will once again create our own experiences.

Lessig uses the example of music to show how we are moving back to active participation in our experiences from the passive consumption of the late twentieth century. Prior to the invention of radio and the phonograph, composers sold their scores to publishing houses, which in turn sold them, in the form of sheet music, to customers who played the music

themselves—at home, at family gatherings, and so on. With the emergence of the new broadcast media technologies, we stopped *playing* music at home every evening and started *listening* to it: first on our radios and phonographs and eventually on stereos, boom boxes, and Walkmans. With the emergence of digital music and the Internet, however, many more of us are once again making music instead of merely consuming it. We now have software tools that enable us to grab music from the Web, create mixes, samples, and mash-ups, and redistribute the results. Applications like Apple's Garage Band allow us to create music without formal training or even the ability to play instruments, with the result that seven-year-olds can now create unique sound tracks for the PowerPoint presentations they make for their school reports.

The campaigns of William Morris and Lawrence Lessig, separated by a century, an ocean, and another technology revolution, indicate the perceptual shift we will have to make as designers of experiences. Just as Web 1.0 blasted information at prospective customers whereas Web 2.0 is all about engaging them, companies now know they can no longer treat people as passive consumers. We have seen in previous chapters how the shift to participatory design is fast becoming the norm in the development of new products. The same is true of experiences.

Design has the power to enrich our lives by engaging our emotions through image, form, texture, color, sound, and smell. The intrinsically human-centered nature of *design thinking* points to the next step: we can use our empathy and understanding of people to design experiences that create opportunities for active engagement and participation.

experience engineering

Though Disney may be the most powerful example of experiences at scale—Disneyland in Anaheim can easily welcome 100,000 visitors in a single day—we now see a growing number of brands whose proposition is also based on participatory experiences. The food industry offers perhaps the most dramatic example of a category being transformed both at the source of production and the point of distribution. Through the 1950s and '60s, in Europe and America, local stores began to disappear, replaced by inexpensive but sterile supermarkets. The drive to lower prices—through such industrial processes as packaging, chemical preservatives, refrigeration, storage, and long-distance transport—not only removed much of the natural quality from food but also dehumanized an experience that lies close to the origins of human society. The growing popularity of farmers' markets, community-supported agriculture, the slow-food movement, and a burgeoning literature ranging from Michael Pollan's *In Defense of Food* to Barbara Kingsolver's *Animal, Vegetable, Miracle*, suggests that consumers crave a different experience of food shopping.

Earlier on I discussed the popularity of Whole Foods Market, one of the most successful retailers in the United States. Whole Foods Market continues to grow not just because of the growing market for organics but because it appreciates the importance of experience. Every aspect of the stores—the fresh produce displays, the free samples, the wealth of information about the preparation and storage of food, the variety of "healthy lifestyle" products—is designed to draw us in, to invite us to linger and *participate*. In the flagship store in Austin, Texas, Whole Foods has even experimented with allowing customers to cook.

Experience brands raise the bar when it comes to engaging with the customer at every possible opportunity. Virgin America is an experience brand, as attested by its Web site, its service interactions, and its advertising, all of which ease us into the check-in experience and the actual in-flight service. United is not. Though the p.s. service may be great, no other aspect of the airline reinforces the experience proposition. Experiments abound, however, and we may find them in some unexpected places.

The famed Mayo Clinic in Rochester, Minnesota, is an experience brand of an entirely different nature than Whole Foods Market, Virgin America, or Disney. Like many great hospitals, the Mayo is known worldwide for the expertise of its staff and the skill of its physicians at treating complex diseases. One way the institution sets itself apart from its competitors, however, is the manner in which it has extended its reputation for leading-edge research to innovation around the patient experience.

In 2002 a team of physicians headed by Drs. Nicholas LaRusso and Michael Brennan, the chair and associate chair of the Department of Medicine, respectively, approached IDEO with an idea for a laboratory of clinical experience. Might it be possible to construct an environment—an actual wing of the existing hospital facility—in which new approaches to patient care might be conceived, visualized, and prototyped? Using a set of principles that could have been lifted from a how-to manual of design thinking, we adapted our process to a methodology of "*S*ee-*P*lan-*A*ct-*R*efine-*C*ommunicate" and embod-

ied them in the state-of-the-art SPARC Innovation Program, which opened in 2004. We brought our process to the Mayo Clinic and left it there.

The SPARC laboratory is a design studio embedded in a clinical hospital (the former urology department, to be precise) in which designers, business strategists, medical and health professionals, *and patients* work in close proximity to develop ideas for improving the patient-provider experience. It operates in part like an experimental clinic, in part like an independent design consultancy for other units in the hospital. Half a dozen projects are going on at SPARC at any given time—from rethinking the traditional examination room to prototyping the interface of an electronic check-in kiosk. The work of the SPARC staff and affiliates seems destined to transform the patient experience throughout the institution.

From Disneyland to the Mayo Clinic, experiences can be created in the most playful and the most serious of categories. The example of SPARC suggests that design thinking can not only be applied to products and experiences but can be extended to the process of innovation itself.

to change behaviors—or not to change

Many a frustrated brand manager (or politician or health advocate) has been heard venting that if only consumers (or voters or patients) would just change their behavior, everything would be okay. Unfortunately, getting people to change is difficult under the best of circumstances and all but impossible in the face of resistance.

One way to get people to try something new is to build on behaviors that are familiar to them, as we did when we tapped into the childhood memories of American adults to create a new cycling experience—coasting—for Shimano. An equally compelling story began when Bank of America came to IDEO to help generate product ideas that would help them retain current customers while at the same time bringing in new ones. The team generated about a dozen concepts—service ideas oriented toward boomer moms, educational tools to help parents teach their kids about responsible money management—but one seemed particularly to stick: a service that would help customers to save more. The first order of business was to understand people's prevailing behavior, so we donned our anthropologists' pith helmets and headed out into the field—to Baltimore, Atlanta, and San Francisco—to understand how saving figured in the lives of ordinary Americans.

We found that all people want to save more but only a few have strategies for doing so. At the same time, many people perform unconscious acts that suggest a promising direction. Some people, for example, routinely overpay their utility bills, either out of a love of round numbers or to make sure they are never surprised by a fee for a late payment. Another type of "invisible saving" is the habit of tossing our spare change into a jar at the end of the day (to the delight of the kids, who find it a bottomless source of allowance payments, and the dismay of bank tellers who have to count it out in exchange for a couple of dollars). The project team reasoned that it might be possible to build on these behavioral clues to encourage more saving.

The result, after numerous iterations, validations, and prototypes, was a new service launched by Bank of America in

October 2005, called "Keep the Change." Keep the Change automatically rounds up debit card purchases to the nearest dollar and transfers the difference into the customer's savings account. Now when I buy my morning latte at Peet's and pay my $3.50 with my debit card, the 50 cents change that I would have received if I had handed over $4.00 in cash is deposited in my savings account. With all the coffee I drink, the savings add up pretty quickly. I am not the only one to find this to be an easy way of saving. In its first year, Keep the Change attracted 2.5 million customers, which translates into more than 700,000 new checking accounts and 1 million new savings accounts. It is doubtful that results on this scale could have been achieved by asking profligate spenders to change their ways with pedantic lessons about compound interest or moralizing about the true value of money. By grafting the new service onto existing behavior, however, IDEO designed an experience both reassuringly familiar and invitingly new. Before they knew it, BofA's customers were achieving results they never had before and possibly never thought they would.

building an experience culture by making everyone a design thinker

Nowhere is the challenge of designing compelling experiences greater than in the hotel industry—and in perhaps no other industry are the stakes higher. Any traveler can recall heart-stopping moments when an attentive member of a hotel staff has turned a potential disaster into a great experience, and the reverse is probably true as well. Whereas Bank of America had

only to create a onetime interface, great hotel chains rise or fall on delivering flawless service with flawless consistency. And like all experience brands, they rely on people to a great degree.

Four Seasons Hotels are famous for their quality of service as much as for the luxury of their properties. They are also recognized within the industry for having a staff-training system in which staff members learn how to anticipate the needs of their customers and build on the ideas of their colleagues—essential qualities, as we have seen, of design thinkers. In one program, which looks like an appealing perk but is actually a very shrewd investment, qualified employees, after just six months employment, are eligible to put themselves on the receiving end of the luxury hotel experience by staying at any Four Seasons property worldwide. Employees come back from these sojourns with a first-person appreciation of the meaning of hospitality, fired up to provide the best and most empathetic experience possible. Four Seasons knows that exceptional experience starts with its own people.

Creating an experience culture requires going beyond the generic to design experiences perceived as uniquely tailored to each customer. Unlike a manufactured product or a standardized service, an experience comes to life when it feels personalized and customized. Sometimes this feeling can be achieved through technology, in the way that Yahoo! allows people to customize their search pages. Most often it comes from the ability of experience providers to add something special or appropriate at just the right moment. This sense of timing is rarely the result of a corporate strategy developed by marketing executives working miles away and months or even years before. The design team back at home base may do a wonder-

ful job of creating a great stage for the experience and may even create some useful scripts to help keep it moving along, but they cannot anticipate every opportunity. That is why the training program at Four Seasons includes improvisation rather than drilling the staff with canned scripts. A real experience culture is a culture of spontaneity.

This insight inspired Ritz-Carlton, a Marriott International subsidiary and sister brand of Marriott Hotels, to ask us to help it think about how to take the building of an experience culture to scale across all of the fifty luxury hotels in the Ritz portfolio. Would it be possible to extend this idea of personalized experience to every one of the properties without losing the personal touch and sacrificing their unique character? The key to creating an integrated, coordinated experience, of course, was to avoid trying to create an integrated, coordinated experience.

IDEO designers decided to develop a two-piece program called "Scenography," intended to equip general managers with the tools to anticipate the needs and meet the expectations of their guests. In the first phase, they created a tool kit consisting of inspirational examples to show what a great experience culture might look like. Using visual language inspired by art and theater—scenes, props, mood—and original photography to capture a precise emotional ambience, they recast the hotelier not as operational manager but as artistic director, creatively empowered to choreograph a unique experience.

The second phase of "Scenography" addressed the fact that each hotel operates as an independent fiefdom full of local touches and property-specific management. Rather than propose a blandly uniform corporate identity across each of them, "Scenography" developed a template to help managers judge

for themselves whether or not they were meeting the high standards sketched out in the imagined scenarios and even to craft their own scenes from scratch. The hospitality industry has a record of providing discrete products and isolated amenities. We wanted them to think about service as something that happens continuously over time, with many encounters and a strong emotional outcome. We were asking them, in effect, to tell a story through an experience.

