

Disruptive Genius

Innovation guru Clayton Christensen on spreading his gospel, the Gospel, and how to win with the electric car

HEN HE WAS 34 years old, Clayton Christensen started a company with a few by Craig Lambert

MIT professors called Ceramics Process Systems Corporation. "I was the business guy," he explains. "We were making new products out of advanced materials. In that market niche, we were the only ones to succeed: we beat DuPont, Alcoa, Hoechst. I could not

explain this by our having smarter people. The other companies had smart owners and smart managers, too. How could smart

people fail? I started to think about other industries where talented leaders had failed—were they actually stupid managers?"

Living in the Boston area, Christensen, M.B.A. '79, D.B.A. '92, now Clark professor of business administration, had enjoyed a

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close-up view of the rise and fall of Digital Equipment Corporation (DEC), a minicomputer manufacturer. DEC ranked among the world's most widely admired companies in the 1970s and 1980s, and was, after state government, the second-largest employer in Massachusetts. Minicomputers were much smaller than mainframes, which had appeared in the 1950s, yet much larger than the personal desktop computers that followed them, beginning in the early 1980s. In the 1970s, minis ruled much of computation.

But by the late 1980s, the business desktop microcomputer was eating DEC alive. "People attributed DEC's demise to [CEO Ken] Olsen," Christensen says. (Olsen had regarded desktop computers as toys for playing video games and publicly predicted they would fall flat in the business market.) "But the 'stupid manager' hypothesis didn't make sense, because *every* company that made minicomputers, *every one of them*, died in unison! It wasn't just Digital, but Data General, Prime, Wang, Honeywell. You might expect these companies to collude on price occasionally, but to collude to collapse is a stretch."

Christensen became curious about what drove an entire category of businesses to crash together in a short time—including successful, well-managed businesses led by very smart people, like Olsen. For his doctoral thesis at Harvard Business School (HBS), he studied the computer disk-drive industry. A colleague had suggested researching disk drives for the same reason that Innovator's Dilemma. Yet, "Ironically...it was disruptive technology that precipitated the leading [disk-drive] firms' failure."

He explains that disruptive products are typically "cheaper, simpler, smaller, and, frequently, more convenient to use." They tend to reach new markets, enabling their producers to grow rapidly and—with technological improvements—to eat away at the market shares of the leading vendors. In his book, Christensen shows how, between 1975 and 1990, successive generations of disk-drive technologies-14-, 8-, 5.25-, 3.5-, and 2.5-inch drivesdisrupted the markets of their predecessors, and then were themselves disrupted. When 8-inch drives emerged, for example, their smaller capacities held no interest for mainframe-computer manufacturers, the principal customers for 14-inch drives. But the smaller drives matched minicomputer-makers' needs-and with annual gains in performance, they eventually made inroads into the mainframe market. A similar pattern recurred with 5.25-inch drives and desktop computers, 3.5-inch drives and laptop computers, and 2.5-inch drives and notebook computers. Established companies are "held captive by their customers," in Christensen's phrase, and so routinely ignore emerging markets of buyers who are not their customers.

Dominant companies prosper by making a good product and keeping their customer base by using sustaining technologies to continue improving it. The products get ever better—but at some

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geneticists study fruit flies: their life spans are brief and new generations appear quickly. Disk-drive success was similarly shortlived: the category leader had been toppled over and over again. Christensen built an enormous database of every company that had made disk drives—every product, every component, all their revenues. "It was not a sample," he says. "It was a *census*."

His doctoral thesis became the seminal 1997 book *The Innovator's Dilemma*—a tremendously influential, best-selling volume that established Christensen as the architect of, and worldwide authority on, "disruptive innovation." In 2011 *The Economist* named it one of the six most important business books ever written. It has spawned numerous sequels, and Christensen has spun off a consulting firm, Innosight; the Christensen Institute, a nonprofit think tank; and a boutique investment firm, Rose Park Advisors—all based on his foundational idea. Four thousand students have taken his second-year course, "Building and Sustaining a Successful Enterprise," which helped win him an HBS Extraordinary Teaching Award in 2010.

