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BY JOHN SVIOKLA



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When contemplating possible threats to their business, many executives worry about disruption. They see competitors with new technologies poised to capture their existing customers, and they know it's better to be a disruptor than a disruptee. But disruption is often misunderstood. In fact, as *New Yorker* writer Jill Lepore points out ("The Disruption Machine," June 23, 2014), many celebrated cases have been less disruptive than they were portrayed as being. What most industries experience as disruption is typically not a sudden change from one source, but the accumulated impact of a range of interacting factors. If you want to be prepared for disruption, it's critical to understand the more gradual, prevalent, and multi-

faceted dynamic that underlies it: a phenomenon called dematurity.

Dematurity is what happens to an established industry when multiple companies adopt a host of small innovations in a relatively short time. Those seemingly trivial moves combine to rejuvenate the old mature industry and make it young again. The term was coined in the early 1990s by Harvard Business School professors William Abernathy and Kim Clark. They were thinking of the U.S. auto industry, which was undergoing a profound operational renewal, spurred by Japanese competition, the quality movement, and lean management. Toyota and Honda, with their superior production methods, did not fully disrupt Detroit. They dematured it. Instead of collapsing, the Detroit Three adopted their rivals' tools and techniques, and the entire

industry advanced to higher levels of quality and customer satisfaction.

You can think of dematurity as a crescendo of mini-disruptions that add up to great effect. It will hit most industries sooner or later; it struck sectors as varied as software development, entertainment, and defense contracting. It is happening right now in the U.S. in healthcare and electric power generation. In the long run, dematurity is a great boon, but it can also be terribly threatening to individual companies. Nearly all cases of dematurity have one thing in common: the genuine surprise of executives when it happens to their industry. It is all too easy to be caught off guard—to ignore the small changes that appear one by one, to fail to believe they will affect you, and to end up at the tail of the wave, outpaced by competitors who saw the possibilities earlier.

The solution lies in gaining better sensitivity—in other words, improving your ability to recognize and respond to the signals of incremental change. This is difficult, but not because information about the pending changes is sparse. Rather, the signals are too abundant. News breaks of deals, partnerships, and market entrances or exits. Scholars, commentators, and business leaders talk of looming disruption. Some of that talk is accurate in its foresight, and some of it is hyperbole. It is difficult to know which is which.

Here, then, to help you sharpen your mental gauge for disruption and dematurity, are five often overlooked but genuinely prescient signals of pending industry change. They reflect more than 20 years of close observation of innovation launches in a variety of industries. These phenomena tend to arise when an industry is on the verge

of dematurity. Look for early signs of these five changes, and you can better recognize the impact of today's events—and the trajectory of tomorrow's.

New Customer Habits

In the 1980s, most people who bought telephones installed them in a single location, connected them to the telephone network with a wire, and used them exclusively to communicate via voice. By the end of the 1990s, mobile phones were available with analog transmission networks. Consumers used them as portable supplements to their wired voice lines—a widespread incremental improvement, but not a dramatic shift in people's habits.

Then digital transmission (2G and 3G) became available. In 2002, people sent more than 250 billion text messages. Before long,

ing in business and pricing models for a broad group of digital industries—electronics, creative content, gaming, photography, video, music—that had formerly operated independently of one another.

A similarly powerful paradigm shift is happening now in business-to-business IT with cloud- and Internet-based software subscriptions, known as software-as-a-service (SaaS). This sector did not exist before 2000. Formerly, nearly all corporate technology adopters bought the software they needed to run their businesses, and installed it on machines residing in their own facilities. Web-based software delivery models, known as application service providers (ASPs), struggled to gain enough scale to make money. They were hobbled by slow Internet speeds, non-modular software development practices, and a

Not every promising technology fosters a customer habit. The Segway, a highly publicized, technologically ingenious self-balancing electric vehicle, turned out to be too unwieldy and expensive to reform habits. It has sold only about 50,000 units since its launch in 2001. Similarly, although the SodaStream home soft drink machines are widely distributed kitchen appliances, it's not yet clear whether they have enough popularity to disrupt the carbonated beverage industry. Much depends on how many people prefer the convenience of never running out and the thrill of making soda themselves to the convenience of a prepackaged can that doesn't need cleaning.