What we learn from the hospitality industry, where brands are built on the delivery of great experiences, is that transforming the culture of an organization is every bit as important as designing the lobby or the curbside service. Empowering employees to seize opportunities when and where they see them and giving them the tools to create unscripted experiences is an essential element of that transformation. Rather than delivering a set of instructions created for them by a bunch of designers somewhere, we encourage them to become design thinkers themselves.

executing the idea

On a recent trip to Grand Rapids, Michigan, my colleagues and I arrived in the early evening at a new JW Marriott hotel. Expecting to grab something to eat in town, we were instead met by one of our partners from Steelcase, who informed us that arrangements had been made for us to eat in the hotel's "stateroom." Images of the captain's table on the *Titanic* flashed through my mind. I began to feign symptoms of jet lag, but to no avail. We were escorted into the restaurant and then ush-

ered through the serving doors into the kitchen, where we were greeted by sous chefs, pastry chefs, and waiters and led, finally, into the private office of the executive chef, where a table had been laid for us. We were deep in the inner sanctum, his private domain, surrounded by cookbooks, open wine bottles, favorite music, and all the clutter of a large-scale culinary operation. A perfect meal followed. We chatted with the chef about local produce, secrets of the kitchen, and tricks of the trade. I learned a lot about food that evening, but even more about design.

One does not have to be the executive chef of a fancy restaurant to realize that eating is about more than food, nutrition, or diet. When friends come to your house for dinner, you give plenty of thought to the experience: What will you cook? Should we eat indoors or out? Will the seating favor a subdued conversation with old friends, or should it be designed to impress a business associate or put a foreign visitor at ease? Thinking through this process is the difference between cooking a meal and designing an experience, but it's important not to get lost in the staging of the event: the effect will be lost if the salad is wilted, the chicken tastes like rubber, and you can't find the corkscrew. For an idea to become an experience, it must be implemented with the same care in which it is conceived.

A one-off experience such as a dinner party is a bit like a piece of fine woodworking: it works with the grain and bears the mark of the craftsman, and imperfections are part of its charm. When the experience is repeated many times, however, each of these elements must be precision-engineered to deliver the desired experience consistently and reliably. We can think of service design as equivalent to everything that goes into a great product such as a BMW. The designers and engineers go

to great lengths to make sure the smell of the interior, the feel of the seats, the sound of the engine, and the look of the body all support and reinforce one another.

In designing houses, Frank Lloyd Wright was famous for the fastidiousness with which he attended to every aspect of the owner's experience. The Meyer May House, a modest residence in a suburban neighborhood in Grand Rapids, was designed to protect the privacy of owners and guests through the overall layout of the building, and detail after detail supports this overall objective. The dining room table is situated so that every person can see outside. The lighting is removed from the ceiling and placed on columns at each corner of the table to soften the light on each person's face. The chairs, designed with high backs, create an intimate border around the gathering. Wright also demanded that no high centerpieces be placed on the table to obscure the view between diners. Throughout the house, he designed the living experience down to the last detail.

Too much so, for many of Wright's critics and even some of his clients; the archives bulge with plaintive letters in which they humbly request permission to replace a piece of furniture or alter a window covering. When the wealthy industrialist Hibbard Johnson telephoned Wright to complain that the roof of his house had sprung a leak and rainwater was dripping on his head, the Master is said to have retorted, "Why don't you move your chair?" As tyrannical as he may have been, however (it has been said that he did not have clients so much as patrons), Wright was motivated by the belief that design and execution must work together if the architect is to deliver not just the house but the experience of it.

the experience blueprint

In the days before large-format photocopy machines, never mind computer-aided design, technical drawings still needed to be reproduced for building contractors and workers on the factory floor. They used a chemical process that produced blue-lined prints with a strong smell of ammonia, and the "blueprint" became synonymous with the specifications used in manufacturing or construction. The blueprint reveals on a single page both the general plan and the specific detail, the final objective and the practical means of implementation. Just as a product begins with an engineering blueprint and a building with an architectural blueprint, an *experience blueprint* provides the framework for working out the details of a human interaction—without the smell of ammonia.

The difference is that unlike the plans for an office building or a table lamp, an experience blueprint also describes the *emotive* elements. It captures how people travel through an experience in time. Rather than trying to choreograph that journey, however, its function is to identify the most meaningful points and turn them into opportunities. The concept of an experiential blueprint emerged when Marriott decided to focus on the first, and presumably the most important, point of contact between the customer and the hotel: the experience of checking in.

Marriott had invested millions of dollars in enhancing what was assumed to be the critical moment in the customer journey. Architects were summoned. Operations manuals were prepared. Advertising agencies were put to work. There was only one problem with this strategy, however: the premise was based

on assumptions, not observation. Marriott strategy assumed that when a weary traveler met a friendly face at the check-in counter, an interaction occurred that would color the remainder of the guest's visit. A closer look at the entirety of the picture revealed that even the best check-in experience was more akin to vaulting the final hurdle than to crossing the finish line.

To test this premise, a design team met travelers as they disembarked from their airplanes, accompanied them to the hotel in their taxis or rental cars, observed every detail of the check-in process, and then followed them up to their rooms. The genuinely important moment, they discovered, comes when the traveler enters his room, throws his coat onto the bed, turns on the television, and *exhales*. The "exhale moment," as it came to be called, presented the clearest opportunity for innovation and Marriott was persuaded to shift its resources in that direction.

As with an engineering or architectural blueprint, the experience blueprint takes the form of a physical document that guides the building of an experience. Unlike a prepared script or an operations manual, it connects the customer experience and the business opportunity. Every detail holds the potential to sour a relationship—confusing signage, an inattentive doorman—but only a few offer possibilities for an experience that is distinctive, emotionally gratifying, and memorable. The blueprint is at one and the same time a high-level strategy document and a fine-grained analysis of the details that matter.

From airlines and hospitals to supermarkets, banks, and hotels, it's clear that experiences are much more complex than inert

objects. They vary from place to place, they change over time, and they are hard to get right. Although the design of an experience may involve products, services, spaces, and technology, an experience carries us beyond the comfortable world of measurable utility and into the hazy zone of emotional value.

The best and most successful experience brands have a number of things in common that may provide us with some secure guidelines. First, a successful experience requires active consumer participation. Second, a customer experience that feels authentic, genuine, and compelling is likely to be delivered by employees operating within an experience culture themselves. Third, every touchpoint must be executed with thoughtfulness and precision—experiences should be designed and engineered with the same attention to detail as a German car or a Swiss watch.

CHAPTER SIX

spreading the message,
or *the importance of storytelling*

It's not so easy to get the prime minister of a G8 country to become part of your corporate marketing strategy, but Makoto Kakoi and Naoki Ito, senior account executives at the award-winning Japanese advertising agency Hakuhodo, used the power of storytelling to do exactly that in their brilliant Cool Biz campaign.

In 2005 the Ministry of the Environment, under the leadership of the imaginative minister Yuriko Koike, approached Hakuhodo for help in getting the Japanese people more involved in meeting Japan's commitment to the greenhouse gas reduction goals of the Kyoto Protocol. The government had made several previous attempts, but they had met with limited success. Hakuhodo suggested creating a campaign that mobilized the collectivist ethos of Japanese society toward a concrete goal: working together to reduce emissions by 6 percent. Within a year, according to a survey commissioned by the Ministry of the Environment, the slogan "Cool Biz" was recognized by a staggering 95.8 percent of the Japanese population.

The real challenge, as the Hakuhodo team recognized, was to make the campaign not only familiar but also meaningful. In pursuit of this elusive goal, they enlisted a group of experts to help them identify four hundred everyday activities that cause or reduce carbon emissions. This list was whittled down to six

key practices, which included raising the thermostats on air-conditioning systems in summer and lowering them in winter; conserving water by turning off taps; driving less aggressively; selecting more ecofriendly products at the grocery store; ending the use of plastic bags; and turning off electronic products when not in use. Each of these activities was selected to create a balance of engagement and impact. They were activities that most people could integrate into their daily lives but that, cumulatively and over time, would make an enormous difference.

The target during the first year of the program was the air-conditioning problem. Conventionally these systems were set to 26 degrees C. (79 degrees F.) so that businessmen in their suits and ties could work comfortably in the hot, steamy Japanese summer, while female office workers in their short formal business skirts often covered their laps with blankets to stay warm. This oddity would have been bad enough if not for the inconvenient truth that cooling buildings to such a low temperature requires huge amounts of energy, especially during the summer months.

Hakuhodo created Cool Biz, a period from June 1 to October 1 every year when businessmen and women may wear more casual clothing, so that it is easier to stay cool. Air-conditioning thermostats could then be raised to 28 degrees C. (82 degrees F.) instead of 26, a small adjustment but one that created enormous energy savings. Ingrained cultural practice threatened to derail this sensible idea: how to get conservative Japanese businessmen to change the way they dress? Rather than bombarding people with a campaign of print and TV advertisements, the Hakuhodo team set up a Cool Biz fashion show at

the Expo 2005 World Exposition in Aichi in which dozens of CEOs and other senior executives strutted about in casual business wear with open necks and lightweight materials. Even Prime Minister Junichiro Koizumi was featured in newspaper and TV stories tieless and in a short-sleeved shirt.

The event caused a sensation. In this traditional and hierarchical society, in which people defer to the guys at the top, a message went out that it was okay to depart from convention—business dress, in this case—to protect the environment. To help reinforce the message, the government distributed Cool Biz pins to any organization that signed on. It was forbidden to criticize coworkers for wearing casual clothing if they were wearing a Cool Biz badge. For the second time in a hundred years, the Japanese set about literally to reengineer their business etiquette. Within three years, 25,000 businesses throughout the country had signed on to Cool Biz and 2.5 million individuals had made commitments on the campaign's Web site. In Japan Cool Biz has now thawed to become Warm Biz to help save energy during the winter months, and Cool Biz sites have begun popping up in China, Korea, and elsewhere in Asia.

With Cool Biz, Hakuhodo turned an idea into a campaign and a campaign into a movement engaging millions of ordinary citizens and the political and business elite. Rather than relying on traditional advertising, Hakuhodo generated a conversation. Newspapers and magazines reported on the phenomenon because people wanted to know about it. The prime-time news media followed suit. Cool Biz had become a cool story.

Many notions have been proposed to explain what differentiates human beings from other species: bipedal locomotion, tool use, language, symbolic systems. Our ability to tell stories

also sets us apart. In his provocative book *Nonzero*, the journalist Robert Wright makes the case that consciousness, language, and society have developed an intimate relationship with technologies of storytelling throughout the forty-thousand-year history of human society. As we learned how to spread our ideas, our social structures expanded from nomadic groups to tribes to settled villages and then to cities and states, followed by supranational organizations and movements. Before long the Japanese were cooling their buildings in the summer and heating them in the winter to make it bearable to go to work wearing Western-style clothes—and telling themselves stories about it.

Mostly we rely on stories to put our ideas into context and give them meaning. It should be no surprise, then, that the human capacity for storytelling plays an important role in the intrinsically human-centered approach to problem solving, *design thinking*.

designing in the fourth dimension

We have already seen hints of storytelling at work: in ethnographic fieldwork; in the synthesis phase, in which we begin to make sense of large accumulations of data; and in the design of experiences. In each case, we are talking about adding not just a new widget but a whole new dimension to the designer's tool kit: the "fourth dimension," designing with time. When we create multiple touchpoints along a customer journey, we are structuring a sequence of events that build upon one another, in sequential order, across time. Storyboards, improvisation, and

scenarios are among the many narrative techniques that help us visualize an idea as it unfolds over time.

