

How to Put Disruptive Innovation to Work

The authors of 'The Innovator's Guide to Growth' talk about growth, creativity, and ways to foster innovation in companies

BY RENEE HOPKINS CALLAHAN

This summer brings the publication of a new book in the series exploring disruptive innovation that was started by Clayton Christensen's *The Innovator's Dilemma* in 1997 and continued in Christensen's *The Innovator's Solution* in 2003. The newest book is *The Innovators' Guide to Growth: Putting Disruptive Innovation to Work* by Scott, D. Anthony, Mark W. Johnson, and Joseph V. Sinfield of Innosight, along with Elizabeth J. Altman of Motorola, with a foreword by Clayton Christensen. The book will be published July 1 by Harvard Business Press, and is available for order now on Amazon.com.

Here we offer a conversation with three of the book's authors—Scott, who is president of Innosight; Mark, who is chairman and co-founder of Innosight; and Liz, who is vice president of strategy and business development in Motorola's Mobile Devices business.

Q: What is the main premise of *The Innovator's Guide to Growth*?

Scott: Following the right steps and putting in place the right structures can allow managers and entrepreneurs to improve significantly their odds of creating profitable growth businesses. This is of course a view that contrasts with a prevailing stream of thinking that innovation is random and requires creative genius.

Disrupting Class

Why technology has failed to change education for the better—and how it can

BY CLAYTON M. CHRISTENSEN,
MICHAEL B. HORN & CURTIS W. JOHNSON

Following is an excerpt from *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns* (June 2008, McGraw-Hill), the newest book from Clayton Christensen, in which he and his co-authors apply the theories of disruptive innovation to education.

In the book, the authors argue that schools have indeed improved over the years, despite the fact that society has repeatedly increased the jobs that schools are expected to take on. Given that people all learn differently from each other, if society wants to ensure no child is left behind, customization of education to

INSIDE

see 'Innovator's Guide to Growth' on page 13

see 'Disrupting Class' on page 6



Investing in Disruptive Companies

It seems a given that despite the risks, investments in disruptors can pay off handsomely. Our research shows that exactly how big the upside can be. See page 10

- 2 Voices of Disruption:** In 1998, Mimeo disrupted commercial printing by creating a market for on-demand printing. Where does it go next?
- 4 Innovators' Update:** In 2007, we suggested that Getty Images was doing the right thing in embracing the disruptive forces affecting its core stock-photo business. Its subsequent struggles highlight important lessons for companies seeking to transition between declining and emerging businesses.
- 5 Innovation Assessment:** A disruptive comparison of the Tesla Roadster and Think City; plus, a look at three different emerging nanotechnologies: Paint with silver nanoparticles, nanofiber clothes that use the wearer's movements to generate electricity, and "memristors" that may one day replace transistors.

Voices of Disruption

THOMAS J. KARRAT

Each issue, we feature a person who is “in the trenches” of disruption. This issue, we talked to Thomas J. Karrat, executive vice president, sales and marketing, for Mimeo. Previously Mr. Karrat was senior vice president, sales, for Yahoo!Hot Jobs. He started his career as a co-op student at EMC, where he rose to manager of the company’s largest division, with responsibility for over \$1 billion in annual sales. Note: Innosight is a loyal Mimeo customer.

Q: What is Mimeo?

A: Mimeo is the leading innovator in on-demand, online printing and binding services, and offers overnight delivery for most jobs. The company was founded in 1998 with the mission of giving busy professionals a better alternative to time-consuming, low-quality results that copy shops and in-house print centers provide. We can deliver as early as 8:30 a.m. the next day.

Along with printing and binding, we offer a wide range of services, including document management solutions, unlimited online document storage, warehousing and kitting, and CD and DVD duplication.

We currently have over 500 em-

ployees who are located in our New York headquarters, our print production and distribution facility in Memphis, and our sales office in San Mateo, CA.

Q: How do clients use Mimeo?

A: With Mimeo, printing and assembling documents takes just minutes. New users simply download the Mimeo print driver. To print a document, the user opens the file and hits “print,” selecting the Mimeo driver from the drop-down menu.

Files are automatically uploaded to the Mimeo server, where the user can then choose their paper and binding options, proof their document online, enter their deliv-

ery selections, and submit their order. All documents are stored in the user’s DocCenter account, where they can be updated and reprinted whenever needed.



Q: What makes Mimeo disruptive?

A: Mimeo has radically changed the traditional process by which people create and distribute business documents. That gives our customers a range of competitive advantages, including greater employee productivity, reduced document costs, and improved workflow processes.

One client told us that within seven months of deploying Mimeo.com, their company had gained back seven man-years of time.

Q: Could you give us a sense of digital’s share of the overall print-market and its rate of growth?

A: The U.S. printing market is approaching \$200 billion a year. The larger share of that is what’s traditionally called commercial, long-run, offset printing. The digital component is about \$30 billion right now, and is projected to grow to about \$60 billion over the next four years.

There aren’t any published figures on the percentage of the market that is coming online. Though small, it is probably the fastest-growing seg-

STRATEGY & INNOVATION

Editor: Renee Hopkins Callahan

Editorial Director: Scott D. Anthony

Circulation Manager: Gretchen Rice

Business Manager: Kevin Bolen

Editorial Advisors: Clayton M. Christensen, Professor, Harvard Business School; Clark Gilbert, Innosight Director; Richard Foster, Innosight Director



Innosight is a boutique consulting and training firm that helps companies improve their ability to create innovation-driven growth. Its unique methodologies and proprietary tools facilitate the discovery of new, high-growth markets and the rapid creation of breakthrough products and services. Its approach builds on the research of its founder, Harvard Business School Professor Clayton Christensen, author of *The Innovator’s Dilemma*, *The Innovator’s Solution*, and *Seeing What’s Next*. For more information, visit our website at www.innosight.com, call us toll free at 1-877-934-7787, or email us at inquiries@innosight.com

Letters and Reader Feedback: Letters, editorials, ideas for articles, and other contributions may be submitted to: Editor, at editorial@strategyandinnovation.com

Subscription Information: Subscription price is U.S. \$149 (6 issues); single copy: U.S. \$26.95. To subscribe to Strategy & Innovation, call 617.393.4535. Web: <http://www.strategyandinnovation.com/subscribe>. To subscribe to receive Innovators’ Insights alone, call 617-393-4535 or go to www.strategyandinnovation.com. For group subscription rates, call 617-393-4535.

Services, Permissions, and Back Issues: Strategy & Innovation (ISSN 1543-7760) is published bimonthly by Innosight, LLC. POSTMASTER: Send address changes to SI, P.O. Box 257, Shrub Oak, NY 10588-0257. To resolve subscription service problems, please call 617.393.4535. E-mail to inquiries@strategyandinnovation.com. Copyright © 2008 by Innosight LLC. Material may not be reproduced in whole or in part in any form whatsoever without permission from the publisher. To order back issues or reprints of articles, or for information about group subscription rates, please call 617.393.4535. E-mail: inquiries@strategyandinnovation.com. Web: <http://www.strategyandinnovation.com>

ment. The online print market now is about \$1 billion, and we believe that is probably 1 percent or 2 percent of the entire market.

Q: How does Mimeo differ from competitors such as VistaPrint, and how big a competitive issue is the FedEx Kinkos combination?

A: We are very familiar with VistaPrint. It's an amazing company with a great story and a great management team. But we are different in size, product type, and in the particular markets that we are serving.

VistaPrint's customer base, for the most part, is the small office and home office (SOHO) marketplace—a company size of one to five employees. To these customers, they generally offer offset or commercial printing, and not so much digital. They also create templates for their customers, whose companies are often too small to have a graphic designer or marketing people in-house.