For every prospective innovation, whether you're promoting it or facing off against it, seek out any early signals of new customer habits. The way people embrace or reject the innovation, and the logic underlying their response, will tell you a great deal about whether it's a smartphone or a Segway.

New Production Technologies

When a new technology changes the way an established business produces its core product, dematurity often follows. For example, many auto insurance providers are changing the way they price their policies. Instead of classifying customers' likely driving risk through actuarial statistics about gender, age, and location of residence—and thus getting only a rough statistical view of the habits and risk levels of individual drivers—they now use data collected from in-car diagnostic devices. This allows them to design more profitable products that return more savings to customers. MetroMile, a startup launched in 2012,

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they began to integrate other functions—reading magazines and books, listening to music, playing games, finding places to eat in unfamiliar neighborhoods, and so on. This new group of consumer habits added up to a paradigm shift in everyday life. The same person who might once have carried a cellular phone, map, book, camera, Gameboy, and Walkman now could have one device serving all those purposes. By 2007, the year the iPhone was introduced, it was clear that major changes were com-

lack of cloud computing, and their offerings were too frustrating to be usable. Today, employees in companies of all sizes routinely access application services via high-speed cloud connections, a completely new customer habit that took hold only after incremental improvements in related technologies and practices propelled SaaS across a threshold of usability. The business is growing 20 to 30 percent per year; this, plus its clear link to new habits, indicates that it has only just begun to rejuvenate the software industry.

provides a free device for cars that tracks mileage, driving patterns, and locations; it pays for this service with insurance policies targeted at urban residents who drive less than 10,000 miles a year and who pay by the mile. Progressive Insurance, a more established auto and home insurance company, uses its own in-car monitor called Snapshot to gather data, and rewards safer drivers with lower premiums.

The power generation sector—an industry that is controlled by large, semipublic semi-monopolies—is also facing dematurity because of new production technologies. Today, utility customers buy electricity directly from the companies that generate it. But the centralized, expensive infrastructure that has long been a strength of the industry is also a source of costs, inflexibility, and disaster risk. In particular, the hurricanes and other weather catastrophes of the past few years, especially the tsunami that hit the Fukushima Daiichi nuclear power plant in Japan in March 2011, have provided a wake-up call for many companies. Losses related to those events, coupled with the falling costs of fuel cells, solar panels, personal wind turbines, and other storage and power-management technologies, will probably lead many power companies to embrace alternative power systems and the digital grid over the next few years.

How do we know this long-awaited shift will finally happen now? Because the technology is crossing a threshold of effectiveness and cost efficiency. It also helps to recognize the complement of new customer habits: When large companies such as Google use renewable technologies to power installations like large server farms, it gives other

commercial building owners and nearby homeowners more reason to change their habits as well. When the change reaches critical mass, the winning electric power companies will be those that move away from selling supply, and toward selling wind turbines, gas generators, and other means of production.

Another good example of production technology breakthroughs is digital fabrication. This newly prevalent technology is altering the foundational practices of most manufacturing industries. Fabrication machines use software to control 3D printers that can build components and products by placing hundreds or even thousands of layers of material—usually plastic polymers or metals—in specified shapes. As with many other technological advances, each year brings devices that are faster, cheaper, and more varied in their capabilities than those of the year before.

The technology has now reached a tipping point. More than two-thirds of 100 U.S. industrial manufacturers surveyed by PwC in 2014 reported deploying 3D printers in some way. Many of the machines are used to prototype new products. Early adopters report that their product development cycles are shrinking as they quickly design, build, and redesign products before launch. The technology also makes new supply chain value propositions possible. Companies can produce discontinued parts as needed on a 3D printer. Some manufacturing experts anticipate that the use of 3D printing will cause a US\$3.4 billion annual drop in materials transportation costs, by enabling manufacturers to construct components entirely on site instead of assembling them from smaller parts made by

multiple suppliers. (For another perspective, see “A Skeptic’s Guide to 3D Printing,” by Tim Laseter and Jeremy Hutchison-Krupat, *s+b*, Winter 2013.)