Designing with time is a little different from designing in space. The design thinker has to be comfortable moving along both of these axes. I learned this back in the mid-1980s, when designers working in the computer industry were still concerned mostly with hardware (remember all those beige boxes?). Software was still the domain of geeks in computer labs, not designers, much less students in classrooms, workers in offices, or consumers at home. The Apple Macintosh, which was oriented toward a mass market, changed everything. The smiley Mac icon told a completely different story from the blinking green cursor of MS-DOS.

The talented designers at the core of the Macintosh software team—Bill Atkinson, Larry Tesler, Andy Hertzfeld, Susan Kare—were by no means the only ones thinking about how to create a seamless computing experience at that time. In 1981 Bill Moggridge, having been lured from Britain to the Bay Area by the challenges of the emerging digital technology, began work on the design of a curious little "laptop" computer for a Silicon Valley start-up called GRiD Systems. The team received a patent for the idea of folding a thin, flat screen down over the keyboard. The GRiD Compass established the standard layout for the laptop computer and went on to win countless awards. Once the computer was turned on, however, the terrible DOS-based operating system overwhelmed the experience. To perform the simplest operation, it was necessary to type an arcane sequence of commands that bore no relation to lived experience—in the sharpest contrast to the ingenious device, which folded in half like a notebook and disappeared into a briefcase.

Inspired by the Mac and the GRiD, Moggridge decided there had to be a role for professional designers in software development—the insides, as it were, and not just the outsides of computers. This led him to propose a new discipline: interaction design. In 1988, when I joined Bill's team at ID Two in San Francisco, I worked with a small team of interaction designers on projects for computer-aided design, network management, and later video games and various online entertainment systems. For an industrial designer accustomed to designing discrete physical objects, designing for a series of dynamic interactions over time was transformative. I realized I had to have a deeper understanding of the people for whom I was designing. I had to think as much about their actions as the objects they were using—"We are designing verbs," Moggridge kept reminding us, "not nouns."

To design an interaction is to allow a story to unfold over time. This realization has led interaction designers to experiment with the use of narrative techniques such as storyboards and scenarios borrowed from other fields of design. When working on the predecessor of the modern GPS system for Trimble Navigation, for instance, the designers told a story about how a sailor might navigate from one port to the next. Each scene described some important step that would have to be designed into the system. In the early days interaction designers tended to be too prescriptive. Today, they are learning to let go and to allow the user a greater say in determining how things unfold. Almost everything now has an interactive component. The distinction between software and the products in which it is embedded has blurred, and time-based narrative techniques have entered into every field of design.

taking time to design

One of the many problems bedeviling the health care system today is "adherence." Once a doctor has diagnosed a condition, patients often fail to take the prescribed medicine for the duration of the therapy. The pharmaceutical industry is concerned about this for its own reasons: drug companies lose billions of dollars each year because patients give up on their medications. But adherence is a serious medical issue as well. In the phrase of the incurably blunt former Surgeon General C. Edward Koop, "Pills don't work if people don't take them!" In the case of chronic conditions such as heart disease or high blood pressure, patients risk letting the condition get worse. In other situations—antibiotic treatments of bacterial infections, for instance—they may put others at risk by releasing attenuated drug-resistant microorganisms back into the larger population.

IDEO has worked with several pharmaceutical companies on specific drug adherence regimes. The brief: drug companies spend hundreds of millions of dollars, often using aggressive marketing techniques, to promote their drugs, only to lose much of the therapeutic, and business, advantage when the patient stops taking them. They are taking a traditional approach to selling a product rather than creating an experience that engages the patient over time. Rather than badgering doctors with unwanted sales visits and the public with obnoxious television commercials, pharmaceutical companies should use design thinking to explore a new approach to the business of pills.

There are three self-reinforcing phases of medical treatment. First, the patient must understand his or her condition, then accept the need for treatment, and finally take action. This time-based

"adherence loop" suggests a framework with many different points at which it is possible to provide patients with needed positive reinforcement. We can design better information to educate people about their disease; there could be better methods for dispensing and administering medications; along the "adherence journey" the patient might find support groups, Web sites, and call centers staffed by nurses. The specific set of tools will vary according to the particular disease or treatment, but two underlying principles are the same: first, as with every other type of time-based design project, each patient's journey through the process will be unique; second, it will be far more effective to engage individuals as active participants in their own stories. Designing with time means thinking of people as living, growing, thinking organisms who can help write their own stories.

the politics of new ideas

An experience that unfolds over time, engages participants, and allows them to tell their own stories will have resolved two of the biggest obstacles in the path of every new idea: gaining acceptance in one's own organization and getting it out into the world. An idea may be a product, service, or strategy.

More good ideas die because they fail to navigate the treacherous waters of the organization where they originate than because the market rejects them. Any complex organization must balance numerous competing interests, and new ideas, as Harvard's Clayton Christensen argues, are disruptive. If it is truly innovative, it challenges the status quo. Such innovations often threaten to cannibalize previous successes and recast yesterday's innovators as today's conservatives. They take resources away from other important programs. They make life harder for managers by presenting them with new choices, each with unknown risks—including the risk of making no choice at all. Considering all of these potential obstacles, it is a wonder that new ideas make it through large organizations at all.

At the heart of any good story is a central narrative about the way an idea satisfies a need in some powerful way: coordinating a dinner date with friends on opposite sides of town; making a discreet insulin injection during a business meeting; converting from a gasoline-powered to an electric-powered car. As it unfolds, the story will give every character represented in it a sense of purpose and will unfold in a way that involves every participant in the action. It will be convincing but not overwhelm us with unnecessary detail. It will include plenty of detail to ground it to some plausible reality. It will leave the audience with no doubt that the organization "narrating" it has what it takes to make it real. All this takes skill and imagination, as a group of executives from Snap-on discovered.

From the neighborhood gas station to the vast maintenance terminals of the major commercial airlines, the bright-red-and-silver Snap-on toolbox is an icon of machine shops everywhere. The Wisconsin-based company felt less certain about how to tell a compelling story about the computerized products that were the key to its future survival. Every garage mechanic feels an emotional connection with his hand tools, but it's not so easy to personalize the experience of an electronic diagnostic device that interrogates a car's onboard computer to identify problems and parts in need of repair. Where Snap-on saw a problem, a design team at IDEO saw an opportunity to tell a new story.

Once the brief was settled, the team took over an abandoned automobile-repair shop a couple of blocks away in Palo Alto. During a frenetic week of activity, they transformed the place into a space-time narrative their client would not soon forget. On the day of the final presentation, the Snap-on visitors headed up the street to the garage, in front of which was parked a fleet of Ferraris, Porsches, and BMWs, all in the signature Snap-on colors of silver and red.

After a wine-and-cheese greeting, the executives were given a briefing in the main garage bay, then ushered into a room with a museumlike display of inspirational artifacts, and finally to a screening of videos of real mechanics talking about the Snap-on brand. The story reached its climax when the Snap-on executives were led from the makeshift theater into a darkened room. As the lights faded up, they found themselves surrounded by sleek prototypes of a new generation of diagnostic devices transformed from generic computers to high-tech siblings of Snap-on's iconic wrenches and toolboxes. Posters advertising products based on the new brand strategy lined the walls. As the CEO and president played with the models, the marketing VP sponsoring the project stood by with tears streaming down her cheeks. Though it's not always necessary to make your audience cry, a good story well told should deliver a powerful emotional punch.

when the point of the story is the story

Design thinking can help bring new products to the world, but there are occasions when it is the story itself that is the final

product—when the point is to introduce what the evolutionary biologist Richard Dawkins famously called a "meme," a self-propagating idea that changes behavior, perceptions, or attitudes. In today's noisy business environment, where top-down authority has become suspect and centralized administration is no longer sufficient, a transformative idea needs to diffuse on its own. If your employees or customers don't understand where you are going, they will not be able to help you get there. This is doubly true in the case of technology companies and other businesses whose product may not be easily recognized or understood.

Chip designers live in the back room of the computing industry. Nothing would work without them, but no matter how vital their contribution, it is hard to build a brand around a microscopic chip that sits on a board that sits inside a device that sits inside a box. This is the genius of the little "intel inside" sticker affixed to so many of the world's PCs. In the highly competitive computer industry, where Moore's Law humbles the mighty and technological advantages are short-lived, Intel has built a powerful global brand that is meaningful to consumers even though they cannot see it or hold it in their hands.

More recently, pursuing what the Stanford professor of organizational behavior Chip Heath calls "ideas that stick," Intel has moved from adhesive labels to an approach that uses storytelling to explore the future of computing. Having conquered the desktop, Intel is now promoting a shift to mobile computing. Oftentimes these projects are showcased at influential industry events such as the Intel Developer Forum, but it can be hard to demo a product that hasn't been created yet. It's easier just to sit back and enjoy a movie.

Most of us are already lugging around "laptop" computers in our briefcases and backpacks, but Intel wanted to show what life might be like in a world of ultramobile computing—the next generation of smart phones and other devices we might carry with us all the time. Using sophisticated computer graphics, a design team working with Intel created "Future Vision," a series of film scenarios intended to show how we might in the near future integrate mobile computing into our daily rhythms: a Mandarin-speaking businessman finds his way to the offices of his American partner while preparing for a tough negotiating session; a jogger receives a Wi-Fi notification that his afternoon meeting has been moved forward to 8:30 a.m.; shoppers compare prices; and friends coordinate their urban movements in real time. The design team even arranged for "Future Vision" to be uploaded onto YouTube, where it has been seen by well over half a million people.

Intel did not have to go to Hollywood to make "Future Vision." A design team, working with a talented film crew, completed the entire project in a few weeks and at a fraction of the cost of a conventional ad. Effective storytelling, even with high production value, does not have to break the bank.

propagating the faith

Should an idea manage to survive the perilous journey through an organization and out into the market, storytelling can play another vital if obvious role: communicating its value to its intended audience in such a way that some of them, at least, want to go out and buy it.

We are all familiar with the power of great advertising to tell stories, and create myths, about new products. I remember as a kid in the United Kingdom in the 1970s watching the great TV "adverts" for Hamlet cigars, Silk Cut cigarettes, and Cadbury's Smash. They were clever, funny, and engaging. Advertising, in those days, greased the wheels of the consumer economy, and it resonated with a more optimistic, less skeptical public. By then, however, there were already indications that things were changing: I loved the ads, but I never took up smoking and the taste of the powdered potato mix that went into Cadbury's Smash still makes me slightly nauseous.

Many observers have commented on the decline in the effectiveness of traditional advertising. One simple reason is that fewer people are reading, looking at, or listening to traditional forms of broadcast media. But there are other reasons why thirty-second spots no longer serve as an effective vehicle for new ideas, including what the Swarthmore College psychologist Barry Schwartz has identified as "the paradox of choice." Most people don't want more options; they just want what they want. When overwhelmed by choice, we tend to fall into behavioral patterns used by those whom Schwartz calls "optimizers"—people paralyzed by the fear that if they only waited a little while longer or searched a little harder, they could find what they think they want at the best possible price. That was not a problem in the days when "automobile" meant a black Model T or "the phone company" meant AT&T. The other camp is populated by "satisficers," who have given up on making consumer decisions and will put up with whatever works. Neither presents marketing departments with a happy situation, and marketers have been driven to increasingly desperate measures

to deal with the fact, with dubious results. I suspect that I am not the only one who can recall an ad but have no idea which financial service, pain reliever, or limited-time offer it advertised.