While Mimeo does do some business for the SOHO marketplace, the vast majority of our business comes from small, mid-sized businesses, with a minimum of \$20 to \$25 million a year in revenue, up to the largest companies in the world. We do business with nearly 200 of the Fortune 1000 right now.

About FedEx—we have a great relationship with FedEx. They are a huge provider of services to us, in particular for the overnight delivery portion of our business. However, I don't believe their strategy is based around centralization and web-enabled technologies, because that would likely be a conflict with their strategy to create greater footprint through retail presence.

Our competitive advantage lies not in the use of FedEx, but in our

unique ability to process an order so quickly and efficiently that we can guarantee delivery of a quality product by 8:30 a.m. the next day.

Q: What is the long-term vision for Mimeo?

A: While we're heavily focused on product development, sales, and marketing in the U.S. right now, we think our model is portable to other markets and that's driving our intention to expand internationally, which we will be doing very rapidly.

We can also extend our product offerings to serve different users with different kinds of document needs, as we have done with our new Mimeo Marketplace offering.

Q: What is Mimeo Marketplace?

A: Marketplace is an innovative tool that allows companies to create a custom-branded online document storefront that works in a similar way as sites like Amazon.com.

In creating Mimeo Marketplace, we focused on major challenges for many of our target audiences—making documents readily accessible for recipients.

With their own Marketplace, users can let franchises, branches, students, or anyone else go online, directly purchase the materials they need on-demand, and receive them as early as the next day. This service eliminates the need for companies to warehouse obsolete documents and allocate staff to handle the operations and logistics of kitting and distributing the documents.

It also allows for a faster and more accurate process and, if the company wants, their online store can even serve as a profit center.

Today, many organizations are seeing as much as 200 percent turnover of employees, which means

they are regularly in need of updated learning aids, branded training materials, and so on, from corporate headquarters.

With Marketplace, sales and marketing organizations can make these updated materials available “real time” to employees who work out of remote offices or who work out of their homes.

Q: What is the strategy for Mimeo's success, as you look ahead?

A: Although we are private, we have been growing at a revenue rate of more than 40 percent for four years in a row. Our gross margins are expanding and we are profitable.

All of that is occurring while we are investing heavily in the business and staying laser-focused on the technology that makes the user experience more convenient and drives value for the customer.

Above all, we are focused on production quality. We have publicly proclaimed a 99.6 percent error-free rate, 20 percent higher than the industry standard. That stems not only from our passion and our great people, but from our business model itself. Centralization enables greater economies of scale, which then enable us to invest more in quality assurance programs.

Again, I think when you are a disruptive transformational player in a huge market, and you find a model that works, you stick to it. We just have to keep doing what we are doing and learn ways to do it even better.

Hopefully, over time we will be able to accelerate our growth even further. Really, the only thing keeping us from growing even faster than we are is just getting the word out. ♦

Reprint # 060303

Innovators' Update: Managing the Transition

What to do when the need for transformation is *too urgent*

Each issue, we'll take a look back at a past Innovators' Insight to see how our analysis has held up. In this issue, we look at Insight #91, "Getty Gets It." The Insight praised Getty Images for embracing disruptive innovation. What has happened since?

In June 2007, we praised Getty Images Inc.'s purchase of Pump Audio, a company that sold promotional rights for songs written or produced by artists that are not controlled by any of the major record labels.

The purchase fit Getty's overall strategy of finding ways to prosper from the disruptive forces affecting its core business of providing stock photos to traditional media companies. Getty appeared to be poised to become a rare example of a company that succeeded by embracing the disruptive forces affecting its core business.

Two months after our Insight, Getty's stock plunged by more than 50 percent as the company's sluggish organic growth disappointed investors. Then, in February a private equity company offered \$2 billion for Getty, a 40 percent premium over its market value at the time, but a 30 percent discount from the company's value last June.

What happened? The transformation of Getty's core business was happening too quickly to be offset by the growth of any of Getty's new growth efforts.

In August, one analyst noted how Getty's new growth businesses "remain highlights and are of growing importance in diversifying Getty's revenue mix, but are not yet large enough to offset declines elsewhere."

Getty encountered a challenge that frequently stymies companies encountering disruptive change: It is very difficult to manage a transition between declining core businesses and growing new businesses.

The paradox is that when companies need to act differently, they can't, and when they **can** act differently, they don't need to.

The time at which it becomes obvious that a company needs to transform itself is the time it has the least ability to take actions that can drive successful transformation.

Because the need is so pressing, the company gets impatient. That impatience shuts off iteration, and leads the company to target large, obvious markets that can be inhospitable to new growth strategies. Companies can prematurely shut off the very businesses that have the greatest chances of success.

On the flip side, when a company has the freedom and flexibility to take the right actions, the lack of urgency can lead it to under-invest in potentially transformative opportunities. When there's no burning platform, it is easy to treat innovation as interesting but not essential.

It is critical for companies to begin building new growth businesses before it becomes obvious that they need new growth businesses. If not, public market pressure makes it incredibly difficult to follow the right

course with disruptive ventures.

Going private might provide Getty enough freedom to recognize the full potential of its disruptive bets. Disk drive manufacturer Seagate found success following this tactic earlier this decade. The company spent two years as a private company, allowing it to perfect low-priced disk drives that went into Microsoft's Xbox gaming machine and Apple's iPod product line. Today, Seagate's market capitalization is about five times what it was when it went private in 2000.

Generally, if you are in a circumstance where your core business is healthy and growing, find a way to create the burning platform that gives innovation efforts the appropriate priority. Make sure you have managers whose success and failure rests on the success and failure of your innovation efforts.

If you are in a circumstance like Getty's, where the need for transformation is clear but patience isn't there, consider finding a way to shield transformational efforts from the stifling gaze of the public market.

Alternatively, consider a medium-to-large acquisition—such as Hewlett-Packard's recent \$14 billion acquisition of outsourced IT provider Electronic Data Systems—that can provide "air cover" to allow organic transformational efforts to succeed.

Getty seems to be following a solid strategy. If it successfully goes private and its new owners allow it to execute it in the right way, it could still emerge as a real disruptive success story.