Cheaper, Simpler, Smaller

THE THEORY of disruptive innovation lies at the core of his success. It grows from the distinction between *sustaining* technologies and *disruptive* ones. The former produce incremental improvements in the performance of established products: disk drives, for example, might offer faster speeds and greater memory storage. In contrast, disruptive technologies are "innovations that result in *worse* product performance, at least in the near term," he wrote in *The*

point their quality overshoots the level of performance that even the high end of the market needs. Typically, this is when a disruptive innovation lands in the marketplace at a lower price and relatively poor level of performance—but it's a level adequate for what the lower end of the market seeks. The disruptive technology starts to attract customers, and is on its way to staggering the industry's giants.

Examples abound. Small off-road motorcycles from Honda, Kawasaki, and Yamaha disrupted the hegemony of large, powerful bikes from Harley-Davidson and BMW. Transistors overthrew vacuum tubes. Discount retailing and home centers savaged the dominance of Sears. Online courses are barging into higher education. Drones challenge manned fighters and bombers. Nurse practitioners underprice medical doctors. Digital photography eclipsed film, and mobile telephones are replacing landline service. Outpatient clinics and in-home care pull revenue away from general hospitals.

Consider the hegemony of Detroit's Big Three—General Motors, Ford, and Chrysler. At one time, they dominated the auto industry, producing bigger, faster, safer, more comfortable cars with more and more features. But these improving products also "create a vacuum underneath them," Christensen says, "and disruptive innovators suck customers in with fewer features and a cheaper price." Toyota, Honda, and Nissan disrupted the Big Three's marketplace by introducing smaller, lighter, less safe, and less comfortable but reliable cars that needed few repairs and got good gas mileage—at a significantly lower price. Within a few

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years, they had garnered a large share of the market. Says Christensen: "The leaders get killed from below."

Many drivers who bought those cheap, reliable Toyota Corollas had not been buying cars, or certainly not *new* cars, before. The disruption forged a new market. "Disruptive innovation generates growth," Christensen explains. "Sustaining innovation makes good products better—but then you don't buy the *old* product. They're replacements. They do not create growth."

To bring these powerful ideas into the real world, Christensen in 2001 founded the consulting firm Innosight (www.innosight. com) with Mark Johnson, M.B.A. '96. Now employing about 100, the company works mostly with Fortune 100 companies that are seeking to defend their core businesses and adapt to disruptive en-

Mormonism and Mortality

LAYTON CHRISTENSEN'S BOOK, How Will You Measure Your Life? (2012; with James Allworth and Karen Dillon), focuses on values and offers its readers guidance in aligning their choices, professional and otherwise, with the things that genuinely matter to them. He does as much in his own life, which enables him to live in a way that one might describe as whole-hearted.

Born in Salt Lake City, Christensen grew up in a Mormon family and served as a missionary in South Korea from 1971 to 1973; he speaks fluent Korean. He earned a summa cum laude degree in economics from Brigham Young University, then attended Queen's College, Oxford, as a Rhodes Scholar, where he received an M.Phil. in applied econometrics and played some basketball, as he had in college. (He stands six feet, eight inches, and remarks, "I'd rather play basketball than eat." His six-foot, 10inch son Matt played on the 2001 NCAA championship team at Duke.) Christensen was a Baker Scholar (a top academic honor) at Harvard Business School, and became a White House Fellow in 1982, serving as an assistant to secretaries of transportation Drew Lewis and Elizabeth Dole.

He and his wife, Christine, have raised their five children in a reverently Mormon household. In 1999 he wrote a short essay, "Why I Belong and Why I Believe," as a gift to his children; it appears under the "Beliefs" section of his website, www.claytonchristensen.com. There, he writes that the mechanism by which the Church of Jesus Christ of Latter-Day Saints has helped him understand and practice the essence of Christianity is "to have no professional clergy. We don't hire ministers or priests to teach and care for us. This forces us to teach and care for each other—and in my view, this is the core of Christian living as Christ taught it." He describes the many ways daily life offers him opportunities to serve others, whether it be helping unload some-

vironments. It also coaches them on how to disrupt markets proactively, harnessing disruption's engine of growth for themselves.

"It's hard to do both," says David Duncan, a senior partner at Innosight who earned a Harvard Ph.D. in physics in 2000. "As successful companies get bigger, their growth trajectories flatten out, and they need to find new ways to expand. But that will look different from what they did in the past. Most are so focused on maintaining their core business that when push comes to shove, the core will almost always kill off the disruptive innovation—the new thing.

"The two goals conflict for resources," he continues. "CEOs are accountable to shareholders and feel Wall Street pressure to meet earnings targets. But innovations usually have lower profit margins at first, and pay off in the long term. Plus, the people who are

one's moving van or visiting an elderly couple, in poor health and struggling with alcoholism, who lived in a dilapidated apartment in a rough part of Boston.

