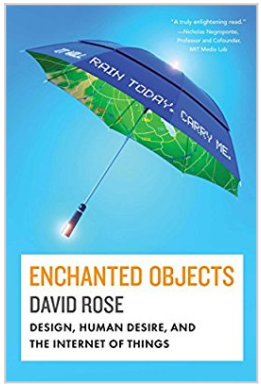

Enchanted Objects: Design, Human Desire, and the Internet of Things

By David Rose

Enchanted Objects: Design, Human Desire, and the Internet of Things By David Rose

In the tradition of *Who Owns the Future?* and *The Second Machine Age*, an MIT Media Lab scientist imagines how everyday objects can intuit our needs and improve our lives.

We are now standing at the precipice of the next transformative development: the Internet of Things. Soon, connected technology will be embedded in hundreds of everyday objects we already use: our cars, wallets, watches, umbrellas, even our trash cans. These objects will respond to our needs, come to know us, and learn to think on our behalf. David Rose calls these devices—which are just beginning to creep into the marketplace—Enchanted Objects.

Some believe the future will look like more of the same—more smartphones, tablets, screens embedded in every conceivable surface. Rose has a different vision: technology that atomizes, combining itself with the objects that make up the very fabric of daily living. Such technology will be woven into the background of our environment, enhancing human relationships and channeling desires for omniscience, long life, and creative expression. The enchanted objects of fairy tales and science fiction will enter real life.

Groundbreaking, timely, and provocative, *Enchanted Objects* is a blueprint for a better future, where efficient solutions come hand in hand with technology that delights our senses. It is essential reading for designers, technologists, entrepreneurs, business leaders, and anyone who wishes to understand the future and stay relevant in the Internet of Things.

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Editorial Review

Review
"David Rose has written a spectacular book. While glass slabs have already entered every nook and cranny of our lives, Rose paints a much more compelling future where we are deeply engaged with *enchanted objects*. Rose's vision of human computer interaction is more exciting and persuasive than the current norm and this brilliant book gives us a road map for how to get there. While I'll continue to invest in many things that improve our glass slab world, I believe that the future is enchanted objects." (Brad Feld, Managing Director at Foundry Group)

"Beyond the internet of things we find the internet of enchanted objects, a medium designed for pre-attentive cognition, conveying information subliminally and delightfully. I highly recommend this book. It is filled with evocative examples that will influence our imagination and help us move beyond our fixation on the screen." (John Seely Brown,former chief scientist, Xerox, and visiting scholar at the University ofSouthern California)

"David Rose's vision for enchanted objects and their platforms is spot on. With this book, he offers innovators and businesses a convincing guide for success in this space." (Glenn Lurie, President, Emerging Enterprises and Partnerships, AT&T Mobility)

"David Rose does not predict. He extrapolates the future from personal experience and technical fluency. His balance between a romantic humanism and scientific destiny is unique. His storytelling is intellectually rich, laced with history and never pedantic. *Enchanted Objects* is a truly enlightening read." (Nicholas Negroponte, Professor and Co-Founder, MIT Media Lab; author of Being Digital; a founder of WiReD Magazine)

"Delightful. . . . In the scrum of talking heads wrestling to gain control of the narrative behind the Internet of Things, Mr. Rose is an engaging, plain-spoken guide." (*The New York Times*)

"Rose touches something significant to most of us... A fine *tour d'horizon* of innovative enchantment and its ground rules and responsibilities." (*Kirkus Reviews*)

"In the fully realized, enchanted world of David Rose...objects that, once instructed, require no human prompting to function, already exist. They're part of the Internet of Things, an ethereal interconnection of gadgets and human desires that...will pervade our lives in the very near future." (*Wall Street Journal*)

"Provocative." (*Fast Company*)

About the Author
David Rose is an award-winning entrepreneur and instructor at the MIT Media Lab, specializing in how digital information interfaces with the physical environment. A former CEO at Vitality, he founded Ambient Devices, which pioneered technology to embed Internet information in everyday objects like lamps, mirrors, and umbrellas. CEO of Ditto Labs, Rose has been featured in *The New York Times* and parodied on *The Colbert Report.* A frequent speaker at conferences and for corporations, he lives in Brookline, Massachusetts, with his wife and two children. *Enchanted Objects* is his first book.