— Scott D. Anthony

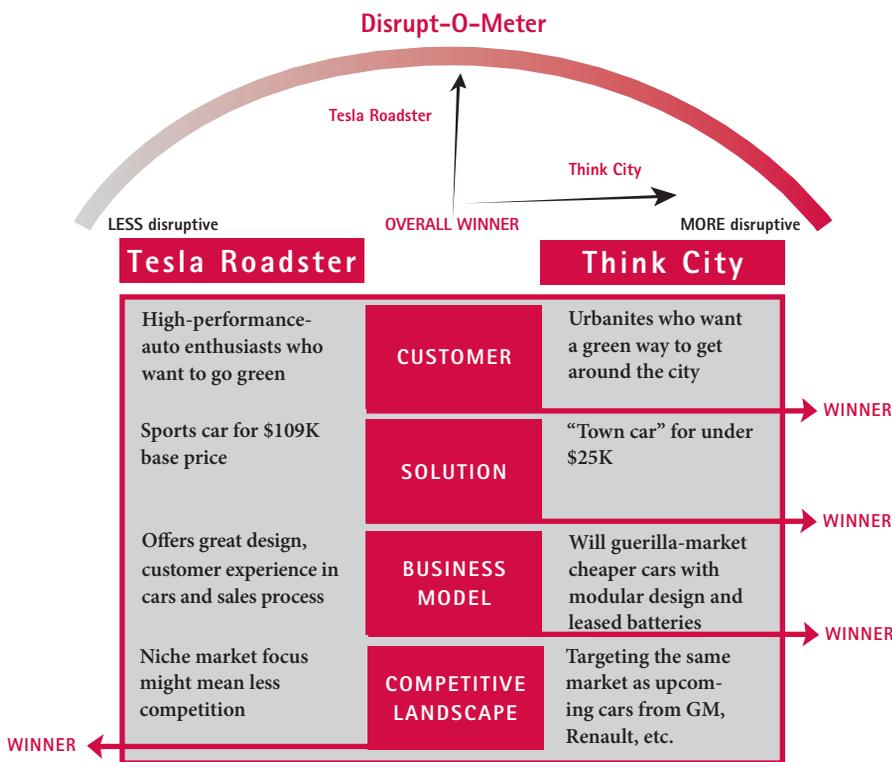
Reprint # 060304A

Disrupt-O-Meter

Tale of the Disruptive Tape: Think City vs. Tesla Roadster

“Is company X disruptive?” Whenever we’re asked this question—and we’re asked it often—we run through a simple mental checklist that looks at the target customer, the solution, the business model, and the competitive landscape. In this issue, we use our “Disrupt-O-Meter” to analyze two new electric-car offerings: Think’s City and Tesla’s Roadster.

Record-high gas prices have sharpened the focus on alternatives, including electric cars. Think Global and Tesla Motors will each debut its first car in the U.S. in 2009. Silicon Valley-based Tesla offers a high-end sports car that tops out at 135 MPH and can run 220 miles per charge, sold in high-end, high-touch dealerships. Norway-based Think expects to sell primarily online, a la Dell, and will offer a tiny “town car” with top speeds of 65 MPH and 110 miles per charge. Which is more disruptive?



More Disruptive: Think City. A few years from now there will be many all-electric subcompacts like Think available from established companies as well as start-ups, so shouldn’t that give Tesla the edge? Not necessarily—Think has a potentially disruptive business model, eschewing traditional showrooms in favor of build-to-order online sales. And City’s modular design allows Think to assemble modules produced all over the world. The City will be sold modularly as well—batteries are not part of the sale price, but will be leased to customers for a monthly fee. Meanwhile, Tesla is focusing its innovation on the customer experience, including sales. Tesla’s first dealership in a \$2 million Hollywood location was consciously modeled on Apple stores. Tesla’s focus on the luxury segment—it intends to introduce a luxury sedan in 2009—means less competition, but a smaller overall market. ♦ Reprint # 060305A

EMERGING TECHNOLOGY WATCH

Medical Uses for Silver Nanoparticles

Researchers have come up with several medical uses for silver nanoparticles. Since silver has antibacterial properties, bacteria cannot build up a resistance to them. “Nanoparticles interact with the bacteria and rupture the cell wall,” says George John of The City College of New York, lead author of a study on the subject published recently in *Nature Materials*. Researchers have made paint that is embedded with silver nanoparticles that hospitals can use to coat their walls and countertops to fight infection. The paint could keep its germ-killing abilities for up to three years, possibly longer. Nanoparticles are also being studied for use in drug delivery, since they are able to pass easily through cell membranes.

‘Nanoshirt’ Generates Power

Nanotechnology researchers are developing a “power shirt” that can generate enough electricity to power small electronic devices. A recent issue of *Nature* detailed how pairs of textile fibers covered with zinc oxide nanowires can generate electrical current using the piezoelectric effect. Combining current flow from many fiber pairs could allow the wearer’s body movement to power a range of portable electronic devices. The shirt could be used by soldiers in the field, hikers, and others whose physical motion could be harnessed and converted to electrical energy. Also, the fibers could be woven into curtains, tents or other structures to capture energy from wind motion, sound vibration, or other mechanical energy.

Memristor Could Replace Transistors

Scientists at Hewlett-Packard Laboratories reported in *Nature* that they have developed a new nanometer-scale electric switch that “remembers” whether it is on or off after its power is turned off. This “memristor,” or memory resistor, might be useful for constructing nonvolatile computer memory (which is not lost when the power is off). Replacing transistors with memristors could also someday keep us from having to recharge our cellphones every other day. However, industry adoption is far from certain. The same researchers noted that “even to consider an alternative to the transistor is anathema to many device engineers.”

Reprint # 060305B

match students' different learning needs and learning styles is the key to improving results. In order to introduce customization, schools need to move away from monolithic instruction of batches of students toward a student-centric approach.

The authors argue that technology presents a promising path for escaping the interdependent curricular architecture of American schools that prevents customization. Adopting student-centric technologies can mediate the clash between the need to standardize the way schools teach and test, and the need to customize how students learn. In this excerpt, the authors describe why placing computers in schools has so far not had the desired effect, and how using technology to grow and change how education itself operates will help.

Educators have seen computers reinvent many other professions. As a result, they have invested heavily in computers. In 1981, there was one computer for every 125 students in schools. By 1991 there was one for every 18, and in 2000 there was one computer for every five students.

Many schools now have a laptop for every child, and if the \$100 computer becomes a reality, they will likely be everywhere. Over the last couple of decades, schools have spent well over \$60 billion in equipping classrooms with computers.

Despite these investments, students report using the computers sparsely in their schools. Fifth graders report using computers 24 minutes a week in class and in computer labs. Eighth graders report using computers an average of 38 minutes a week.

Because many high schools have begun offering courses in how to use computers, and offering vocational classes that relate strongly to computers, older students use them more than in the younger grades.

But even then schools use computers as a tool and a topic, not as a primary instructional mechanism that helps students learn in ways that are customized to their type of intelligence.

Larry Cuban, who has conducted highly regarded studies on this topic, reports that in early-grade elementary school classrooms, computers serve to sustain the traditional early childhood school model. Computers have become just another activity center that children can opt to use in the course of the day. At the computer, they can play such games as "Franklin Learns Math" or "Math Rabbit."

While these games are popular with the children, they do not supplant traditional teaching; instead, teachers use them to supplement and reinforce the existing teaching model. As such, computers add cost while failing to revolutionize the classroom experience.

In middle and high school core academic classes in particular, students report that computers have had little to no impact on the way they learn.

Teachers still deliver the instruction. Students use computers primarily for word processing, to search the Internet for research papers, and to play games. A small number of middle school teachers—fewer than 20 percent—reported using computers for drill-and-practice software or for math

games and the like.

High school teachers report having made good use of computers to make better lesson plans and to communicate more with parents through email and blogs.

But again, as Cuban concluded, "In the end, both supporters and critics of school technology (including researchers) have claimed that powerful software and hardware often get used in limited ways to simply maintain rather than transform prevailing instructional practices." Some argue that even where education technology has been used, the results have been no better than teacher-based instruction.

One might conclude from this that the software just isn't good enough yet, which then implies that if school leaders, software companies, and educators just keep working on the technology with a few billion dollars more, the impact will materialize.

Crammed technologies fail to make an impact

We don't think so. To see why, consider the case of Jaime Escalante. Escalante began teaching math at Los Angeles' Garfield High School in the late 1970s. In a school where drugs, gangs, and violence were daily realities, against all conventional wisdom Escalante offered AP Calculus to a few students in 1982.

At the end of the year all of these students passed the AP exam. The Educational Testing Service (ETS), which administers the AP exams, thought they must have cheated. It was simply implausible that 100 percent of the students from one

class in Garfield High would pass AP Calculus.

The students retook the exam and passed again. It was a testament to the students, but also to Escalante and his ability to teach and motivate. By 1991 when Escalante left the school, 570 Garfield High students were taking AP exams.

Escalante was an exceptional

teacher in the classroom. Why not capture Escalante’s instructional magic on film and make it available to schools anywhere?