From the perspective of the design thinker, a new idea will have to tell a meaningful story in a compelling way if it is to make itself heard. There is still a role for advertising, but less as a medium for blasting messages at people than as a way of helping turn its audience into storytellers themselves. Anyone who has a positive experience with an idea should be able to communicate its essential elements in a way that encourages other people to try it out for themselves. Bank of America launched its successful Keep the Change offering with plenty of advertising, but the campaign served mostly to build on a habit many customers already practiced and make them propagandists for it.

Examples abound of effective storytelling, of design thinking engaging an audience and playing itself out in the medium of time. When the MINI Cooper brand launched in the USA, BMW made excellent use of storytelling to market a brand. Instead of relying on the normal mind-numbing TV ads full of cars speeding through the mountains or depositing their elegantly dressed cargo in front of fancy restaurants, the creative agency Crispin Porter + Bogusky exploited the car's small, cute, and irreverent character. Their "Let's motor!" campaign evoked the story of David and Goliath, with the diminutive MINI bravely arrayed against its gigantic American competitors. MINI billboard ads appeared everywhere, and their clever visual puns inspired spontaneous storytelling about the place of the MINI—and of the billboards advertising it!—in the urban

environment. Magazine pullouts included fold-up MINIs. In one particularly nasty tweak to the U.S. auto industry, professional drivers tooled around Manhattan in SUVs with MINIs strapped to the roof! After signing the papers—including one headed "The Sucky Financial Bit"—new buyers were given a personal Web site where they could follow the progress of their MINI being made. All of these clever marketing tools not only were well executed, they also got people talking, and that became part of the story.

the challenge of a good challenge

There is almost no trick in the design thinker's tool kit more enjoyable to observe or more productive of results than a "design challenge." This exercise takes the form of a structured competition in which rival teams attack a single problem. A single team usually comes out on top, but the collective energy and intelligence they mobilize ensures that everybody wins. IDEO was recently asked by one of the Bay Area's leading art schools to help imagine the future of the institution, so we spent most of the modest budget hiring the school's own design students to figure it out in rival teams; the results exceeded everyone's expectations.

The creative team at Hakuhodo, the Japanese advertising firm that created the Cool Biz campaign, experimented with another twist on the design challenge. The battery division of Panasonic had been struggling with its Oxyride battery, which is more powerful and longer lasting than a normal alkaline battery but is otherwise indistinguishable from its countless com-

petitors. Rather than running a normal ad campaign promoting Oxyride's technology, the Hakuhodo team posed a simple question: "Can man fly on the power of household batteries alone?"

For four months a group of student engineers from the Tokyo Institute of Technology worked on the design and construction of a battery-powered, piloted airplane, while a TV show followed their progress and a Web site stoked public curiosity and built support for the team. At 6:45 on the morning of July 16, 2006, three hundred journalists turned up to watch as the plane took off from a makeshift runway and soared almost 400 meters (1,300 feet)—powered by 160 Oxyride AA batteries. All the Japanese news channels covered the flight, and the story found its way into international news services, including the BBC and *Time*. The event generated media coverage that Panasonic estimated to be worth at least $4 million, and Oxyride's brand recognition jumped by 30 percent. Hakuhodo and Panasonic used a simple design challenge to turn advertising on its head. The aircraft even ended up in the National Science Museum—an honor not shared by the Energizer Bunny!

A decade before the first battery-powered manned flight, the spaceflight activist Dr. Peter Diamandis used a dramatic design challenge to capture the public imagination and stimulate a major technological initiative. According to the terms of the first Ansari X Prize, announced in 1996, a nongovernmental team must build and launch a spacecraft capable of carrying three people to an altitude of 100 kilometers (62 miles) above the earth's surface and repeat the feat within two weeks. The challenge was a huge success. Twenty-six teams from seven countries spent more than $100 million before SpaceShipOne,

the team from Burt Rutan's company, Scaled Composites, won the prize on October 4, 2004. Since then, and in large measure due to the X Prize challenge, entrepreneurs have invested more than $1.5 billion in support of the private spaceflight industry. The X Prize Foundation has extended its program of "Revolution Through Competition" to superefficient cars, genomics, and landing robots on the moon. Numerous other organizations have followed Diamandis's example.

Design challenges are not only a great way to unleash the power of competition, they also create stories around an idea, transforming people from passive onlookers into engaged participants. People love the idea of following bands of adventurers as they compete to achieve the impossible. Reality TV has exploited this fascination with dubious results, but organizations such as the X Prize Foundation have shown how this same fascination can be mobilized to fulfill technological dreams and achieve profound humanitarian goals.

from chasing numbers to serving humans

Effective storytelling, as part of a larger campaign of using the element of time to advance an integrated program of design thinking, relies on two critical moments: the beginning and the end. At the front end, it is essential that storytelling begin early in the life of a project and be woven into every aspect of the innovation effort. It has been common practice for design teams to bring writers in at the end to document a project once it has been completed. Increasingly they are building them into the design team from day one to help move the story along in

real time. At the far end, a story gains traction when it is picked up by its intended audience, who feel motivated to carry it forward long after the design team has disbanded and moved on to other projects.

Among the many ways that the American Red Cross provides relief to the disadvantaged, one of the most important is large-scale donor blood collection. This volunteer-run organization goes to schools and workplaces and sets up a donor clinic for a day. In recent years the donor base has been shrinking, however, and the Red Cross decided to apply design thinking to the challenge of increasing the percentage of Americans donating blood from 3 percent of the population to 4 percent. This meant shifting the question from percentage points to a more human-centered focus: What are the emotional factors that lead people to donate blood or refrain from doing so? How might we improve the donor experience to make more people want to give blood?

Together, the IDEO–Red Cross team explored various ways of making the temporary field clinics more comfortable for the donor and easier for the all-volunteer staff to set up and take down. Numerous practical ideas resulted from the effort—storage units that doubled as furniture, a system of mobile carts—but one detail expressed the new, human-centered orientation: in the course of repeated on-site observations, the design team noted that many people had strong personal motivations for giving blood—in memory of a lost family member or on behalf of a close friend whose life had been saved by a blood donation. The stories they told were powerful and often the reason why donors came back again and again and even recruited their friends and coworkers.

The design team decided that better signage and more comfortable seating were less important than inviting people to share their stories and thus reinforce the emotional reasons for giving blood. Returning donors might feel that their private experiences were connected to something larger. New donors might learn something about the range of motivations behind this altruistic act. In the new experience, when donors check in they are given a card and invited to write a brief story about their reasons for wanting to give blood. Donors who wish to have their pictures taken can add their photograph to the card before it is posted on a board in the waiting area. What could be simpler than telling a story and sharing it with others, each of whom is there for a different reason but who are bound to one another by a common commitment?

On the basis of promising results from a prototype set up in North Carolina, the American Red Cross is preparing to move forward with full-scale pilot programs in Minnesota and Connecticut.

life after the thirty-second spot

The sheer excess characteristic of our time—of goods, services, and information—is one reason for the declining success of conventional advertising. A second reason is that we ourselves are growing more complex and sophisticated. With access to greater volumes of information than could have been imagined by our parents' generation, our judgments are more complex and our choices more discerning. One need only look at the hopelessly dated jingles and antics that enlivened the commer-

cials of our childhoods to see how far we have come. It's become impossible to sell a box of laundry detergent—much less communicate the urgency of an idea such as global warming—through a thirty-second spot.

As a result, storytelling needs to be in the tool kit of the design thinker—in the sense not of a tidy beginning, middle, and end but of an ongoing, open-ended narrative that engages people and encourages them to carry it forward and write their own conclusions. Herein lies the success of the forceful story created by Al Gore and told in his Academy Award–winning movie, *An Inconvenient Truth*. By the end of the film the Nobel laureate, Academy Award winner, and self-described "former next president of the United States" presents the evidence of global warming to his viewers and challenges them to make it their own.

"Design" is no longer a discrete stylistic gesture thrown at a project just before it is handed off to marketing. The new approach taking shape in companies and organizations around the world moves design backward to the earliest stages of a product's conception and forward to the last stages of its implementation—and beyond. Allowing customers to write the last chapter of the story themselves is only one more example of design thinking in action.

In each of the preceding chapters I have tried to identify techniques that originated in the design community—field observations, prototyping, visual storytelling—that lie at the center of a human-centered design process. In the course of these studies I have made two arguments: First, that it is time for these skills

to migrate outward into all parts of organizations and upward into the highest levels of leadership. Design thinking can be practiced by everybody. There is no reason why everyone, up to and including the "C-level"—CEOs, CFOs, CTOs, and COOs—cannot master these thought processes as well.

The second part of my argument will become clearer in the chapters that make up part two. It is that as design thinking begins to move out of the studio and into the corporation, the service sector, and the public sphere, it can help us to grapple with a vastly greater range of problems than has previously been the case. Design can help to improve our lives in the present. Design thinking can help us chart a path into the future.

CHAPTER NINE

design activism,
or *inspiring solutions with global potential*

A half century ago Raymond Loewy boasted of his role in boosting the sales of Lucky Strike cigarettes by fiddling with the graphics on the box. Few designers today would even touch this type of project. The rise of design thinking corresponds to a culture change, and what excites the best thinkers today is the challenge of applying their skills to problems that matter. Improving the lives of people in extreme need is near the top of that list.

This is not merely a matter of collective altruism. The greatest design thinkers have always been drawn to the greatest challenges, whether delivering fresh water to Imperial Rome, vaulting the dome of the Florence Cathedral, running a rail line through the British Midlands, or designing the first laptop computer. They have searched out the problems that allowed them to work at the edge because this was where they were most likely to achieve something that has not been done before. For the last generation of designers, those problems were driven by new technologies. For the next generation, the most pressing—and the most exciting—challenges may lie in the highlands of southeast Asia, the malarial wetlands of East Africa, the favelas and rain forests of Brazil, and the melting glaciers of Greenland.

I do not mean to suggest that designers have never before

taken on problems at the scale of sustainability and global poverty. Victor Papanek's *Design for the Real World* was required reading when I entered art school three decades ago, and I still recall our late-night discussions about design being for "people, not profit." Out of this righteous indignation came any number of tin-can radios and emergency shelters, but apart from a dawning consciousness of our social responsibilities, there is little evidence of its having had a lasting impact. The reason is that as designers we focused our skills on the object in question and ignored the rest of the system: Who will use it, how, and under what circumstances? How will it be manufactured, distributed, and maintained? Will it support cultural traditions or disrupt them?