New Lateral Competition

There was a time when a family doctor had a near monopoly on primary care services. The doctor knew the patient, knew the family history, and was present whether in treating the flu or deciding a twisted ankle needed an X-ray. The only problem was the time it took to get an appointment, or the three-hour wait for the doctor to be free.

Today, the demand for accessible, quality healthcare delivered in a timely way has created an explosion in convenience providers. CVS’s Minute Clinic, Walgreens’s Healthcare Clinics, and urgent care chains branded to major health networks are offering relatively inexpensive, rapid, and accessible medical care. These cover basic preventive services such as immunizations, flu shots, and diabetes tests; treatment of sudden conditions such as burns, sprains, splinters, back pain, and migraines; and chronic needs, such as the management of asthma and high blood pressure.

A traditional family doctor might look down on these clinics as providing an impersonal, transactional service, but consumers don’t seem to mind. Visits to retail clinics in the U.S. tripled between 2008 and 2013. One recent study by the PwC Health Research Institute found that 45 percent of consumers across all age groups are willing to use alternative providers for a range of basic health services. Their options to do so will rapidly expand. CVS and Walgreens together have close to 1,000 clinic locations in

the United States, and Walmart is getting into the game through an experimental partnership with Kaiser Permanente. These new healthcare actors are giving primary care providers and even hospital emergency rooms competition as the source of choice for quick, simple medical services.

The emergence of healthcare convenience chains is just one example of the dematurity that occurs when a new type of competitor appears—one with products and services that substitute for those of

New Regulations

Changes in government regulation patterns have an enormous impact on the type and intensity of competition in many markets. The passage of the Affordable Care Act, for instance, is adding millions of patients to the healthcare system in the United States. This places new competitive pressure on payors and providers, challenging both types of companies to raise the effectiveness and cost-effectiveness of their offerings. Suddenly, old players and new entrants alike see opportunities to

cal use, are undergoing scrutiny by multiple agencies around the world. The carbon tax seems to be gaining momentum as one tool in the effort to curb industrially produced greenhouse gas emissions. And recent U.S. government relief for people with outstanding student loan debt may be just the beginning of efforts to use regulatory means to make a college education more affordable and to make evaluations of colleges more useful and accessible.

In general, emerging regulations give you a good way to anticipate change, even in areas where imminent change seems unlikely. For example, loosening regulation on the use of autonomous flying vehicles like drones will have an effect on investigative journalism, law enforcement, and insurance, along with the effects of their use in war and defense. Similarly, when regulatory relaxation appears imminent for self-driving automobiles, we can expect a major dematurity wave to hit mass transit systems, taxi services, the car rental industry, and presumably many other transportation-related endeavors.

New Means of Distribution

The advent of digital infrastructure has already thoroughly dematured media and entertainment—affecting formerly established business models for music, motion pictures, publishing, periodicals, advertising, and communications. Now it is dematuring the physical world as well. For example, consider what the online taxi dispatch service Uber is doing for personal transportation. Anyone who has been caught trying to hail a cab on a rainy evening in New York City knows that the system is in desperate need of an overhaul. As of 2014, there were fewer

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incumbents. Usually these involve lateral moves, the transfer of capabilities and business models from one sector to another, where the first sector has a completely different (and better) way of solving the second sector's problems. Though they're considered to be disruptive, lateral moves are not always that abrupt and clear-cut; they often occur in incremental fashion, with some incumbents (in the healthcare clinic model, Kaiser Permanente, for example) taking part. Thus, when you see a lateral competitor emerge, even in nascent fashion, it's a good predictor of more widespread system change. Indicators visible today include the use of mobile phones for paying bills, and the increasing popularity of prefabricated buildings, which may revitalize some aspects of the construction industry, even in urban settings like New York.