Sure, it’s not the same as having Escalante himself there (nor are we arguing this would offer the potential of customizing an education through the power of computer-based learning), but if he is that

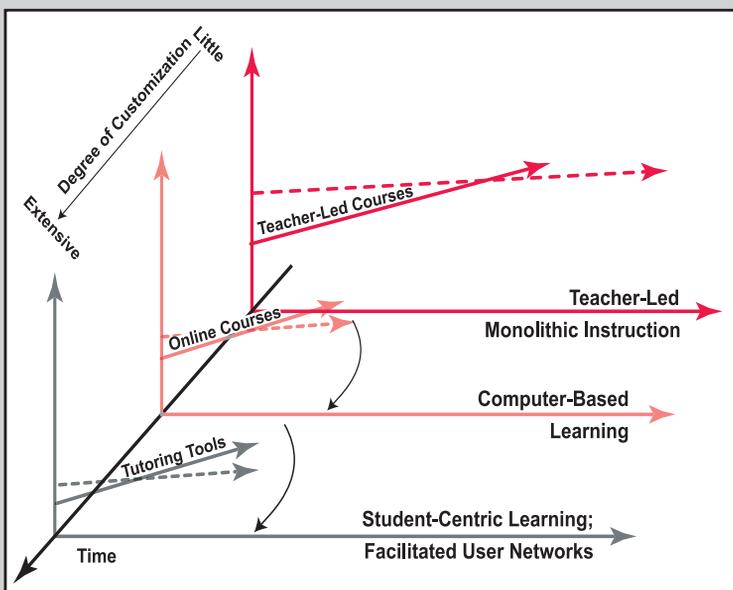
good, why narrow his impact to one classroom in one school?

People have in fact done this with great teachers of Escalante’s caliber. But these sorts of films have had little impact because they were simply crammed into classrooms as a tool on top of the traditional teaching methods.

Not surprisingly, never has a cal-

The Two Stages of Instructional Disruption

The disruptive transition from teacher-delivered to software-delivered instruction is likely to proceed in two stages, if the history of disruptive innovations can serve as a guide. The image below illustrates the two stages the disruptive transition is likely to take.



The rear-most plane in the image represents most current public and private school systems. These are characterized by monolithic instruction with traditional textbooks, and standardized assessment.

The middle plane in the image represents the first stage of the disruptive transition. We call the first of these stages computer-based learning. In this stage, the software will be proprietary and relatively expensive to develop, and it will be monolithic with respect to students’ types of intelligence and learning styles. The

instructional methods in this software will largely mirror the dominant type of intelligence, or learning style, in each subject.

Computer-based learning is not as completely monolithic as the teacher-delivered mode is, however. Today’s software accommodates different paces of learning, and some allows students to choose different pathways to learning the material.

The front plane in the image represents the second phase of this disruption, which we term *student-centric learning*. In this stage, software will have been developed that can help students learn each subject in a manner that is consistent with their type of intelligence and learning style. Whereas computer-based learning is disruptive relative to the monolithic mode of teacher-led instruction, student-centric technology is disruptive relative to personal tutors.

(from *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*)

culus teacher announced to the class, “Kids, today is a great day. We have these films of a teacher in Los Angeles, and you just need a technician to run the projector. You don’t need me any more.”

The sum of these assessments is that traditional instructional practices have changed little with the introduction of computers and other modern technologies. A class does not look too much different from the way it did a couple of decades earlier, with the exception that banks of computers line the walls of many classrooms.

Lecturing, group discussions, small-group assignments and projects, and the occasional video or overhead are still the norms. Computers have not increased student-centered learning and project-based teaching practices. The implementation of computers has not caused any measurable improvements in achievement scores.

And most importantly, for the purposes of this book, computers have made almost no dent in the most important challenge that they have the potential to crack: allowing students to learn in ways that correspond with how their brains are wired to learn, thereby migrating to a student-centric classroom.

Understanding how schools have spent so much money on computers only to achieve such little gain isn’t so hard. Schools have crammed the computers into the existing teaching and classroom models in much the same way that

incumbent companies inevitably try to morph potentially disruptive products, services, and technologies into their existing processes and values.

Teachers have implemented computers in what to them was the most common-sense way—to

most of the time you couldn’t hear music at all.

Thomas Edison began to change all this when he invented the phonograph in 1877. Suddenly you could hear music in places other than those where it originated. And you could now hear more than just the local instrumentalists.

As people recorded the great musicians like Rachmaninoff, you could hear the best musicians’ brilliance right in your living room.

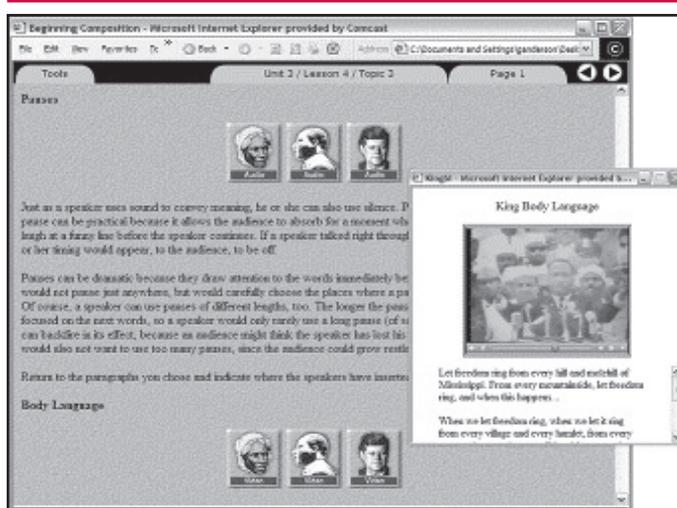
But imagine what would have happened if RCA Victor, which pioneered the ability to record music with Edison’s technology, had made a recording of Rachmaninoff playing his Piano Concerto No. 2,

then sold tickets to a concert in Carnegie Hall where people could listen to Rachmaninoff—but instead of the real person playing the music with a live orchestra, the concert’s promoters had rolled a Victrola phonograph onto the stage and played their recording into a microphone.

The same people who would have been delighted with the quality of the recording when they were listening at home in Poughkeepsie, New York—where the recording was infinitely better than nothing—would have been deeply disappointed when the recording was pitted in head-on competition against the real people in the real place.

Fortunately for the recording industry, RCA Victor didn’t at-

Screenshot from an online English class offered through Class.com



sustain their existing practices and pedagogies rather than to displace them.

So how could schools implement computer-based learning in ways that transform teaching and learning? We’ll illustrate how by first recounting the phonograph’s commercialization—and then its ultimate disruption of live music.

Lessons from Rachmaninoff

Through the 1870s, people had few options for listening to music. They either had to provide the music themselves or arrange for a local instrumentalist to play.

People were of course limited by their particular repertoire and skill. Rarely could you hear the music you wanted to hear where and when you wanted to hear it—and

tempt the Carnegie Hall stunt. It instead sold its phonographs and recordings to people who couldn't go to Carnegie Hall, and its customers could play them whenever and wherever they wanted to hear music. It took about a century for the technology to become good enough that listening to the recording was nearly as good as hearing the music live.

Today, nearly everyone from the casual music listener to the music connoisseur hears the majority of their music through recordings, not live.

Imagine the outcome if the early recording industry had marketed its products to be played after the intermission during live symphony concerts to allow the performers to go home early.

Or what if it decided it couldn't commercialize Edison's technology at all, and kept working on it in laboratories until it was quality-competitive with the best live musicians? The industry would have spent billions and achieved little.