Enchanted Objects

PROLOGUE

MY NIGHTMARE

I HAVE A recurring nightmare. It is years into the future. All the wonderful everyday objects we once treasured have disappeared, gobbled up by an unstoppable interface: a slim slab of black glass. Books, calculators, clocks, compasses, maps, musical instruments, pencils, and paintbrushes, all are gone. The artifacts, tools, toys, and appliances we love and rely on today have converged into this slice of shiny glass, its face filled with tiny, inscrutable icons that now define and control our lives. In my nightmare the landscape beyond the slab is barren. Desks are decluttered and paperless. Pens are nowhere to be found. We no longer carry wallets or keys or wear watches. Heirloom objects have been digitized and then atomized. Framed photos, sports trophies, lovely cameras with leather straps, creased maps, spinning globes and compasses, even binoculars and books—the signifiers of our past and triggers of our memory—have been consumed by the cold glass interface and blinking search field. Future life looks like a Dwell magazine photo shoot. Rectilinear spaces, devoid of people. No furniture. No objects. Just hard, intersecting planes—Corbusier's Utopia. The lack of objects has had an icy effect on us. Human relationships, too, have become more transactional, sharply punctuated, thin and curt. Less nostalgic. Fewer objects exist to trigger storytelling—no old photo albums or clumsy watercolors made while traveling someplace in the Caribbean.

In my nightmare, the cold, black slab has re-architected everything—our living and working spaces, our schools, airports, even bars and restaurants. We interact with screens 90 percent of our waking hours. The result is a colder, more isolated, less humane world. Perhaps it is more efficient, but we are less happy.

Marc Andreessen, the inventor of the Netscape browser, said, "Software is eating the world." Smartphones are the pixelated plates where software dines.

Often when I awake from this nightmare, I think of my grandfather Otto and know the future doesn't have to be dominated by the slab. Grandfather was a meticulous architect and woodworker. His basement workshop had many more tools than a typical iPad has apps. He owned power tools: table saw, lathe, band saw, drill press, belt sander, circular sander, jigsaw, router. And hand tools: hundreds of hammers, screwdrivers, wrenches, pliers, chisels, planes, files, rasps. Clamps hung from every rafter. Strewn around his architectural drawings were T squares, transparent triangles, hundreds of pencils and pens, stencils for complex curves, compasses, and protractors of every size.

The diversity of wood-working tools in my grandfather's workshop, or utensils in a kitchen, or shoes in your closet, prove our presence for specialization. This debunks the myth of technology convergence.

I don't recall my grandfather ever complaining about having too many tools. Or dreaming of tool convergence—wishing some singular mother-of-all-tools would come along to replace them. Redundancy abounded. Specialization was prized. When carving, he would lay out a line of chisels that, to my untrained eye, looked pretty much the same. He would switch rapidly from tool to tool, this one for a smaller-radius cut, this one to take out more material, this one for a V-shaped cut. As a five-year-old, my job was to brush the wonderful-smelling wood shavings off the worktable and sweep sawdust into piles on the floor.

Just as important as the suitability of the tool to the job was its relationship to the worker. The way it fit the hand, responded to leverage and force, aligned with my grandfather's thought process, reminded him of past projects or how he had inherited a particular tool from his own father, a cabinetmaker. Tools were practical, but they also told stories. They each possessed a lineage. They stirred emotions. Hanging from the rafters were hundreds of specialized jigs he had made to hold a particular part of a clock as it passed through the table saw or to route dovetail joints. As tools summoned memories, he would glance up from his work. "You know that rocking chair that sits on the porch, David?" Yes, I would nod. "Remember the legs and how they have a nice smooth bend to them?" Yes, of course. He would point to the bow in his hand. "This is what I used to form the curve."

Grandfather's tools were constructed and used with a respect for human capabilities and preferences. They fit human bodies and minds. They were a pleasure to work with and to display. They made us feel powerful, more skilled and capable than we were without them. They hung or nestled quietly, each in its place, and never made us feel stupid or overwhelmed. They were, in a word, enchanting.