keep patients out of the doctor's office with fitness and nutrition tools like MapMyRun and MyFitnessPal, and diagnostic tools such as at-home strep throat testing kits. This kit has the potential to prevent 78,000 doctor's office visits per year, valued at \$94 million in physician revenue. Some of these diagnostic tools have prompted new regulations. For example, the U.S. Food and Drug Administration halted operations for the direct-to-consumer genetic testing company 23andMe, pending review of its saliva sample DNA test service.

Financial services, energy, education, transportation—all these industries and others are subject to new and revised government rules, each with its own form of regulatory push and pull. New payment systems such as bitcoin for online markets, or prepaid cards for physi-

than 15,000 yellow cab licenses (called medallions) in operation in the city, and great peak pressure on demand: Everyone wants to use the supply of taxis at the same time. This is a classic distribution system overload problem.

Uber sets up a new distribution system that overcomes the limits of the old one. It allows riders to log in to the system and indicate where they are and where they are going. The Uber app then responds with a wait estimate and often a fixed price. Uber has moved the distribution off the street corner and into the mobile device, which tells riders how much their ride will cost based on real-time demand, weather, distance, and current traffic conditions—take it or leave it. Instead of wondering how long it will take to hail a cab, taxi riders feel the sense of certainty that a better distribution system often brings. Whatever happens to Uber the company, we can be certain that taxi management systems like the one it has developed are here to stay.

Business-to-business environments are similarly affected by emergent distribution shifts, like the one signaled by Monsanto's 2013 acquisition of the Climate Corporation. Climate is an agricultural service provider that sells crop insurance and delivers it in conjunction with in-depth analysis derived by crunching data pertaining to such variables as weather and soil composition. Agricultural clients get real-time advice about when to plant, weed, or fertilize. Seemingly small adjustments can have a huge impact on farm yields. If Monsanto chooses to bundle its seeds with insurance or data services as a result of this deal, it will change the distribution system for agricultural insurance.

Leading in Dematurity

One of the few certainties in business today is that dematurity is coming to your industry, and soon. Responding effectively requires that you throw out old assumptions about how value is built and sustained in your markets. You need to ask questions about your industry that others believe have already been fully, inexorably, answered: What makes for efficient scale? Who is the competition? Who are the customers? What do customers want? Who owns what? Where is the risk?

If asking these questions and pursuing untraditional answers seems like an unlikely path to success, consider this fact: More than 80 percent of the self-made billionaires who are profiled in my upcoming book, *The Billionaire Effect*, made their billions in mature industries that they reinvigorated by tackling one or many of the factors identified above. They either introduced a product attuned to new consumer habits, changed the technologies of production, adopted ideas from another industry, adapted to new regulation, changed the distribution system, or made some combination of those moves. Elon Musk, CEO of Tesla Motors and SpaceX, challenged the internal combustion engine's dominance in the auto industry by developing a customer-friendly electric car. Farallon Capital Management founder Tom Steyer worked laterally: He created an investment vehicle for university endowments and changed how those customers defined profitable investing. Alibaba founder Jack Ma created one of the largest e-commerce sites in the world by taking advantage of production and distribution changes inherent in the Web to provide platform and infrastruc-

ture services to thousands of small businesses.

Although dematurity is inevitable, your business can be the one that benefits most. Half the task is recognizing the facets of impending change early enough to prepare. The five indicators in this article provide you with a starting point, a way to begin honing your judgment and identifying the real threats to your industry. The other half of the task is to respond in a way that makes you stronger: by assembling and integrating the capabilities you'll need in this new, rejuvenated marketplace. The right capabilities will probably be a combination of what you already do well and what you must learn to do from scratch. If you can set your company up to sense and respond to dematurity ahead of time, then you'll be one of the first to catch the big wave of small changes—before everyone else in your industry gets on board. +

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