A better model is that developed by Martin Fisher, a Stanford PhD who was denied a Fulbright scholarship to work in Peru because he didn't speak Spanish. Fisher reluctantly agreed to a ten-month assignment in Kenya, where he ended up staying for seventeen years. In Nairobi he observed that people in poor countries who have been thrust into the global economy do not need money so much as the means to earn money. Together with his development partner Nick Moon, Fisher founded KickStart, a provider of low-cost "microtechnologies" including a treadle-operated deepwater pump—significantly called the "Super MoneyMaker"—that have helped more than 80,000 local farmers launch small businesses in East Africa. Fisher understood that the ingenious pumps, brick presses, and palm-oil extractors were not enough. His customers needed a local infrastructure including marketing, distribution, and maintenance. Educated in the high-technology world of Silicon Valley and schooled in the slums

of Nairobi, Fisher shows how design thinking extends the perimeter around a problem.

the most extreme users of them all

When Hewlett-Packard asked IDEO to study microfinance in East Africa, our human factors experts did not know what they were getting into. We did not have much experience with Africa, and it would be generous to say that we are experts in microfinance. So of course we accepted the assignment.

The two-person team traveled to Uganda, where they planted themselves in various rural communities and in the capital city of Kampala, where they talked to local women about the on-the-ground realities of microfinance. In the course of their fieldwork, the pair noted an acute need for keeping accurate records of financial transactions but also saw the obstacles of doing so with the tools and technologies we take for granted in the West. The use of electronics is not widespread in rural Africa. Components need to be simple and robust. Products need to be designed so that they may be easily repaired or inexpensively replaced. Reprogramming a Windows-like interface is far too costly for the small populations of tribes speaking numerous languages and dialects. The closer the team looked, the more daunting the list of constraints became.

With the return of the field researchers, the full design team began work on a product that owed more to IDEO's decades-long work with the toy industry than with consumer electronics. The device uses simple, off-the-shelf electronic components that are inexpensive, readily available, and easy to repair. Instead

of an interface based on a large, expensive display, a simple printed-paper keyboard sits over the buttons so that adapting to a new language is as simple as printing a new piece of paper—or even handwriting a new sheet. The "Universal Remote Transaction Device" would not have been a big hit at the annual International Consumer Electronics Show in Las Vegas, but it was an appropriate tool for an emerging market in a developing country. Even better, the device could be used not just for keeping track of microfinancial transactions but also for remote monitoring of health care incidents, agricultural issues, supply-chain management, and more.

I wrote early on about the benefits that come from seeking out extreme users and why the most compelling insights often come from looking outward, to the edges of the market. The objective is not so much to design for these marginal, outlying populations as to gain inspiration from their passion, their knowledge, or simply the extremity of their circumstances. We may, however, be far too timid about what this concept implies. Even when we look at tech-savvy teenagers in Korea to help us think about what's next for middle-aged Americans, we are sticking to the places and people we already know and to consumer-oriented problems that are basically our own. We do not often think of going to the poorest, most neglected corners of the earth to learn about the lives of people who have fallen out of the system, but this is where we may find globally applicable solutions to the world's most pressing problems. Sometimes necessity is the mother of innovation.

This argument can be misconstrued. Though it is praiseworthy to contribute our talents to the eradication of preventable disease, disaster relief, and rural education, too often our instinct has been to think of these interventions as social acts that are different from and superior to the practical concerns of business. They are the domain of foundations, charities, volunteers, and NGOs, not of "soulless corporations," which attend only to the bottom line. Neither of these is any longer an acceptable model, however. Businesses that focus solely on bumping up their market share by a few tenths of a percentage point miss significant opportunities to change the rules of the game, and nonprofit organizations that go it alone may be denying themselves access to the human and technical resources necessary to create sustainable, systemic long-term change. The influential business strategist C. K. Prahalad has written about the fortune to be found at the "bottom of the pyramid" by companies that dare to approach the world's poorest citizens not as suppliers of cheap labor or recipients of their charitable largesse but rather as partners in creative entrepreneurship. Prahalad's description of the Aravind Eye Hospital in Madurai, India, is a case in point.

a passage to India

Aravind was founded in 1976 by the late Dr. G. Venkataswamy—"Dr. V," as everyone called him—to explore ways to deliver medical care to inhabitants of poor and developing countries. The alternatives, at that time, were to import practices and facilities from the West—which placed them impossibly beyond the reach of most Indians—or to rely on "traditional" practices, which deny people the fruits of modern research and often simply mean no treatment at all. Dr. V felt there must be a third way.

My own passage to India began with a visit to one of Aravind's mobile eye camps in the "suburbs" of Madurai in the southern Indian state of Tamil Nadu. I didn't expect neat, three-bedroom houses in planned communities. On the other hand, I was not prepared for what I saw: shantytowns cobbled together out of cardboard boxes and corrugated metal, simple houses mixed with workshops left over from the Raj, shops the size of a Wal-Mart parking space selling every imaginable necessity. But I also saw people having their eyes tested. I saw how more complex cases were transmitted via satellite back to the hospital, where experienced doctors could make the final diagnosis. I watched patients with operable cataracts boarding a bus headed for Aravind, where they would have the operation the same day.

Aravind has its own in-house manufacturing facility that makes the intraocular lenses and sutures used in cataract operations. It is an amazing example of the use of extreme constraints as the inspiration for breakthrough innovation. Dr. David Green, who has been honored by the Ashoka Foundation, the MacArthur Foundation, and the Schwab Foundation for Social Entrepreneurship, working with Dr. P. Balakrishnan at Aravind, hypothesized that it might be possible to use small-scale computer-aided manufacturing technology to make the lenses locally rather than importing them from foreign medical suppliers at a cost of approximately $200 per pair. In 1992, through his nonprofit Project Impact, Green set up a small manufacturing unit in the basement of one of the hospitals and started making plastic lenses. Over time it expanded to make sutures as well and ultimately met all the international standards it needed to export products internationally. Aurolab

(as they eventually named their basement start-up) is now the biggest exporter of lenses and sutures in the developing world. It has recently relocated to a new factory. A confessed "serial social entrepreneur," Green has turned his attention to hearing loss and pediatric AIDS drugs—a global campaign that started as a prototype within the Aravind system.

In the hospital itself we dressed in scrubs and toured the wards, where physicians perform more than 250,000 surgeries per year. Assembly-line operating procedures are at the core of Aravind's productivity. As a surgeon removed the damaged lens from one patient in a quick but skillful procedure, the next patient was being prepared right alongside in the operating room. Postoperative recovery did not take place in a fancy ward with satellite TV and cut flowers but in a simple room with rush mats on the floor, where patients spent the night before returning home the next day. It was not luxurious by the standards of the West, but it was as comfortable as the beds they slept in at home. For about a third of the patients it was free; the remainder paid on a sliding scale, which began at 3,000 rupees (about $65) and for which they received exactly the same care.

It is unlikely that a Western doctor, hospital administrator, architect, or industrial designer would have forgone expensive wards in favor of rush mats and concrete floors, even if their mission were to help the blind. This insight grew out of Dr. V's empathy with the culture of the poor. He realized that giving his patients something consistent with what they were accustomed to in their villages but still good enough to meet acceptable medical standards, allowed him to serve the poor in an economically viable way. And he has succeeded. The Aravind Eye Hospital has served millions of patients. Aurolab operates

at a 30 percent profit, which is plowed back into clinics in Nepal, Egypt, Malawi, and Central America. While the Aravind management team takes private donations to fund additional work, the operating model is self-sustaining and the clinic is no more reliant on charitable donations than the majority of Western health care facilities.

Although many people have praised Aravind for its entrepreneurial model of "compassionate capitalism," as a designer my experience there showed me the enormous potential of working under extreme constraints. How ironic that the holy grail of corporate America—where innovation leads to breakthrough solutions and enhanced profitability—should be realized on the straw mats of an eye clinic in rural India. Not only is Aravind providing untold benefits to the citizens of Madurai, Pondicherry, and the other cities in which its hospitals now operate, it is also exporting its ideas and approaches to other health care facilities throughout the developing world—and perhaps beyond. Indeed, there are signs that Aravind's approach, and that of others like it, may become accepted practice in the West. Not only are young surgeons coming from the United States and Europe to train at Aravind, patients too are beginning to travel to India in search of world-class care at a fraction of the price they would pay in New York or Los Angeles.

Dr. Venkataswamy died in 2006. To the end of his life, when he spoke about his vision for Aravind he liked to use McDonald's as the standard of scale and efficiency that he dreamed of bringing to health care. His achievement was to use the design thinker's tools of empathy, experimentation, and prototyping to reach McDonald's-like efficiency in an organic, sustainable way.

food for thought

A thousand miles to the north, on the outskirts of New Delhi, lies the demonstration farm set up by International Development Enterprises (IDE), India. Founded by the social entrepreneur Paul Polak, IDE's mission is to provide low-cost solutions that meet the needs of small farmers in developing countries. The narrow road that leads to the farm passes through fields of healthy crops irrigated by a variety of techniques. In one corner there are drip irrigation pipes, in another sprinklers made from very simple, low-cost materials. Amitabha Sadangi, who heads IDE (India), repeats the same message over and over: designing for the poor begins and ends with a focus on cost. Every detail must be designed to be no more expensive than necessary, and no efficiency is too small not to seize. This approach would seem sensible to most western manufacturers, but Sadangi and Polak take it one step further. In a rural twist on the quarterly bottom line, they require that any investment made by a farmer be repaid many times over in just one growing season. Whereas an American farmer may take out a loan to buy a hundred-thousand-dollar tractor and repay it over many years, farmers in the developing world cannot take the risk, nor do they have the capital to make such investments. This constraint has led to innovations that have the potential to transform agriculture in the developing world—and perhaps beyond.

Many of IDE's drip irrigation products are designed to last not a decade or two, as we might expect in the West, but for only one or two seasons. This seemingly shortsighted approach may seem irresponsible to a Western engineer, but by using less durable and therefore less expensive materials, IDE has brought

the cost of irrigation down to approximately five dollars for a 20-meter-square (67-foot-square) plot of land. A farmer can expect to reap many times this amount in extra profit by growing fruit or vegetables, which will enable him to irrigate more land in future seasons. By driving the cost down, IDE enables farmers to reinvest the additional profits to reach economic sustainability faster and with less risk. And by thus increasing demand for its low-cost systems, IDE, like Aravind, operates on the basis of a sustainable business model.

This approach has the potential to make a significant difference to subsistence farmers in India, Africa, and beyond, but its potential impact may be greater than that. The idea of designing products in an integrated manner such that low cost, entry-level offerings create wealth quickly for customers has applications well beyond farming. In the developing world this business model is being applied to mobile computing, communications services, clean water delivery, rural health care, and affordable housing. Why could it not apply to many of the same sectors in the West? The economic convulsions rocking the developed world as I write suggest that the prevailing model is not working. There could be no more opportune moment to imagine how we might move in the direction of a society where what we buy helps create wealth rather than just consume it. The idea of designing products, services, and business models that create a rapid return on investment seems very attractive, and it is no accident that it first appeared in places where most people have no choice.