WE HAVE ALREADY IMAGINED THE FUTURE OF TECHNOLOGY

I want the future of our relationship with digital technology to look less like the cold slab of glass of my nightmare and more like my grandfather's basement workshop—chock-full of beloved tools and artifacts imbued with stories. I want the computer-human interface to be an empowering and positive experience—to minimize the interruption, annoyance, and distraction of our so-called smartphones and glass-faced tablets.

Over millennia, as humans worked with textiles, wood, and metal to craft clothing, furniture, homes, and cathedrals, we developed specialized tools for specific jobs. But, in today's world, characterized by the convergence of everything into smartphones, we have become close-minded, obsessed with apps, app stores, and icons. Few innovators are daring to ask, "What other kinds of future interfaces might rival the dominance of the black slab?"

Some people, however, are imagining interfaces outside the current norm. I admire the thinking of David Merrill, my MIT colleague and founder of the inventive toy company Sifteo. He and I share a view of the needs and opportunities for human-technology interaction that are not currently being answered by the smartphone and its kin.

For one, we need to connect the billions of legacy objects that already make up our infrastructure—thermostats, doorknobs and locks, buses and bridges and electric power meters. We also need devices that can manipulate real material, such as 3-D printers that can translate electronic designs into physical objects, into food, and, eventually, into aromas. And we need tangible interfaces that make the human body smarter. Technology can enhance our five senses and optimize our physical abilities by accommodating and responding to the way we already operate in the world: with natural gestures, expressions, movements, and sounds.

What if screens atomize into a smaller, tangible, and more siftable material like sand? This is the vision of the innovative game company Sifteo. Each of these blocks is a screen that knows its orientation to the others.

These are just a few of the hundreds, thousands, possibly millions of possibilities for objects to interact with us in ways that glass slabs cannot. This book will uncover, analyze, and celebrate those objects and new forms of interaction. Technology, I believe, should help make human beings, and the world we live in, more captivating and more enchanting. You and I can help illuminate the way toward that future.

FALLING FOR ENCHANTED OBJECTS

I grew up in Madison, Wisconsin, a university town, situated on an isthmus between two large lakes. It is a town known for both its easygoing liberalism and its excellent selection of cheeses. Perhaps it was all of the sailing and boating we enjoyed, or maybe it was my father's rural upbringing, but, for whatever reason, we were obsessed with the weather. The forecast suffused the opening of almost any conversation. We regularly consulted our antique brass barometer, which hung proudly on the wall in the upstairs hall of our house throughout my boyhood and is still there today. Given to my parents as a wedding gift, the barometer is encased in brass, set in mahogany, with a white dial and two hands. You might mistake it for a clock, but if you look closer, you see that the numbers signify millibars, rather than minutes. Inscribed on the face are the words Stormy. Rain. Change. Fair. Very Dry. Beneath, a legend: Falling. Deteriorating. Rising. Improving. Every morning my father, on his way from bedroom to bathroom, would stop at the barometer, tap it, and gaze at the face as if it were a crystal ball. As he received a portent of the day ahead, he'd give a quiet "Hmmph" or "Aha" in response.

My father's weather station is inspiringly simple. It never needs an upgrade or recharging. There are no little buttons to confuse or exasperate you.

The old-fashioned barometer has come to represent for me a new and radically simpler way to think about our relationship with technology interfaces. The information the barometer had to offer could be ascertained with a quick look—it was glanceable. The device was polite, Zen-simple, and never intimidating. The object was dedicated to a single task of information delivery, located in one never-changing place in the house, quietly waiting to do its job. And it did so without the need for updates or upgrades or maintenance or a service plan. Our family barometer still faithfully serves my parents, nearly five decades later. The barometer came to serve as a model for me as a young interface designer, a fantastic exemplar for future interfaces. How could I make technology interactions that were this simple and convenient and useful and long-lasting?

I have always loved objects of measurement and display such as our family barometer, both real and imagined. Do you remember Frodo's sword Sting in The Hobbit? It's one of those fantastic objects. Not only is it perfectly made for its task—well-balanced, attractive, and sharp—it has an additional and amazing ability: it detects the presence of goblins and evil orcs. When danger approaches, Sting glows blue, anticipating its own need and use. It is a trusty weapon, an infallible warning system, a handsome object, and a fantastic companion—for a hobbit.