Success with disruptive innovations always originates at the simplest end of the market, typically competing against nonconsumption. Then, from that base, the technology gets better and better until, ultimately, it performs well enough that it supplants the prior approach.

If the recordings of Rachmaninoff found a welcome market by not competing directly against the live musician himself, why should people pit the recordings of teachers like Escalante in direct competition with teachers?

Just as no one would pay to go to Carnegie Hall to listen to a phonograph recording, we should not

expect teachers today to use a recording of Escalante to teach when they can use their own skills.

And it's not just the recording industry. Virtually *every* successful disruptive innovation took root similarly—competing against nonconsumption—so that people were delighted to have a product even if its capacities were limited.

Nonconsumption presents an opportunity

Computer-based technology will become successful in education only if allowed to compete against nonconsumption, where it surely would be better than nothing. Then bit by bit it could improve and change the way learning is done in schools. In fact, in some areas computer-based learning is methodically gaining ground as students, educators, and families find it to be better than the alternative—having nothing at all.

Despite skepticism and pessimism from many that the lack of an open market means schools would not implement this computer-based technology in disruptive fashion, the evidence suggests otherwise: Public education enrollments in online classes are exhibiting the classic signs of disruption as they have skyrocketed from 45,000 in 2000 to roughly 1 million today.

How has this happened? At first glance there is little nonconsumption in U.S. schooling, and one therefore might expect to see the disruption only occurring in developing countries where education is not universal; after all, children are required to attend school in the United States. On the contrary, looking at the class level within

U.S. schools reveals many areas of nonconsumption—areas where the alternative is nothing at all.

These areas include AP and other specialized courses; small, rural, and urban schools that are unable to offer breadth; “credit recovery” for students who must re-take courses in order to graduate; home-schooled students and those who can't keep up with the schedule of regular school; students needing special tutoring, and pre-kindergarten.

In these foothold markets computer-based learning has already planted itself and is gaining “market share” at a predictable pace.

Although the data are hard to aggregate on a consistent basis, the data suggest that by 2019, 50 percent of high school courses will be delivered online. In other words, within a few years, after a long period of incubation, the world is likely to begin flipping rapidly to student-centric online technology.

And when the day comes that technology begins to be used to facilitate student-centric education, rather than being crammed into an educational model based on monolithic instruction, educators will finally be using that technology in a way that will transform teaching and learning. ♦

Clayton M. Christensen is the Robert and Jane Cizik Professor of Business Administration at the Harvard Business School, is co-founder of Innosight, and is author of five books including *The Innovator's Solution* and *The Innovator's Dilemma*. He can be reached at cchristensen@hbs.edu. **Michael B. Horn** is cofounder and executive director, education, of Innosight Institute. He can be reached at mhorn@innosightinstitute.org. **Curtis Johnson** is a writer and consultant, a former college president, and former chief of staff to Minnesota Governor Arne Carlson. He can be reached at cjohnson@citistates.com.

Reprint #060301b

Investing in Disruptive Innovation

Do disruptive companies offer shareholders a better financial return than alternatives?
The answer is yes, and our research reveals just how much better that return can be

BY LESLIE FEINZAIG

In a world of perfect information, a public company's stock price would precisely reflect the present value of its future earnings.

But there is no such thing as perfect information. Public markets value companies based on results—both the actual results and expectations of what future results might look like.

Whether the market rewards or penalizes companies depends on how closely they meet the results that are expected—whether the actual numbers are north or south of the forecast, and how far.

It makes sense, then, that there is a lot of money to be made from accurate forecasting. A return-seeking investor would love the ability to spot surprises—positive or negative—before the market does.

Our readers know that disruptive innovators promise exponential returns. And incumbents targeted by disruptors can surprisingly stumble.

So, given the market impact of disruption, it is somewhat surprising that the body of research on disruptive innovation is not generally applied to financial analysis and forecasting.

Clayton Christensen's seminal works have had a profound impact on industry practitioners, with a growing number of prominent companies incorporating disruptive initiatives into their innovation pipeline in order to achieve growth.

If companies are turning to Christensen's tools on behalf of their shareholders, why don't shareholders factor in these initiatives to their investment strategy?

Why don't Wall Street analysts pay attention to disruptive initiatives when they make their predictions, and reward disruptors in their recommendations?

How to value disruption

In considering these questions, we thought perhaps the problem is that no one really knows how to properly value disruption. And because of that, no one really knows just how large disruption's upside is.

To find out, we conducted an experiment to compare the returns of disruptive innovators to those of the incumbent companies they directly disrupted.

We rummaged through our database of disruptions, on the lookout for cases that would allow for a meaningful financial comparison. We built a sample of eight disruptive companies, matched to a sample of eight incumbents—companies that were disrupted (see "Portfolio Details" on page 12).

Then, we looked at total returns indexed for each company starting on the year of the disruptor's IPO. When that was done, we compared the returns of our portfolio of sustaining companies and our portfolio of disruptive companies to the Standard & Poor's returns over

time periods equivalent to each of the disruptor–incumbent pairs.

The sample included disruptors whose IPOs occurred as recently as 2004 (e.g., Google), so as companies "expired" (i.e., reached the most recent data available), we re-invested returns proportionally in the remaining companies.

There are obvious caveats to this experiment: the starting sample is tiny, and shrinks further after several years; we also picked winning companies in both portfolios, so there is substantial survivor bias.

Stellar results from disruption

The results are eye-opening.

As illustrated in the chart on Page 11, in the three years after the disruptors' IPOs, the S&P 500 portfolio had yielded 34 percent returns, equivalent to a 10 percent compound annual growth rate (CAGR); the incumbent portfolio yielded 41 percent returns (12 percent CAGR), and the disruptive portfolio yielded 200 percent returns (44 percent CAGR).

At the five-year mark (with six pairs of companies remaining in the sample), the S&P 500 returns were 31 percent (6 percent CAGR), incumbents' returns were almost 68 percent (11 percent CAGR), and disruptor's returns were an astounding 350 percent (35 percent CAGR).

At first blush, it might seem surprising that the incumbent portfolio produced such strong returns.

But remember, disruptors often win by creating new market spaces. Incumbents can continue to thrive for many years after a disruption takes root. For example, it took a full 15 years for Digital Equipment to meaningfully feel the results of the personal computer disruption, and newspaper companies weren't meaningfully affected by Internet-based disruptors for about a decade.

What about risk?

Sophisticated investors would argue at this juncture that the differential returns between the samples are risk-related compensation. As viewed through the lens of conventional financial theory, young disruptive public companies have riskier profiles than stable, established incumbent companies.

Fortunately, finance aficionados have a way to answer this ques-

tion—the Capital Asset Pricing Model (CAPM), which helps measure portfolio risk and the return an investor can expect for taking that risk.

Underlying CAPM is the idea that investment risk consists of two elements: the overall risk for the entire market, and the specific risk of a specific security—the degree to which a specific security's price movements are not correlated with the general market's fluctuations.

This latter risk measure is a stock's "Beta" (when a stock has moved 1.5 percent for every 1 percent move of the overall market during the past five years, for example, it is said to have a beta of 1.5). The CAPM formula also takes into account the expected return of a risk-free security, such as a U.S. government Treasury bond.