The essay also relates how, as an Oxford student in 1975, Christensen began a nightly practice of reading the Book of Mormon from 11:00 P.M. to midnight, combined with prayer and an inquiry to God as to whether what he was reading was in fact His truth. One October evening, "I felt a marvelous spirit come into the room and envelop my body. I had never before felt such an intense feeling of peace and love." The spirit stayed with him that entire hour and returned each night thereafter. "It changed my heart and my life forever."

In the Mormon Church, he explains, "We truly believe that we are children of our heavenly parents. When that's your mind-set, you regard people in a different way. If you're starting a company or running a company, and you recognize that the people you are working with are children of God, you're much less inclined to disparage them, or not try to help them become better people."

Regarding missionary work (his 2013 book The Power of Everyday Missionaries explores this topic), he draws an analogy with the healthcare industry. (Christensen likes to use business metaphors in religious contexts; he says the early Christian church went on "a merger and acquisition spree" and notes that "there's an enormous amount of non-consumption in understanding God.") "In order for people to make good choices, they have to understand what the options are," he says. "The Kaiser Permanente health plan, in California, has a much better system for providing higher-quality and lower-cost care, by any measure. Members stay in the system for 18 years, on average, for example. So imagine that Kaiser Permanente just stayed out in Northern California and didn't tell anybody about how to do it better-while the rest of America falls off the cliff into low-quality, very complicated, and expensive healthcare. It wouldn't be right. They need to speak up and say, 'There's a better way to do things, you guys.' In a similar way, as Mormons, we need to talk to other people about what we believe. It's not that we're tryvery good at operating the core business are very different from the entrepreneurial ones, with their agile, adaptive mind-sets, that you need to run disruptive stuff. What *can* work is to separate out the disruptive entity, protect it, and let it operate by a different set of rules than the core business."

Innosight, for example, worked with an Indian company, Godrej & Boyce, on a new product, a refrigerator suitable for households in rural India, where a large majority of families don't have refrigeration—a classic case of non-consumption. Western man-

ufacturers have noticed this, says Duncan, but "a lot of companies have just said, 'Let's take our Western fridge, make it smaller and cheaper, and sell it in India.' But electricity is unavailable or unreliable in many rural areas. Many families can't afford major appliances, and don't need that kind of appliance, anyway....They go shopping every day or two, so [the fridge] only needs to keep things cool for 48 hours." Godrej introduced the ChotuKool, a small, portable, battery-powered refrigerator priced at \$69. "By the

ing to impose something on them, but if they don't understand that this is an option, they can't choose."

Christensen became a major consumer of healthcare in his own right after a harrowing period in 2010, when he suffered a heart attack and then was diagnosed with follicular lymphoma, a systemic cancer that had resulted in three large tumors. Just as he was finishing chemotherapy, he suffered a serious stroke while giving a talk in church. Luckily, a neurologist in the congregation instantly recognized what had happened when Christensen's speech turned to gibberish, and drove him to the hospital. "Had I not been close to great care with any of these events, I would have passed away," he says.

These brushes with mortality "sure have given me a lot of opportunities to think," he continues. "It's been posed to me: maybe this is the end. But I've been able to say to myself, and to my family, that if God needs me more on the other side, I'm ready to go. I'm not ashamed of how I've lived my life, and it actually hasn't caused me to reprioritize anything, other than wanting to do more good for more people."

How Will You Measure Your Life? tells of a company generative for employees at the advanced-materials company Christensen ran in the 1980s. He saw a young scientist, Diana, and noticed the joy and love she shared with her husband and two young children.

in the larger context of her life, and to call up a vision of how a day of positive experiences and support at work could send her home with "a replenished reservoir of esteem that profoundly affected her interaction with her husband and those two lovely children. And I knew how she'd feel going into work the next day—motivated and energized. It was a profound lesson."

The lesson, he says, was that "for the first time in my life, I re-

standards we are used to, it doesn't perform well," Duncan says. "It would never sell here! But in rural India they have sold 100,000 units in the last year or two."