Organizations such as the Aravind Eye Hospital, International Development Enterprises, and many others like them are experimenting with approaches that measure success not by

profit but by social impact, and they challenge us to think about how these lessons might be applied elsewhere. In one sense, we have seen this kind of innovation before. Toyota, Honda, and Nissan all began their meteoric rise by creating inexpensive solutions for their own markets at a time when Detroit measured the success of its cars by the height of their tailfins. They went on to demonstrate to the world that there is nothing intrinsically "Japanese" about good design, efficient manufacturing, reduced fuel consumption, and low cost. Might the Aravind model not "bounce back" to show us all the way forward? The argument for working with the most extreme users, where the constraints are unforgiving and the cost of failure high, is not just a social one. It may be how we will spot opportunities that have global relevance and how we will avoid becoming the victims of the new competitors who thrive in environments where more prudent organizations fear to tread.

whom to work with

Whether or not they have adopted or even heard of "design thinking," many of these social entrepreneurs are applying its tenets. Social issues are, by definition, human-centered. The best of the world's foundations, aid organizations, and NGOs know this, but many of them have lacked the tools to ground this commitment in ongoing, sustainable enterprises fueled not just by outside donations but by the energies and resources of the people they serve.

In 2001 Jacqueline Novogratz created Acumen Fund, a New York–based social venture fund that invests in enterprises

in East Africa and South Asia committed to serving the poor in an ongoing and sustainable way. Acumen has invested in both for profit and not-for-profit enterprises ranging from franchised health clinics to affordable housing. Its model is gaining worldwide attention. Novogratz has spoken explicitly about how her leadership team used design thinking—in addition to the standard metrics of investment "performance"—to evaluate the success of individual investments based on a balance of business sustainability and social impact. Indeed, our shared interest in using design thinking to balance business goals with philanthropic objectives has led IDEO into an ongoing partnership with Acumen Fund.

Our collaboration began with a series of workshops in which we explored a set of critical needs that might be translated into viable projects, ranging from antimalarial bed nets to hygiene and sanitation. We decided to focus on clean water. In the developing world, some 1.2 billion people are at risk of disease from drinking unsafe water. Even when water is collected from a high-quality source, it often becomes contaminated during the lengthy trip, often by foot and usually over bad roads, to its final destination. The team drew up its own brief: how might we create safe and easy means of water storage and transportation that improve the health and living conditions of low-income communities while creating opportunities for local entrepreneurs?

As the project progressed, we gathered as many insights into how to implement our ideas as into solutions themselves. No matter how compelling an idea might be, it is of little value if it cannot be sustained by its intended customers in India or Africa. To achieve this, the project team tapped into what the

anthropologist Clifford Geertz called the "local knowledge" of NGOs and entrepreneurs in the field, which resulted in numerous culturally appropriate ideas: new types of payment using mobile phones or prepaid coupons, better branding of delivery vehicles to spread awareness, local delivery depots that could be owned and run by the community. Future steps will focus on ways to support these local groups as they bring ideas to market.

Aravind, IDE, and Acumen Fund offer examples not just of well-designed products but of design thinking applied across the entire spectrum of a problem: the product, the service in which the product is embedded, the business model of the enterprise that provides the service, the investors behind the enterprise, and more. It is a mistake to think of them as organizations of well-intentioned, well-heeled do-gooders. These social enterprises have set out to achieve the integration of the desirability-viability-feasibility triad. This has naturally led to cross-disciplinary initiatives. In Aravind's case most of the design thinkers involved were doctors, not designers. The design thinkers at the Acumen Fund are venture capitalists and development experts. They have learned to maneuver their way through government bureaucracies and adapt their efforts to available infrastructure because systemic problems can be addressed only through systemwide collaboration.

what to work on

In contrast to companies that may be struggling to extend their brands into a new subniche of a saturated market, the opportu-

nities for socially engaged design are everywhere. Indeed, that is itself a problem, at least while there is a limited amount of design thinking talent to go around. The Rockefeller Foundation recently asked IDEO to consider how the design industry might make a greater contribution to solving social problems. After talking to dozens of NGOs, foundations, consultants, and designers, one of our most telling insights was that our efforts are in danger of being spread far too thinly. There are ten potential projects for every design thinker with the time and the talent to tackle them, and 95 percent of them are in Africa, Asia, and Latin America—which complicates the challenge of getting out into the field to gain insight or quickly and iteratively prototype our ideas.

The solution is to find some way to aggregate the efforts of design thinkers globally so as to create a critical mass, build momentum, and begin to make real progress on some of the selected problems we want to address. One of the most promising examples of this is the charitable organization Architecture for Humanity, cofounded in 1999 by Cameron Sinclair. In its first iteration Sinclair used the Web to bring architectural talent to bear on the design of emergency housing and shelters in response to major disasters such as the 2004 tsunami that devastated Southeast Asia and Hurricane Katrina in the following year. A TED prize enabled him to create the Open Architecture Network, which provides a platform for tackling longer-range, systemic issues, not just responding to ad hoc emergencies. The network's modest mission is to "improve the living standards of five billion people" by setting design challenges, posting design solutions so that they can be shared and improved, connecting stakeholders, and creating a participative approach to solving

design problems. It seeks, in effect, to leverage the collective energies of architects and designers worldwide in a way that aggregates, focuses, and amplifies them.

If we need to set priorities, the United Nations' Millennium Development Goals would be a good place to start, but "eradicating extreme poverty" and "promoting gender equality" are far too broad to serve as effective design briefs. If the Millennium Development Goals are to be met, they will have to be translated into practical design briefs that recognize constraints and establish metrics for success. More promising questions might be:

How might we enable poor farmers to increase the productivity of their land through simple, low-cost products and services?

How might we enable adolescent girls to become empowered and productive members of their community through better education and access to services?

How might we train and support community health workers in rural communities?

How might we find low-cost alternatives to wood-burning and kerosene stoves in urban slums?

How might we create an infant incubator that does not need an electrical supply?

The key, as every designer knows, is to craft a brief with enough flexibility to release the imagination of the team, while

providing enough specificity to ground its ideas in the lives of their intended beneficiaries.

sometimes the thing to do is stay home

Not all the most critical social design issues are to be found in the developing world. Western health care—to take what is only the most obvious example—is facing an imminent crisis. Indeed, for many millions of Americans the system has already broken down. Rising costs are threatening the stability of the system, while as a society we have committed ourselves to unhealthy lifestyles that exact a tremendous social and economic toll. Medical researchers focus their energies on cures for chronic diseases—heart disease, cancer, stroke, diabetes—and policy experts work to improve the efficiency of health care administration and delivery. In isolation, however, these efforts will never be sufficient. A sustained effort to integrate these paths and explore divergent alternatives is needed, and this is where design thinking can help.

In medicine, once the patient has been stabilized, the larger task is to identify the source of the condition—to move as it were, from the *curative* to the *preventive* side of the problem. A case in point is obesity, which contributes to several of the leading causes of death in Western society and is now clinically described as having reached epidemic proportions. Some of the relevant factors relate to a person's biological, cultural, demographic, and geographic circumstances, while others lie within the domain of personal choice. All of them present opportunities for design thinking.

The incidence of childhood obesity has skyrocketed in recent decades; according to the Centers for Disease Control and Prevention, the number of overweight and obese children has tripled since 1980. What used to be called adult-onset diabetes has had to be renamed type 2 diabetes because it is no longer just adults who get it and it is no longer unusual to see kids taking insulin. At the individual level we might start by thinking about why kids develop poor eating habits early in life that are difficult to change later on. We can then begin to think about ways to address some of those issues. Some school districts have banned junk food in cafeterias and vending machines, but simply depriving kids of food they want is self-defeating. More promising are positive inducements such as that of Alice Waters, the founder of the renowned Berkeley restaurant Chez Panisse. Waters has started an initiative called Edible Schoolyard to encourage schools to grow produce to provide healthy ingredients for school lunches while educating kids about where their food comes from. In the United Kingdom, Jamie Oliver developed his School Dinners program, which works with local authorities to introduce healthier, better-tasting food. Each of these can be thought of as the response to a classic design challenge. Instead of the Millennium Development Goals' righteous exhortation to "end childhood obesity," they are asking the design thinker's question: "How might we . . . encourage kids to eat healthier foods?"

The other half of the obesity equation has to do with fitness and exercise—what both economists and nutritionists might agree to call an "input-output" model. While we consume more calories than ever, ours may be the least active generation in history. Here, too, lie opportunities for design thinking to contribute to what has typically been considered either a medical or a

public policy issue. Nike, for instance, has mobilized its internal design teams to help them not just to *provide equipment to athletes* but to *learn about their behaviors*. This has in turn led to some significant product innovations. Since 2006 Nike's customers have tracked more than 100 million miles using a simple device that sits inside their running shoes and communicates data about their pace and distance to their iPods. On arriving home, they download the data to a Web site where they can review their progress over time or against that of fellow runners. Nike's innovation is to close the information loop by allowing people to evaluate the effects of their behavior. The Wii Fit from Nintendo similarly taps into people's need to see results but—alas—without having to leave the comfort of their living rooms.

These first small steps toward encouraging healthier behaviors will have to be repeated countless times before significant societal benefit is realized, but they do indicate that there is hope. Design thinkers have become adept at approaching important social issues from the angle of individual motivations and the behaviors that follow, but there is also a level of analysis that needs to be directed at the social forces that constrain the choices we are able to make in the first place. Healthy bodies are a necessary but not sufficient condition of a healthy society, but the reverse is also true. Around the world, design thinkers have become activists and are applying their skills to sources of social dysfunction.

from global to local

The British Council for Industrial Design was formed at the end of World War II to assist in postwar economic recovery,

but since that time it has broadened its mission to the application of design to a diverse range of contemporary social issues. In recent years the Design Council, as it is now known, has collaborated with national and local authorities to bring creative problem solving to bear on questions that could scarcely have been imagined a decade ago. In "Dott 07 (Designs of the Times)," the Council sponsored a year of community-based projects, competitions, exhibitions, conferences, symposia, and festivals throughout northeast England to explore such questions as "Can design help in the fight against crime?" "Are our food production systems ripe for a redesign?" "How can design make schools more sustainable?" One particularly successful program, Design and Sexual Health (DASH) set out to balance the requirements of publicity and discretion in encouraging people to take advantage of a social service that typically carries a stigma. The project team first surveyed 1,200 residents, community leaders, and health professionals and then went on to create an integrated program of communication, education, and clinic and service design that focused not on diseases but on the experience of visitors to the clinics.

Hilary Cottam, herself a onetime director of the Design Council, has taken this approach to local design thinking one step further. Teaming up with the innovation expert Charles Leadbeater and the digital entrepreneur Hugo Manassei, she created Participle, an organization dedicated to creating new social solutions through the collaboration of local communities and leading experts from around the world. Taking a design-led approach and basing its work on the philosophies of the British welfare state first established by Sir William Beveridge, the team at Participle has tackled issues ranging from loneliness in

old age to improving the integration of youth into society. One project, called Southwark Circle, resulted in a new membership organization that helps the aged take care of household tasks. Ideas were refined and prototyped in collaboration with older people and their families before the service was launched in Southwark, South London, in early 2009. Cottam believes that locally created solutions can ultimately lead to national models for community-based social services.

designing future design thinkers

Perhaps the most important opportunity for long-term impact is through education. Designers have learned some powerful methods for arriving at innovative solutions. How might we use those methods not just to educate the next generation of designers but to think about how education as such might be reinvented to unlock the vast reservoir of human creative potential?