Sting, the barometer, and so many other steampunk-era objects—vintage car and boat dashboards, analog dials, and stereo interfaces—have material qualities that I respond to. Not only are they delightful to operate and live with, they have a knowingness about them, a possession of knowledge that they convey, an ability to amplify human abilities. Like a vintage clock, such instruments seem to carry the weight of experience.

Even as a kid, I imagined creating objects that were as handy as Sting and as mystical as the barometer. In those hours I spent in the workshop with my grandfather (avoiding the Thanksgiving or Christmas hubbub taking place upstairs), we would turn bowls on the lathe, take apart clocks, build stereo speakers and bike rollers, dream up and draw fantasy homes or airports. My curiosity carried through my childhood: at robot camp one summer, we programmed a poodle-size robot using a complicated series of codes called assembly language, and, in high school, I learned to program on my first Apple IIe, making it spin out of control with a recursive algorithm.

In college, computing opened my eyes to a new world of possibilities for what objects could already do and

what they might eventually be able to do. A double major, I found that both physics and fine art had their own thrilling languages for characterizing the physical world, each with revelations and enlightenments. My graduate work at Harvard included the building of software-learning simulations like SimCity. Then I came to MIT's Media Lab, a place where programmers mix with artists, musicians, and educators, and everyone experiments with technology and computation, seeking to reinvent everything from cinema to opera to medicine and education. There, I had another revelation: technology could enhance objects in ways that would come close to, or even surpass, the qualities of the magical objects from folklore and science fiction that I have loved since I was a kid. To make ordinary things as extraordinary and delightful to use and as pleasing to live with as my father's barometer and my grandfather's tools, the human-computer interaction needs to be freed from clicking and dragging. There can (and will) be real flying carpets and should be (and already are) Dick Tracy wrist communicators.

Enchanted objects: ordinary things made extraordinary.

Today's gadgets are the antithesis of Grandfather Otto's sharp chisel or Frodo's knowing sword. The smartphone is a confusing and feature-crammed techno-version of the Swiss Army knife, impressive only because it is so compact. It is awkward to use, impolite, interruptive, and doesn't offer a good interface for much of anything. The smartphone is a jealous companion, turning us into blue-faced zombies, as we incessantly stare into its screen every waking minute of the day.

It took some time for me to understand why the smartphone, while convenient and useful for some tasks, is a dead end as the human-computer interface. The reason, once I saw it, is blindingly obvious: it has little respect for humanity.

What enchants the objects of fantasy and folklore, by contrast, is their ability to fulfill human drives with emotional engagement and élan. Frodo does not value Sting simply because it has a good grip and a sharp edge; he values it for safety and protection, perhaps the most primal drive. Dick Tracy was not a guy prone to wasting time and money on expensive personal accessories such as wristwatches, but he valued his two-way wrist communicator because it granted him a degree of telepathy—with it, he could instantly connect with others and do his work better. Stopping crime. Saving lives.

The humanistic approach to computing that I propose in this book is not about fanciful, ephemeral wishes, but rather persistent, essential human ones—omniscience, telepathy, safekeeping, immortality, teleportation, and expression. To prioritize what new technologies to explore and which new devices to develop, companies and product makers must fundamentally start with human desire in its most basic forms. In doing so they can focus on creating products that can have a meaningful and positive impact in the world.

• • •

My other grandfather, my father's father, Pop Rose, died of a heart attack just after his sixty-second birthday. To my father's great regret, Pop and I never met. His death came too soon, in part because of behavioral health issues: he smoked and failed to take his heart medication regularly. He was hardly alone. As a society we are doing a better job of controlling smoking, but one of the major barriers to more effective health care, and a driver of its astronomical costs, is that people don't take the medications they are prescribed.

Today, as you would expect, there's an app for that. But, even though Pop Rose was a doctor himself and knew very well that he was at risk, would he have used a smartphone app to help him with his medication regimen? Would he have been able to find the tiny icon on the screen and use it to log his behavior? Would he have remembered all his passwords for secure Wi-Fi, iCloud, and the protected electronic medical-record

system used by his doctors at the University of North Carolina?