Competing with Non-Consumption

THE THEORY of disruptive innovation "allows you to predict whether a competitor will flee you or fight you," Christensen says. Essentially, competitors fight each other when they make similar products and target the same customers. But in the case



alized that I had always wanted to help other people. Until then, I'd framed it as, 'If you really want to help people, you should study sociology.' But I realized: sociologists just talk. If you really want to change people's lives, be a manager. You have an opportunity, for 10 hours each day, to structure their work so that when they come home, they have a higher degree of self-esteem, because they accomplished something that matters to people."

of disruptive innovation, the established competition typically leaves a virgin marketplace wide open to the newcomer. The disruptor is thus competing *not* against other suppliers, but against "non-consumption." It is creating *new* consumers. "The innovation transforms something that used to be so costly, only the very rich had access to it," he explains. "These innovations make it so affordable and simple that normal people can do what only the rich and very skilled could do before."

Take collecting art. "You buy a house or move into a new apartment and there's this big wall of unadorned space. So you buy a piece of art to stick there," Christensen says. "For the first three weeks, you notice it every time you walk past it—you enjoy it. But after that it becomes so commonplace that you don't even notice it on the wall. What you've done is: you've spent money and brought a product home and consumed art for three weeks. Then you stop consuming that art—and what makes it worse is that this piece of art *preempts* the consumption of art in that space. So I have a student who is building a business around putting a flat-screen, highdefinition television screen on that wall space, with a lovely frame around it. And every three weeks, over the Internet, they will send you a fresh piece of art, so you can start consuming art again."

Or consider the problem facing the Disney Company's management, which, between 1985 and 2000, "convinced themselves that the core market for their theme parks was declining: smaller families, kids grow up faster, their interest in Cinderella maxes out at a is so hard to confront. Normally they would flee this market, ignore it—or go the other way and install new, bigger thrill rides at Disney World. Typically, *another* company would pursue this kind of disruption. But if Disney read our material, they'd say, 'Holy cow—we're in a booming business, because there is so much nonconsumption and now we know how to tap into it!"

The iPhone Enigma

THE THEORY of disruptive innovation in fact does not apply to all businesses. A former Christensen student, Michael Raynor '90, D.B.A. '00 (who co-wrote *The Innovator's Solution* with his mentor), pointed out that disruption has never happened in hotels. In the 1950s, for example, Holiday Inn entered the low end of the market and has never gone upmarket, nor been disrupted from below. (Similarly, McDonald's began at the bottom of the market and has remained there.) "It took us almost five years to figure out why this was happening," Christensen says.

The reason is that in most industries, "there's a technological core—a system inside the product that defines its performance and can be extended upmarket to do better things." In steel, for example, the electric furnace was the technological core that enabled mini-mills to disrupt integrated steel mills, which use blast furnaces to extract iron from raw ore. Mini-mills began by melting scrap metal, making every batch (with different ingredients and characteristics) of such low quality that the mills could sell it only

The disruption is competing against non-consumption. "The innovations make it so affordable and simple that normal people can do what only the rich and very skilled could do before."

younger age now," says Christensen. "But the theory of disruption looks at it differently. I told my students to go five miles north of Boston to Everett and Revere, to spend 20 minutes walking around the residential neighborhoods there—which are filled with threefamily homes—and to ask: how much non-consumption of family outings to Disney World is there here? Well, oh my gosh, these communities are *filled* with non-consumption because it is so costly to do that, most families can't go, or might go only once.

"If you want to create a new-market disruption," he continues, "you'd put up a four-story building in the middle of Everett or Revere, and rather than having *real* rides in it, have *simulated* rides: you don't go anywhere, but you feel like you are on a roller-coaster or an airplane ride. Like a flight simulator or video game, but maybe at IMAX scale. Now, Disneyland and Disney World are organized around fantasies. So, say in February, all the rides would be programmed to escape the real world into the fantasy world of *Shrek*. The characters—call it 'Disney Lite'—would come from *Shrek* stories. Then at the end of February the facility shuts down for two days and on March 1, reopens with the fantasy rides programmed as Peter Pan Land. You could get there easily—you don't have to travel 1,000 miles and stay in a hotel for a week.

"But this could be disruptive to the Disney theme parks," he continues. "If people started not going to Disney World, [because they could buy \$20 tickets for simulated rides instead of buying \$100 tickets for real rides,] the Disney executives could say, 'We're cannibalizing our own business.' That's why disruption for rebar (used inside concrete construction). But the electric-furnace technology evolved so that the mini-mills could monitor and control the proportions of specific metals, like nickel and zinc, in the mix, and eventually produce automobile-quality steel.