In 2008 I spoke to students at the Art Center College of Design in Pasadena about "Serious Play," the connection between the activities we all participated in as children and the characteristics of innovation and creativity. I argued that exploring the world with our hands, testing out ideas by building them, role playing, and countless other activities are all natural characteristics of children at play. By the time we enter the adult world, however, we have lost most of these precious talents. The first place this begins to happen is at school. The focus on analytical and convergent thinking in education is so dominant that most students leave school with the belief either

that creativity is unimportant or that it is the privilege of a few talented oddballs.

Our objective, when it comes to the application of design thinking in schools, must be to develop an educational experience that does not eradicate children's natural inclination to experiment and create but rather encourages and amplifies it. As a society our future capacity for innovation depends on having many more people literate in the holistic principles of design thinking, just as our technological prowess depends on having high levels of literacy in math and science. Surprisingly, perhaps, for a firm that won its reputation doing industrial design for the likes of Apple, Samsung, and Hewlett-Packard, engagements with public and private schools, with the educational initiatives of groups such as the W. K. Kellogg Foundation, and with colleges and universities has become a growing part of IDEO's work.

Ormondale is a public elementary school in the affluent Bay Area community of Portola Valley. The school's staff had become convinced that "in order to produce 21st century learners, we could not use 18th century methods." In contrast to the expectations of our corporate clients, Ormondale asked us not to deliver a finished design but rather to facilitate a process in which those designing the program—the teachers themselves—would be responsible for implementing it. The team brainstormed, led workshops, developed curricular prototypes, and conducted observations of analogous institutions ranging from a wildlife conservation network to a Mormon food distribution network. The Ormondale teachers have now developed a set of tools based on a shared philosophy of "investigative learning" that engages students as seekers of knowledge rather than receivers

of information. The process—participatory design—mirrored the end product: a participatory teaching and learning environment.

Opportunities to rethink the structure of education exist all the way up the chain. Within the structure of a traditional art school, the California College of the Arts in San Francisco has applied the principles of design thinking—user-centered research, brainstorming, analogous observations, prototyping—to crafting its strategic plan for the future of arts education. The Royal College of Art in London is collaborating with its neighbor, the Imperial College, to leverage the different but mutually reinforcing types of creative problem solving found in art and engineering. In Toronto students at the Ontario College of Art & Design have the opportunity to team up with their counterparts at UT's Rotman School of Management in a shared pursuit of creativity and innovation.

One of the newest experiments can be found at Stanford University in the Hasso Plattner Institute of Design—the so-called d-School. The d-School does not seek to educate traditional designers and does not, in fact, offer any "design" courses at all. Rather, it serves as a unique environment where graduate students in fields as far flung as medicine, business, law, and engineering can come together to work on collaborative design projects in the public interest. The d-School encourages human-centered research, brainstorming, and prototyping in every student project, but it also applies these core principles of design thinking to itself. Spaces are fungible, academic ranks are irrelevant, the curriculum is in permanent flux—it is, in short, an ongoing prototype of the educational process itself.

Finding ways to apply the principles of design thinking to the problems of society—on the outskirts of Kampala, in the offices of a social venture fund in New York, or in the classrooms of an elementary school in California—is the sort of problem that is attracting the most ambitious designers, entrepreneurs, and students today. They are motivated not by an altruistic desire to "give something back" for a few months after graduation or upon retirement but by the fact that the greatest challenges are always the source of the greatest opportunities.

The projects and personalities highlighted in this chapter are about not charity, philanthropy, or self-sacrifice but a genuine reciprocity of interests. There is nothing wrong with "stopping out" for a year or two to help the Peace Corps build a playground in Nepal or El Salvador. The initiatives examined here, however, do not call for highly trained specialists to *interrupt* their careers but for them to *redirect* them in ways that serve those in extreme need.

If we are to build on one another's good ideas—one of the key tenets of design thinking—we will, at least for the time being, have to focus on a finite set of problems so that our successes can be cumulative over time and place. This begins with nurturing the natural creativity of all children and keeping it alive as they advance through the educational system and into professional life. There is no better way to fill the pipeline with tomorrow's design thinkers.

CHAPTER TEN

designing tomorrow—*today*

It would be tempting to end this book on the inspiring theme of how design thinking can not only contribute to the success of companies but also promote the general welfare of humanity. The people and projects described in the previous pages are at the leading edge of design thinking. They show what is possible when people tackle the right problems and are committed to seeing them through to their logical conclusions. But, to steal a phrase from Stanford professors Jeffrey Pfeffer and Bob Sutton, design thinking requires bridging the "knowing-doing gap." The tools of the design thinker—getting out into the world to be inspired by people, using prototyping to learn with our hands, creating stories to share our ideas, joining forces with people from other disciplines—are ways of deepening what we know and widening the impact of what we do.

Throughout this book, I have tried to show not only how the designer's skills can indeed be applied to a wide range of problems but also that these skills are not innate and are accessible to a far greater range of people than may be commonly supposed. These two threads come together when we apply them to one of the most challenging problems of them all: designing a life.

getting started

Design thinking evolved from humble beginnings: craftsmen such as William Morris, architects such as Frank Lloyd Wright, industrial designers such as Henry Dreyfuss and Ray and Charles Eames aspired to make the world around us more accessible, more beautiful, and more meaningful. The complexity and sophistication of the discipline grew over time as designers sought to systematize and generalize what they did.

It is difficult to classify the design thinkers we have met throughout this book according to a simple formula. Although we tend to see people as either thinkers or doers, analyzers or synthesizers, right-brain artists or left-brain engineers, we are whole people, and characteristics emerge when we are put into the right situation. When I left art school, I saw design as a deeply personal art. I certainly did not worry about its connection with business, engineering, or marketing. Once I entered the real world of professional practice, however, I found myself immersed in projects whose interdisciplinary complexity reflected the world around me and began to discover aptitudes I'd never known I had. I'm convinced that given the opportunity—and the challenge—most people will have the same experience and will be able to apply the integrative, holistic skills of the design thinker to business, society, and life.

DESIGN THINKING AND YOUR ORGANIZATION

begin at the beginning

Design thinking starts with divergence, the deliberate attempt to expand the range of options rather than narrow them. The designer's inclination to explore new directions is of little value if it comes at the end of the innovation process, by which time the arc of the story has begun to close. Companies should have design thinkers sitting on their corporate boards, participating in their strategic marketing decisions, and taking part in the early stages of their R&D efforts. They will bring the capacity to create new unexpected ideas and will use the tools of design thinking as a means of exploring strategy. Design thinkers will connect the upstream with the downstream.

take a human-centered approach

Because design thinking balances the perspectives of users, technology, and business, it is by its nature integrative. As a starting point, however, it privileges the intended user, which is why I have consistently referred to it as a "human-centered" approach to innovation. Design thinkers observe how people behave, how the context of their experience affects their reaction to products and services. They take into account the emotional meaning of things as well as their functional performance. From this try to identify people's unstated, or latent, needs and translate them into opportunities. The human-centered approach of the design thinker can inform new offerings and increase the

likelihood of their acceptance by connecting them to existing behaviors. Asking the right kinds of questions often determines the success of a new product or service: Does it meet the needs of its target population? Does it create meaning as well as value? Does it inspire a new behavior that will be forever associated with it? Does it create a tipping point?

The typical default approach is to start with prevailing business constraints—marketing budgets, supply-chain networks, and the like—and extrapolate from there, but this tactic leads to incremental ideas that are easily copied. Starting with technology is the second most common approach but is risky and best left to agile start-ups that are in a position to bet on something new and untested. Starting with humans increases the likelihood of developing a breakthrough idea and finding a receptive market—whether managers of fancy resort hotels or subsistence farmers in Cambodia. At both extremes, the first step is to ensure that those involved in your innovation efforts get as close as they can to their intended customers. Reams of market data are no substitute for getting out into the world.

fail early, fail often

Time to first prototype is a good measure of the vitality of an innovation culture. How rapidly are ideas made tangible so that they can be tested and improved? Leaders should encourage experimentation and accept that there is nothing wrong with failure as long as it happens early and becomes a source of learning. A vibrant design-thinking culture will encourage prototyping—quick, cheap, and dirty—as part of the creative

process and not just as a way of validating finished ideas. A promising prototype will generate a buzz among members of the design team, who will become enthusiastic advocates as it becomes a candidate for funding and support. The real test of a prototype, however, is not internal but out in the world, where it can be experienced by the farmers, schoolchildren, business travelers, or surgeons who are its intended users. Prototypes need to be testable, but they do not need to be physical. Storyboards, scenarios, movies, and even improvised acting can produce highly successful prototypes—the more the better.

get professional help

I do not cut my own hair or change the oil in my car, even though I probably could. There are times when it makes more sense to go outside your organization and look for opportunities to expand the innovation ecosystem. Sometimes this will take the form of cocreation with customers or new partners. Sometimes it will mean hiring experts, who may be technology specialists, software geeks, design consultants, or fourteen-year-old video gamers. We have seen how, with the help of the Internet, products and services are moving beyond passive consumption. The active participation of customers and partners is not only likely to yield more ideas but will create a web of loyalty that will be hard for your competitors to erode. Innovators will exploit Web 2.0 networks to expand the effective scale of their teams, and hyperinnovators will be ready for 3.0 whenever it comes.

Extreme users are often the key to inspirational insights. These are the specialists, the aficionados, and the outright fanatics who

experience the world in unexpected ways. They force us to project our thinking to the edges of our existing customer base and expose issues that would otherwise be disguised. Seek out extreme users and think of them as a creative asset. Remember that they may be found on the other side of town or the other side of the world.

share the inspiration

Don't forget your internal network. Much of the effort concerning knowledge sharing over the past decade has been focused on efficiency. It may be time to think about how your knowledge networks support *inspiration*—not just streamlining the progress of existing programs but stimulating the emergence of new ideas. How can you connect like-minded folks to leverage their common passions? What is the typical fate of new ideas within your organization? How can you leverage insights about consumers to inspire multiple projects? Are you using digital tools to document your project outcomes in a way that deepens the knowledge base of your organization and allows individuals to learn from it and to grow?

The rise of virtual collaboration—and of airfares—makes it easy to forget the value of bringing people together in the same room. In a hundred years this notion may seem quaint, but for now it is the way to create powerful bonds. Challenge your organization to think about how it can spend more time doing collaborative, generative work that will produce a tangible outcome at the end of the day—not having more meetings. Face-to-face time cultivates relationships and nourishes teams and is one of the most precious resources an organization possesses. Make it as productive and creative as possible. Building on the

ideas of others is a whole lot easier when the building is happening in real time and among people who know and trust one another. And it is usually a whole lot more fun.

blend big and small projects

There is no silver bullet for innovation. Think of it more as "silver buckshot." It makes sense to take a variety of approaches to innovation, but think about which ones are most likely to leverage the strengths of your organization. Diversify your assets. Manage a diversified portfolio of innovation that stretches from shorter-term incremental ideas—how to increase the mileage of this year's model—to longer-term revolutionary ones—how to produce a car that runs on soybeans or sunbeams. The majority of your efforts will take place in the incremental zone, but without exploring more revolutionary ideas you risk being blindsided by unexpected competition. The downside: you may see fewer of these projects going to market. The upside: those that do are likely to have a lasting impact.