But what if there had been a magical pill bottle—a technology-enabled object that would be as trusty as Frodo's sword, warning my grandfather that danger was lurking and urging him to take his pill? And what if that bottle had the ability to communicate with others, to let people know when he'd failed to follow his regimen?

My family's history of heart disease was one of the motivations behind my development of just such a real, "magic" pill bottle called GlowCap. It looks like a regular, childproof, amber medicine bottle, but has a special cap that glows like Sting and communicates, via the Internet, like a wrist communicator. It has enchanted users enough that people who own one take their medication over 90 percent of the time. By contrast, adherence to medications normally is in the range of 40–60 percent.

I believe that enchanted objects like GlowCap will transform the way people use, enjoy, and benefit from the next wave of the Internet—through embedding small amounts of computation, connectivity, and interaction into hundreds of everyday things that surround us, that we're accustomed to, and that have a welcome place in our homes and lives and rituals.

The idea of enchanted objects has deep roots in our childhoods, in our adulation of superheroes and fascination with fantasy and science fiction, and in the fables, myths, and fairy tales that go back centuries As a result, it seems as if we have always longed for a world of enchantment.

We learn about persistent human needs and fantasies from the age-old myths and fairy tales that already flow in our cultural bloodstream.

Jack Zipes is a retired professor of German at the University of Minnesota and a leading expert on the history of the Grimm Brothers fairy tales and the oral tradition that led to many of the tales by Hans Christian Andersen. When Jack heard the premise of my book—the idea that contemporary inventors should mine myth and folklore to think about the future of humanistic technology—he was hooked. We spoke at length about the origins of enchanted objects that appear again and again in stories from different cultures around the world. As you'd imagine, there are common themes:

The wishing wand or ring that fulfills any desire in an instant.

The flying carpet that swiftly transports us.

The bottomless purse that never runs out of money.

The superspyglass through which we can see thousands of miles.

Magic boots that enable us to walk miles in one stride.

The horn or whistle with which we can summon help.

The crystal ball that enables us to know the future.

The invisibility cloak or shield that hides us from danger.

The endless table that feeds hundreds with a bountiful feast.

Notice how many of these objects are transferable from one person to another. They don't provide any single person a superpower. These objects can be acquired, shared, gifted, traded, and passed down through generations—just like examples of enchanted objects I present in this book.

Futurists have speculated about the idea of enchanted objects for decades, giving the concept various names, including pervasive computing, ubiquitous computing (ubicomp), connected things, or things-that-think. The simplest, most widely used term today—usually credited to Kevin Ashton, the cofounder and former executive director of the MIT Auto-ID Center—is Internet of Things (IoT).

Arthur C. Clarke, the futurist and science fiction writer whose story "The Sentinel" inspired Stanley Kubrick's movie 2001: A Space Odyssey, famously declared, "Any sufficiently advanced technology is indistinguishable from magic."1 Many of today's smartest interface designers agree with him. Matt Jones, a friend and the founder of Berg, a celebrated London-based design consultancy, recently remarked, "Ubiquitous computing has been a long-held vision in academia, which has been derailed by the popularity of the smartphone." But now it seems as if we're getting closer to the Internet of Things, primarily because the price of computation and connectivity has been reduced to almost nothing.

Nearly there, but not quite. The smartphone has taken us a long way down one path, but other technology futures are vying for the attention of companies and their new-product-development dollars. These alternative visions of how technology should evolve hold great promise, but will have very different kinds of interactions with human beings and will thus deliver very different futures.

The glass slab—from the stamp-size iPod nano to the eighty-inch, ultra-HD LCD screen—now has a big lead in the technology race. I call the future defined by this sort of device Terminal World, because the interface is captured on a pixelated screen. In the early days of computing, those screens were called terminals—the "last inch" where machine met human.

For those who believe in Terminal World, such as the business leaders whose companies focus on that trajectory, the goal is to produce and distribute more and more pixels, embed screens in every surface, make devices thinner, cheaper, crammed with more features and functions, and to sell two or three to every person on the planet. Then repeat. It's not hard to envision how this scenario unfolds because it is already upon us. As of this writing, nearly 50 billion apps have been downloaded from the iTunes app store. Google's Android is rapidly catching up. And Microsoft, with its purchase of Nokia, is trying to figure out how to get in the game.