But there *is* no technological core in hotels. "There is nothing inside a Holiday Inn that could allow them to move upmarket," Christensen explains. "They could build hotels with a higher price point, but to do so, they would have to emulate the Four Seasons' business model."

Online learning isn't disruptive for K-12 public education, Christensen explains, because "our educational system isn't good enough to be disrupted technologically in that way." Distance learning is more clearly a disruptive force in higher education, where the quality of the product *is* good enough, and expensive enough, to enable online innovators to offer a more convenient option at a much lower price point (see "Colleges in Crisis," July-August 2011, page 40).

The complexities of technology markets can also pose challenges to Christensen's framework. In the computer industry, as a general rule, in the first years after a new technology appears, "the dominant companies almost always have a closed, proprietary architecture—one in which the design of one component depends on the design of all other components," he explains (and writes about in *The Innovator's Solution*). "That is because the technology isn't yet very well understood. But as it becomes good enough for what customers in the less-demanding end of the market need, it

African Bandwidth

DISRUPTIVE INNOVATION works in developing economies, too-even where there is no established market leader to disrupt. Africa, the world's poorest continent, has very little access to the outside world through telecommunications, especially the Internet. "How could you make it affordable and simple for a larger population to access these things that are now only available to the rich and skilled?" asks Clayton Christensen. "The traditional way would be to wire the place with wires like those for telephone and cable TV. That is very expensive. It would be cheaper to do it all with wireless technology-but that's also expensive: you've got to build the towers, and the towers need electricity, so you need access to electricity." So the market has not developed—meaning that there is no existing industry to disrupt.

"But how about this?" Christensen continues. "How about, every morning at 5:00 A.M., I launch an unmanned aircraft, with a footprint about the size of a kitchen table, that has satellite access to the Internet? And this drone just circles around this community all day long, giving the people wireless access via

gets overturned by modular or open architectures. Hewlett Packard, Sun Microsystems, and Silicon Graphics give way to Dell, Compaq, and IBM. They don't perform as well as the closed ones, but they are good enough.

"Then you had smartphones disrupting laptops, " he continues. "In smartphones, Nokia and RIM [which makes BlackBerrys] were the dominant companies. They had closed, proprietary architectures. Apple came in later than RIM and came in with a better product, the iPhone. The theory said Nokia and RIM should have killed them: you disrupt with a cheaper, simpler product, not a more expensive, better one. I said, 'I don't think the iPhone will succeed.' Two things happened that I didn't see at the beginning. One, the iPhone was a closed, proprietary system on the inside, but to the outside world, it was open to lots of apps that you could plug into it. Nokia and RIM were closed to the outsideyou couldn't stick in apps. They fell off the cliff, and Apple had the field almost to itself. But then comes the Android operating system from Google, which by definition makes the devices open and modular all the way through. So the people using the Android operating system are now Motorola, Samsung, LG. And they are killing Apple: now, Android accounts for about 80 percent of the market. So I was wrong, and then I was right."

Electric Disruption on the Road

DISRUPTIVE THINKING can even solve business riddles that have baffled capitalism for decades, Christensen main-



plane and not tower—at *very* low cost. The technology to do this exists now. You are competing with non-consumption. I'm certain that the bandwidth and the reliability of access are not as good as what we enjoy here. But it's infinitely better than nothing."

tains. "We worry about carbon dioxide and the atmosphere, so a lot of people are saying we need to replace gas cars with electric cars," he says, citing the classic market inertia that contributes to climate change. "But if you want an electric car to compete with gas cars on the California freeway—oh, my gosh, that's a tough business to crack. Traditional cars go from o to 60 miles per hour in six or seven seconds. It takes two or three minutes to refill them with fuel, and there are gas stations everywhere. You can carry the whole family in a minivan. If you want to do this in an electric car, well, a Tesla will cost you s100,000. Refilling the battery takes somewhere between half an hour and four hours, and you have to do it every 200 miles. It's so costly because you have to compete against really good products in existing markets.

"So instead, try asking, 'Is there a market that would love to have a car that *won't* go far or fast?" he continues. "In about 10 seconds of thinking, you'll realize that yes, there is: parents of teenagers in suburbia! These parents spend so much time driving their kids around from one event to another. They would love a car their kid could drive to school or to see friends, but which won't go fast or ride on the freeway. Recharges overnight, and costs about \$5,000. It's really not a car, it's a mobile sound system. It would be competing against non-consumption. *That* would be disruptive to the auto industry." □

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