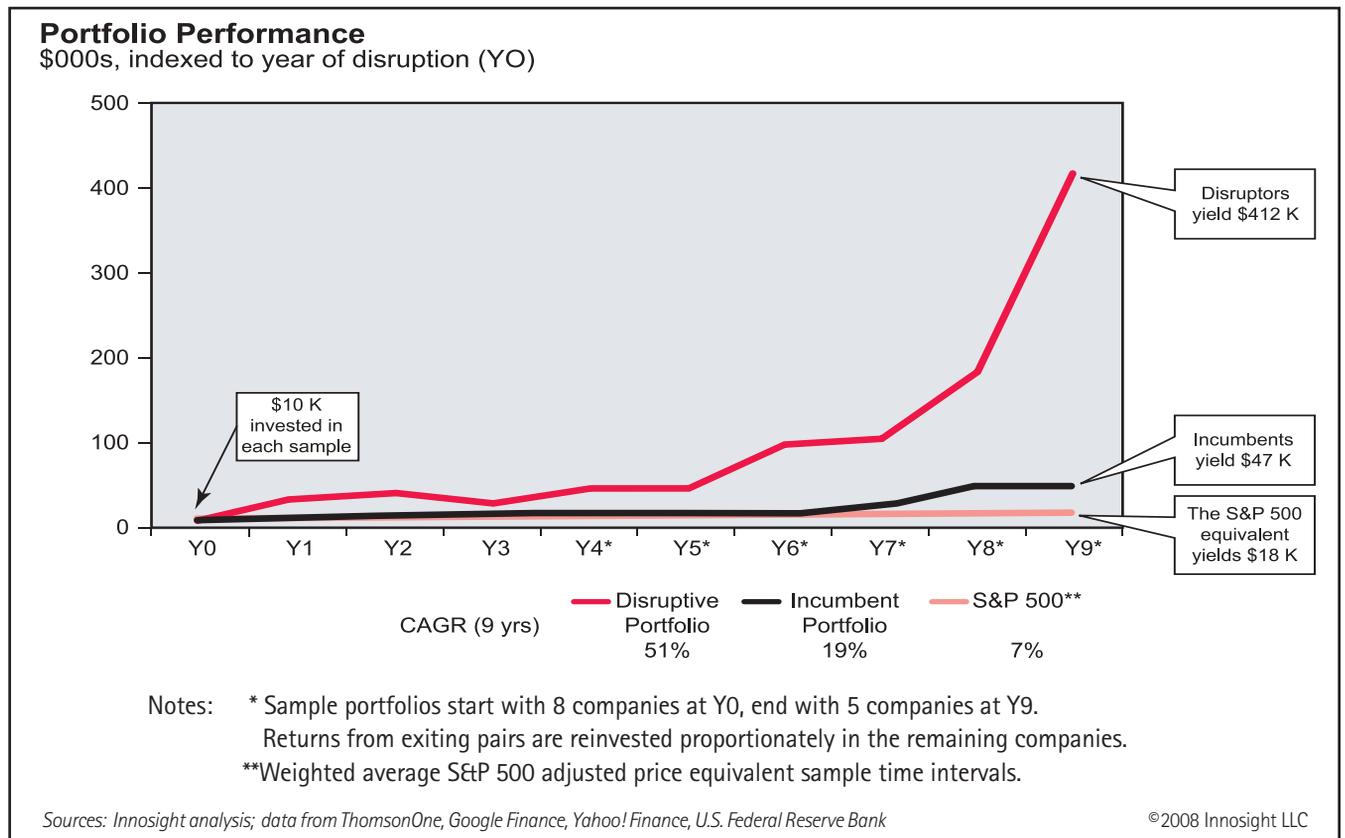
We used CAPM to model ex-

pected returns for the disruptive and incumbent portfolios. And once again, our results favor disruptors by a handsome margin.

Sustaining companies maintained their expected returns—in financial terms there was no "alpha." As expected, CAPM-predicted returns to incumbent companies were close to their actual returns after three years.

Stock prices for disruptors are in fact more volatile, and this increased risk is reflected in higher expected returns for disruptors as compared to incumbents. And yet our experiment suggests that risk-related returns explain the differential results only partially, at best.

Actual returns in the disruptive portfolio were nearly twice as high as expected returns as predicted by CAPM. The difference between actual and expected returns for the



disruptive portfolio continued to grow exponentially over the life of our experiment. Most importantly, the financial returns on disruptive innovation were not predicted, and are not predictable, by the conventional financial models.

Predicting disruptive returns

Disruptive innovation is a powerful force at the hands of sophisticated corporate managers. However, our research indicates that disruption can also be a powerful force at the hands of sophisticated investors.

It may be difficult to replicate our hypothetical disruptive portfolio, as it is entirely made up of companies at the time of their IPO.

But because disruptive forces are understandable and observable, they can easily be incorporated into otherwise-educated investment decisions.

As disruptive circumstances unfold in a market, investors should beware of companies that appear confounded by disruption, and reward those that are educated and poised either to preempt disruption or figure out a way to take advantage of it in their industry.

Investors should also pay attention to the growth expectations of seemingly safe, predictable investments, and favor companies that sprinkle their innovation portfolios with disruptive initiatives to fuel the next wave of growth.

As our research shows, the financial upside to disruptive innovation is real, significant—and most importantly, up for grabs. ♦

Leslie Feinzaig is a senior associate at Innosight. She can be reached at lfeinzaig@innosight.com.

Reprint #060310

PORTFOLIO DETAILS

The Incumbent Portfolio

- **The Hewlett-Packard Company** (NYSE: HPQ) produces and commercializes information technology products. In the 1980s, computers were at the heart of HP's strategy, which was focused on higher-margin customers in business, education, and scientific segments.
- **Merrill Lynch** (NYSE: MER) is a world-class financial services company with a uniquely prominent brokerage network that enables it to serve individual investors.
- **H&R Block** (NYSE: HRB) is the leading tax and accounting services company in America, serving individuals and small businesses.
- **Wal-Mart Stores** (NYSE: WMT) is the largest retailer in the USA, where it operates several chains of large discount department stores.
- **Sotheby's** (NYSE: BID) is a premier auction house, specializing in the fine art, collectibles, and luxury goods categories.
- **Blockbuster Inc** (NYSE: BBI) is the leading brick-and-mortar video rental chain in the U.S.
- **Oracle Corporation** (NYSE: ORCL) develops database management systems for medium and large businesses, and provides service and support.
- **R.R. Donnelley** (NYSE: RRD) provides print and related services, deriving much of its revenue from print-based advertising.

The Disruptive Portfolio

- **Dell, Inc** (NASDAQ: DELL; IPO 1988) disrupted Hewlett-Packard and others within the PC industry, by selling "good-enough," affordable, made-to-order PCs directly to consumers.
- **Charles Schwab** (NASDAQ: SCHW; IPO 1987) disrupted Merrill Lynch and other brokerage houses by offering similar investment services for discounted commissions.
- **Intuit** (NASDAQ: INTU; IPO 1993), founded in 1983, disrupted H&R Block by offering customers an easy-to-use software package that bypassed the need to hire external accounting services.
- **Amazon.com** (NASDAQ: AMZN; IPO 1997) is a leading online retailer. Founded in 1994, it disrupted Wal-Mart and other brick-and-mortar retailers by selling discounted merchandise online.
- **eBay Inc** (NASDAQ: EBAY; IPO 1998) introduced online peer-to-peer auctions in 1995, thereby democratizing the auction industry and capturing the unserved large volume, low-margin segment.
- **Netflix** (NASDAQ: NFLX; IPO 2002) disrupted Blockbuster by introducing subscription-based movie rentals via the Internet in 1997.
- **Salesforce.com** (NYSE: CRM; IPO 2004) provides customer relationship management services on demand, capturing the low-margin, high-volume customer segments that are overserved by Oracle's highly customized product offering.
- **Google** (NASDAQ: GOOG; IPO 2004) is an Internet search technology company that has been monetizing its free consumer services via highly targeted, low-cost online advertising since 2001.