A second possible future is prosthetics—wearable technology. This trajectory locates technology on the person, to fortify and enhance us with more capabilities, to, in a sense, give us superpowers. To make humans superhuman or, indeed, "posthuman." This path of embedded wearability has some great benefits. I'm inspired, for example, when I see how prosthetics can restore physical capabilities to people who have lost them, enabling people—once considered "disabled"—to walk and run as they couldn't before, or to see or hear with range or precision they had lost or never had. However, when companies talk about a future of implants and ingestibles for everyone, I get queasy. Like plastic surgery, this future seems irreversible, fraught with unforeseen consequences, and prone to regret rather than enchantment.

An early and well-known tech prosthetic was the Sony Walkman, introduced in the 1980s, which enabled us to take music with us wherever we wanted to go and also permitted us to acoustically drop out of the world. Today's more insidious and headline-grabbing visual equivalent is Google Glass—the eyeglasslike device

that projects information on a transparent screen that floats at the periphery of our visual field. The promise of this enhanced lens is that we will be able to interact with information that is displayed or projected on almost anything. While there may be benefits, risks and losses are inevitable. Walkman-style dropping out may become even more complete. You won't know when and if other people are accessing and referring to the same information that you are, or to other information altogether, or none at all. There will be no consistent, shared view of the world, even by people standing side by side. Google Glass may go even further, isolating us from each other far more completely than earbuds do today.

The third future for technology interaction is animism. In this trajectory, computers coax us into bonding with them, simulating the comforts and attraction of a living relationship. In this future, the computing intelligence is primarily located in other digital actors, not wearables or iThings. Animism stimulates the same part of the brain that gets excited by cute cats and puppy love. Animism centers on our fantasy that technology can learn us, rather than our having to learn it. Robots that could speak our language, notice our gestures, and understand what we say and wish for would unquestionably provide a pleasing human solution to the awkwardness of today's click, tap, drag-n-drop, pinch, and zoom interactions.

You probably know about the Roomba vacuum cleaner, even if it isn't yet cleaning your kitchen. The goal of the animists is to build more mobile robots of this kind, until we have surrounded ourselves with animated devices that can act as coach, butler, employee, even a friend or mate. But to expect that social robots will become a human doppelgänger, a perfect replica of personhood, is to set ourselves up for entering the zone that Japanese robotics expert Masahiro Mori calls the "uncanny valley" of creepiness and disappointment—that place where the machine's human likeness is so close to the real thing it makes us uncomfortable. Is it a human or a machine?

The most pressing question underlying these competing trajectories is this: What is the most natural and desirable—even invisible—way for human beings to interact with technology without requiring a new set of skills or constantly needing to learn new languages, gestures, icons, color codes, or button combinations? This question has fascinated me for years, driven me to start up five technology companies, and pushed me to pursue academic research and teaching at the Media Lab.

I believe these trajectories—Terminal World, prosthetics/wearables, animism, and enchanted objects—are fluid and transitional. They will all bring some degree of value and will overlap and inform each other.

I have chosen to devote my time and energy to the fourth technology trajectory: enchanted objects. I won't abandon my smartphones or lose interest in the work of my colleagues who are developing wearables and social robots. I simply believe that the most promising and pleasing future is one where technology infuses ordinary things with a bit of magic to create a more satisfying interaction and evoke an emotional response.

Think of this approach to technology as a realization of our fondest fantasies and wildest dreams. A reimagining of flying carpets, talking mirrors, protective cloaks, animated brooms, and omniscient crystal balls—as well as cherished everyday objects of our past lives, such as hallway barometers and woodworking tools—things we have always loved, dreamed about, and wanted in our lives. This book is about that reimagining and how to make it a reality.

Users Review

From reader reviews:

David Crockett:

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Steve Pinson:

The actual book Enchanted Objects: Design, Human Desire, and the Internet of Things has a lot of information on it. So when you make sure to read this book you can get a lot of benefit. The book was compiled by the very famous author. The author makes some research just before write this book. This book very easy to read you can obtain the point easily after reading this book.

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