Encouraging experimentation is easy in the incremental zone. Business units should be encouraged to drive innovation around existing markets and offerings. The creative leader must also be willing to support the search for more breakthrough ideas from the top, whether this means introducing a new line of office furniture or a new primary school curriculum. Most organizations have metrics that measure the effectiveness of a division on its own terms. This type of thinking undermines effective collaboration across departmental silos. It is precisely in the interstitial spaces, however, that the most interesting opportunities lie.

budget to the pace of innovation

Design thinking is fast-paced, unruly, and disruptive, and it is important to resist the temptation to slow it down by relying on cumbersome budgeting cycles or bureaucratic reporting procedures. Rather than sabotage your most creative asset, be prepared to rethink funding schedules as projects unfold according to their own internal logic and teams learn more about the opportunities before them.

Agile resource allocation is challenging in any organization and downright scary in large ones. But there may be ways around a crippling reliance on the predictability of markets and the discipline of annual budgets. Some companies have experimented with venture funds that can be tapped to support promising projects. Others rely on the judgment of senior management to release funding as projects reach certain milestones. The trick is to accept that milestones cannot be predicted with certainty and that projects acquire an inner life of their own. Budgeting guidelines must be expected to change many times over. The key to agile budgeting is a review process that relies upon the judgment of senior leadership rather than some kind of algorithmic process mechanically applied. That's how venture capital funds operate, and successful venture capitalists are nothing if not nimble.

find talent any way you can

Design thinkers may be in short supply, but they exist inside every organization. The trick is spotting them, nurturing them, and freeing them to do what they do best. Who among

your staff spends time watching and listening to customers? Who would rather build a prototype than write a memo? Who seems to get more out of working with a team than holed up in a tastefully appointed cubicle? Who comes to the organization with a weird background (or just a weird tattoo) that might be a clue to a different way of looking at the world? These people are your raw material and your energy supply. They are money in the bank. And since they are accustomed to being marginalized, they will respond with alacrity to an opportunity to get involved in exciting projects at the earliest stage. If they happen to be designers, get them out of the comfort of their design studio and into interdisciplinary teams. If they are from Accounting, Legal, or HR, give them some art supplies.

Once you have tapped your internal resources, think about how you handle recruiting. Hire budding design thinkers from schools that "get it," and bring in some interns and team them up with the more seasoned design thinkers you already have. Create some projects that have relatively short time horizons but are focused on divergent thinking. Share the results around the organization. Get a buzz going around design thinking, and converts will come crawling out of the woodwork. There is nothing as seductive to a true innovator as optimism.

design for the cycle

In many organizations the cadence of business calls for people to shift their job assignments every eighteen months or so. How-

ever, most design projects take longer to move from the launching pad and through their implementation phase—particularly projects aimed at a real breakthrough. When core team members are not able to follow a project through the complete cycle, both will suffer. The guiding idea behind a project is likely to be diluted, attenuated, or lost. Individuals will feel that their learning curves have been wasted and may be left with a sense of frustration that is hard to shake. The experience of going through the entire cycle of a project is invaluable.

DESIGN THINKING AND YOU

There is something wondrously gratifying about putting something new out into the world, whether it is an award-winning piece of industrial design, an elegant mathematical proof, or a first poem published in the high school newspaper. Many people find that cultivating this feeling of personal accomplishment is a powerful driving force. It also happens to be sound business practice because it makes us less likely to accept the familiar, the expedient, or the boring.

don't ask *what?* ask *why?*

Every parent knows how infuriating five-year-olds can be with their constantly questioning "Why?" Every parent has at one point or another retreated behind the authoritarian "Because I said so." For the design thinker, asking "Why?" is an opportunity to reframe a problem, redefine the constraints, and open the field to a more innovative answer. Instead of accepting a given constraint, ask whether this is even the right problem to be solving. Is it really faster cars that we want or better transportation? Televisions with more features or better entertainment? A snazzier hotel lobby or a good night's sleep? A willingness to ask "Why?" will annoy your colleagues in the short run, but in the long run it will improve the chances of spending energy on the right problems. There is nothing more frustrating than coming up with the right answer to the wrong question. This is as true in responding to a brief or designing a new strategy for a company as it is in striking a meaningful balance between work and life.

open your eyes

We spend most of our lives not noticing the important things. The more familiar we are with a situation, the more we take for granted, which is why it usually takes a visiting relative to get us to visit Alcatraz or the Golden Gate Bridge, or spend a weekend in the Wine Country. My friend Tom Kelley likes to point out that "Innovation begins with an Eye," but I'd like to take this one step further. Good design thinkers observe. Great design thinkers observe the ordinary. Make it a rule that at least once a day you will stop and think about an ordinary situation. Take a second look at some action or artifact that you would look at only once (or not at all) as if you were a police detective at a crime scene. Why are manhole covers round? Why is my teenager heading off to school dressed like that? How do

I know how far back I should stand from the person in front of me in line? What would it be like to be color-blind? If we immerse ourselves in what Naoto Fukasawa and Jasper Morrison have recently called "the Super-Normal," we can gain uncanny insights into the unwritten rules that guide us through life.

make it visual

Record your observations and ideas visually, even if just as a rough sketch in a notebook or a picture on your camera phone. If you think you can't draw, too bad. Do it anyway. Every designer I know carries a sketch pad the way a doctor carries a stethoscope. These images will become a treasure trove of ideas to refer to and share.

The same is true for the way we develop our ideas. Ludwig Wittgenstein was the most cerebral of twentieth-century philosophers, but his motto was "Don't think. Look." Being visual allows us to look at a problem differently than if we rely only on words or numbers. I found it more useful to visualize this book as a mind map than to draw up an orderly table of contents. It gave me a sense of the whole that I couldn't get from a linear table of contents. The biologist Barbara McClintock used to speak about "a feeling for the organism." Her colleagues stopped ridiculing her "touchy-feely" approach to science when she was awarded the Nobel Prize in Physiology or Medicine. From Al Gore helping us to visualize the melting of the Greenland icecap to the artist Tara Donovan helping us to visualize a million Styrofoam cups, one picture can, as they say, be worth a thousand words. Maybe more.

build on the ideas of others

Everyone has heard of Moore's Law and Planck's Constant, but we should be suspicious when an idea becomes too closely identified with the person who first thought it up. If an idea becomes a piece of private property, it is likely to grow stale and brittle over time. If it migrates throughout an organization, undergoing continual permutations, combinations, and mutations, it is likely to flourish. Just as habitats need ecological diversity, corporations need a culture of competing ideas. Jazz musicians and improvisational actors have created an art form around their ability to build on the stories being created in real time by their fellow artists. There are a lot of "IDEOisms" floating around our office, but my favorite might be the oft-repeated reminder that "All of us are smarter than any of us."

demand options

Don't settle for the first good idea that comes into your head or seize the first promising solution presented to you. There are plenty more where they came from. Let a hundred flowers bloom, but then let them cross-pollinate. If you haven't explored lots of options, you haven't diverged enough. Your ideas are likely to be incremental or easy to copy.

This can be a difficult commitment to honor. The pursuit of new options takes time and makes things more complicated, but it is the route to more creative and satisfying solutions. In the meantime, your colleagues may get frustrated and your customers impatient, but they will be happier with the eventual results.

You just have to know when to stop, and that is an art that can be learned but probably cannot be taught. Setting deadlines is one way. Not only will they put an outer limit on the amount of time you take, you will find that you become even more productive as the deadline looms. Curse deadlines all you want, but remember that time can be our most creative constraint.

balance your portfolio

One of the most satisfying things about thinking like a designer is that the results are tangible. Something new exists at the end of a project that didn't exist before. Remember to document the process as it unfolds (we don't wait for our kids to become finished adults before taking their pictures!). Shoot videos, preserve drawings and sketches, hold on to presentation documents, and find somewhere to store physical prototypes. Assembled as a portfolio, this material will document a process of growth and record the impact of many minds (which can be useful during performance reviews, job interviews, or when you are trying to explain to your kids just what it is that you do). Dennis Boyle, employee number eight at IDEO, has kept every prototype he ever made (we have declined his request to rent an airplane hangar to store them in). It is hard not to feel proud of your contribution when you have a record of it.

design a life

Design thinking has its origins in the training and the professional practice of designers, but these are principles that can be practiced by everyone and extended to every field of activity. There is a big difference, though, between planning a life, drifting through life, and *designing* a life.

We all know of people who go through life with every step preplanned. They knew which university they would attend, which internship would lead to a successful career, and at what age they will retire. If they falter, they have parents, agents, and life coaches to take up the slack. Unfortunately, this never works (remember the Black Swan?). And anyway, if you know the winner before the start, there's not much point in playing the game.

Like any good design team, we can have a sense of purpose without deluding ourselves that we can predict every outcome in advance, for this is the space of creativity. We can blur the distinction between the final product and the creative process that got us there. Designers work within the constraints of nature and are learning to mimic its elegance, economy, and efficiency, and as citizens and consumers we too can learn to respect the fragile environment that surrounds and sustains us.

Above all, think of life as a prototype. We can conduct experiments, make discoveries, and change our perspectives. We can look for opportunities to turn processes into projects that have tangible outcomes. We can learn how to take joy in the things we create whether they take the form of a fleeting experience or an heirloom that will last for generations. We can learn that reward comes in creation and re-creation, not just in the consumption of the world around us. Active participation in the process of creation is our right and our privilege. We can learn to measure the success of our ideas not by our bank accounts but by their impact on the world.

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I began this book by describing one of my heroes, a man who lived before the profession of design—not to say design thinking—even existed: the Victorian engineer Isambard Kingdom Brunel. As the challenges of the industrial age spread to every field of human endeavor, a parade of bold innovators who would shape the world as they have shaped my own thinking would follow him. We have met many of them along the "reader's journey" that I have tried to construct: William Morris, Frank Lloyd Wright, the American industrial designer Raymond Loewy, and the team of Ray and Charles Eames. What they all shared was optimism, openness to experimentation, a love of storytelling, a need to collaborate, and an instinct to think with their hands—to build, to prototype, and to communicate complex ideas with masterful simplicity. They did not just *do* design, they *lived* design.

The great thinkers to whom I am so deeply indebted are not as they appear in the coffee-table books about the "pioneers," "masters," and "icons" of modern design. They were not minimalist, esoteric members of design's elite priesthood, and they did not wear black turtlenecks. They were creative innovators who could bridge the chasm between thinking and doing because they were passionately committed to the goal of a better life and a better world around them. Today we have an opportunity to take their example and unleash the power of design thinking as a means of exploring new possibilities, creating new choices, and bringing new solutions to the world. In the process we may find that we have made our societies healthier, our businesses more profitable, and our own lives richer, more impactful, and more meaningful.

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