While we are not yet at the point where innovation is paint-by-numbers predictable, patterns of success and failure are coming into sharper focus by the day. The practical tools and techniques in this book will help its readers join the community of practitioners who are beginning to change the world of innovation from one of frustrating inconsistency to one of orderly patterns.

And as long as there are those who can't see the patterns, those who can will gain a powerful source of competitive advantage, because they are the ones who'll be able to disrupt.

Question: What are the most common misunderstandings of the theories of disruption that show up when people are trying to do disruption and they don't quite understand what they are doing?

Scott: The two biggest things that we see are, first, people assume that "different" and "disruptive" are synonyms, so they assume that anything they're doing that's really different than they've done before must be disruptive. And of course, that's not the same way that we've defined "disruption." Disruption is a particular type of innovation, not just something that is different.

And the second thing is people take an internal view when they assess disruption, not a market-based view. So they say, "Oh, this is disruptive to the way we're organized, so it will have disruptive impact." But in reality disruption is entirely a market-based concept. And you can do something that is different, that's disruptive to you, that fizzles in the marketplace, because it's not disruptive to the marketplace.

Mark: I've got a third, which is when people think disruption is constrained to technology, when really it is about the business model. So they'll think that the technology is the disruption, and not the change in the business system. Whether that's disruptive to the market in the sense that the incumbents don't have it, or they have to change themselves, they'll look at it squarely on technology.

Liz: I agree with all three and I've seen all three, but I'd add that in addition to considering technologies without understanding changes in business models, people also frequently think specifically about disruptive products, but they don't think about the business model related to the products. Some think that a new product offering is the only way to create disruptive growth, as opposed to considering new channels or a new marketing approach.

Scott: To add to what Mark and Liz have said, this is incredibly important because technology is eminently copy-able. It's really hard to copy, but you can copy it. But the more it's intertwined business systems, the more difficult it is to copy.

Liz: Also, for incumbent corporations particularly, to change a business model is harder. So that's why people may default to not wanting to change it or think about it. It's much easier to focus on developing a new product than to evaluate all elements of an offering. You don't necessarily have to change all your systems and your compensation, reward systems, etc. if you are only going to introduce a new product.

But, if you're going to think

about changing business models, frequently it means you have to change the way you evaluate and compensate people to get them to change behavior. And that is kind of fundamental to your systems, both human resources (HR) systems and information technology (IT) systems.

For smaller companies that may not be as big a deal, but in a big company once you've rolled out an enormous IT system that's tracking everybody's performance management in one way, and then you want to change the way you track that performance management, that can be an enormous change.

Scott: There was one company I was with recently that told me "what's really interesting is that the targets, the incentives for our most senior leaders, come out of SAP. No one knows exactly how they're calculated, but they come out of SAP. Senior management doesn't even know it. But the SAP system pops them out." And then if you're trying to change that, that's so deeply intertwined.

Mark: That's the big dilemma: how much is the process really mapped to the IT system as opposed to the IT supports the right process?

Liz: The IT system may have supported the right process when it was originally designed. And that's my point in terms of difficulty of change. What you do works at the time and then, six months later, twelve months later, it doesn't.

And there's difficulty in experimenting. To say you have one project where you want to take fifty or a hundred people and do it differently is hard to do when the whole system is geared in a particular way.

Q: What are some of the other main challenges to practicing disruptive innovation, and how does one really overcome them?

Liz: Scott's point one was that new is not disruptive. One of the a-ha's for me a number of years ago when we started this work was the difference between sustaining and disruptive. It's amazing how helpful language can be in getting this concept across, in that you say to someone, "That's great, that's new, and that's breakthrough, but it really is sustaining and not disruptive."

That construct of sustaining vs. disruptive allows people to compartmentalize and understand, "Oh, that's the one that falls in this bucket" vs. "Oh, that's the one that falls in that bucket." As basic as it is, it provides a way to think about it.

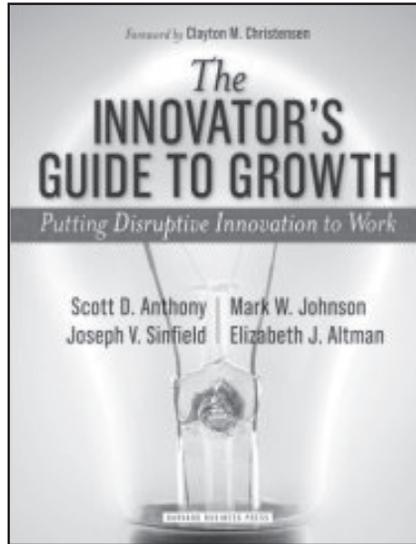
It also allows you to talk about the process in two buckets, as well. It allows you to say, well, we should have a different compensation system, we should have a different set of metrics, we should have a different gate process, whatever it is, for disruptive innovation vs. sustaining innovation. It makes sense.

And you can also say, going back to one of the other concepts in the book, that you need to have your core under control. [People can say] "Look, I get it—90 percent of our work should be focused on sustaining innovation, given what business we're in."

Scott: And sustaining's not a bad word, by the way. It's great, it's wonderful—it's how a company grows.

Liz: We're not saying that you should take your entire business and flip it on its head. Ninety percent of the organization, maybe 70,

maybe 80, whatever's appropriate in your case, but X percent should be focused on sustaining, because it's paying all the bills and because you can't do this other stuff without it. But this work that's labeled "disruption" should be treated differently.



Source: Harvard Business Press

Scott: My client provided an analogy that really sums up why it's so hard to get disruption right. So, I'm right-handed. If I were to start to brush my teeth with my left hand or start using my mouse with my left hand, it's incredibly hard at first, just because my muscles aren't trained to do that.

It's the same sort of thing with disruption. The corporate muscles are trained to do sustaining and when you ask those muscles to do a very different thing it just doesn't work. But it can get better.

This client tried to use his mouse left-handed for awhile and it was really hard but as he practiced and trained, and found out you can get better at it. It's actually a good thing to do. There's research that switching right and left hands oc-

asionally helps your cognition, because it forces you to think more, and think differently.

Q: So how does creativity fit into this? Isn't creativity about doing things differently, breaking out of your expected patterns?

Mark: One of the biggest challenges about disruptive innovation is that there are two forms. One is where you're disrupting the market and keeping the business model the same. You have an opportunity to disrupt the market, and that's Procter & Gamble with Swiffer and Febreze. P&G fundamentally kept its same business model but disrupted the market.

But yet there's a challenge because they need to learn how the market's going to unfold so it's not going to follow the same revenue pattern as incremental product improvements.

So they've got to be creative in a sense in order to manage the evolution of the market opportunity, which means there's some ambiguity in there, which means they have to be able to allow the twists and turns as the market unfolds to happen.

The second kind of challenge with disruption is when your opportunity also means you've got to change your business model as well, and that just furthers the level of ambiguity. Now you've got a fast-changing system—all the things that underpin a successful business including the financial aspect, that's all into play.

So one thing needed is creativity to determine the right model, and second thing is becoming agile and comfortable with managing assumptions. And that's very difficult

for organizations. They actually get away from assumption management to operational management, which is all about execution.

Back to being left-handed or right-handed, the skill of managing the assumptions and learning is a lot different than the skill of controlling and executing.

Scott: There's a difference between a creative input and a creative output. And one of the big things that we try to argue here is that if you follow the right process, if you follow the right approach, if you use the right tools, even if you don't have that creative genius of a Steve Jobs, you can actually come up with something that is a very creative output.

Liz: And the tools in this book help you to harness the creativity,

or codify it ... during a brainstorming session you might have a ton of creativity and great ideas, but then perhaps you don't know how to analyze them, develop them, and put them into context of your business. These tools help you do that.

A lot of people have great ideas and great creativity, but can't develop them into plans that are useful and worth pursuing.

Scott: We have a huge bias that's grounded by our observations in the field. A lot of people think the root cause of their struggles with innovation is "We don't have enough good ideas. So we need to spend a lot of time coming up with more ideas."

And that isn't actually the problem. The problem is that the ideas get screened and the good ones

actually get put to the side, or the process that shapes those ideas takes a good idea and ruthlessly, relentlessly makes it less interesting.

So if you can get the screening mechanism right and get the process right, you then can get a lot more innovation output than you realize. The problem isn't getting more input into that process.

Q: And that goes back to what Liz said, that now we have the language and buckets we could put this into, and maybe that helps people by allowing them to identify which idea goes into which bucket.

Liz: The common language point is really important because it allows people to talk about disruption and innovation in a way that makes sense.

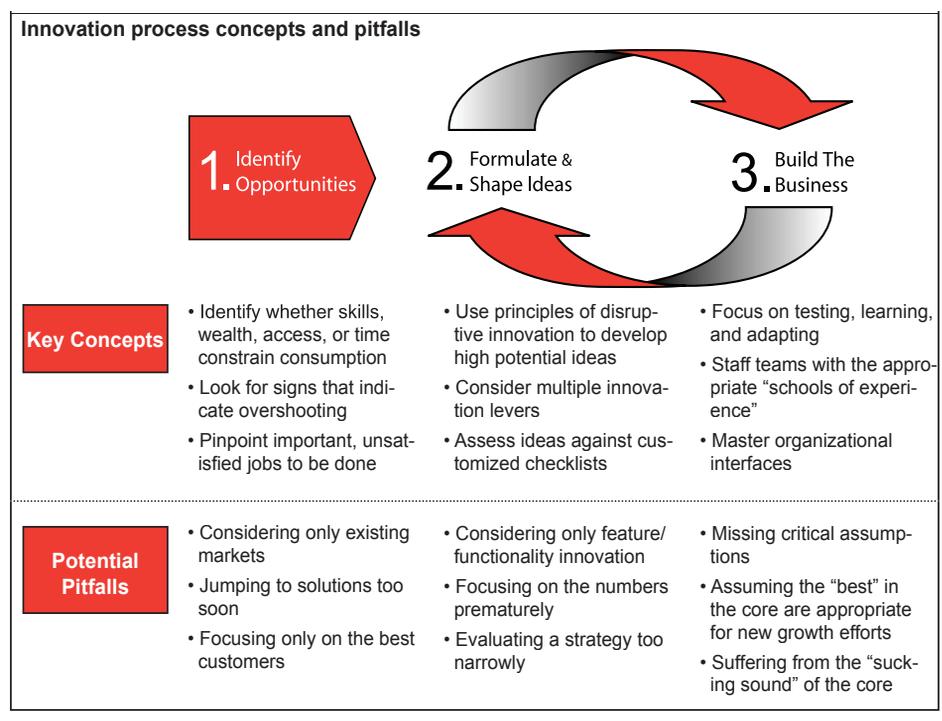
And even if that language is modified or adapted to the culture of the company that you're working in, at least it becomes a common language among people who work together.

It doesn't matter if it's the right language or the wrong language, as long as it's a common language and there's a common understanding, so that you're not using the same words and meaning different things.

Q: I've gotten the impression reading the book that perhaps people don't understand growth—how to grow. Is that something you are seeing?

Liz: I would tie it back to sustaining vs. disruptive again. Those map to

Chapters Two through Eight of *The Innovator's Guide to Growth* walk the reader through a step-by-step process to create new growth businesses. For each step, key concepts are discussed and potential pitfalls pointed out. The graphic below from the book illustrates the innovation processes and pitfalls discussed in the book.



sustaining growth and disruptive growth. Some growth comes from your sustaining products and some growth comes from market expansion. And then there's some growth that comes from creating new markets. Those are different types of growth and you may need to address them differently.

If you're in a contracting market, you have to increase sales. So there's a tie with share also. In an expanding market you can retain share and see growth. And if you expand share you get even more growth. In a contracting or a flat market, you have to increase share to grow.

That's an important concept ... you have to understand the dynamics of the market that you're working in to understand how you're going to grow.

Mark: The challenge about growth is twofold. One is when you do end up in these situations where the market is contracting and you've got to really gain share to stay ahead, the likelihood is margins are going down. It's commoditizing. And so it's not going to be sustainable for very long anyway, and that furthers the need for new growth.

The second is performance. You can be expanding a market and growing it through sustaining efforts, but not be rewarded the same way that you would if you were growing through disruptive initiatives. Because sustaining innovation is very predictable to Wall Street, whereas disruption is very hard to predict.

Scott: As an example, consider Emerson Electric. It is a fabulously well run company. From 1970 to 1995, the company consistently

generated returns on investment that doubled the market's average. But stock performance almost perfectly mirrored the broader market. The predictable growth had already been baked into the company's stock price.

Disruptive innovations are so critical because they surprise the market. What companies need is a bit of a paradox: predictable upside surprise.

The bottom line is that most companies don't consciously address growth. If you ask most corporations what they need to achieve in three to five years to meet their objectives, most will not actually be able to answer that question. Some will, but many will not.

And then if you ask them what sources their growth will come from, many companies won't be able to answer that question.

And if you ask them if they actually have a pipeline of things they are working on to achieve their growth objectives, most companies won't be able to answer that, either.

Again, some of them will. But a lot of them just haven't really thought, where do we want to be? What are the ways we can get there? And what are the specific initiatives we have that we think will allow us to get there? There's a lot of hope and faith in some companies' growth plans.

Mark: In the book, we really are saying that the opportunity of disruptive innovation is to create new growth.

Hope and faith won't create new markets, but disruption will. ♦

Renee Hopkins Callahan is editor of *Strategy & Innovation*. She can be reached at rcallahan@innosight.com.

Reprint #060301

INDEX

<u>Amazon.com</u>	12
<u>Apple</u>	4, 5
<u>H&R Block</u>	12
<u>Blockbuster Inc.</u>	12
<u>Charles Schwab</u>	12
<u>Class.com</u>	8
<u>Dell, Inc.</u>	5, 12
<u>Digital Equipment Corp.</u>	11
<u>R.R. Donnelley</u>	12
<u>eBay, Inc.</u>	12
<u>Educational Testing Service</u>	6
<u>Electronic Data Systems</u>	4
<u>Emerson Electric</u>	16
<u>Federal Express</u>	3
<u>Getty Images</u>	1, 4
<u>Google</u>	10, 12
<u>HP</u>	4, 5, 12
<u>Intuit</u>	12
<u>Merrill Lynch</u>	12
<u>Microsoft</u>	4
<u>Mimeo</u>	1, 2, 3
<u>Motorola</u>	1
<u>Netflix</u>	12
<u>Oracle Corporation</u>	12
<u>Procter & Gamble</u>	14
<u>Pump Audio</u>	4
<u>RCA Victor</u>	8, 9
<u>SAP</u>	13
<u>Salesforce.com</u>	12
<u>Seagate</u>	4
<u>Sotheby's</u>	12
<u>Tesla Motors</u>	1, 5
<u>Think Global</u>	1, 5
<u>VistaPrint</u>	3
<u>Wal-Mart Stores, Inc.</u>	12

Strategy & Innovation archives are now available online!

Issues and articles from
2007 are at:

[http://www.innosight.com/
innovation_resources/
strategy_and_innovation.html](http://www.innosight.com/innovation_resources/strategy_and_innovation.html)