

Michael Schrage On Innovation

Looking for the great clients -- who are the true innovators.

Co-director of the MIT Media Lab's eMarkets Initiative, a senior advisor to MIT's Security Studies Program, and a consultant to MIT's Langer Labs on technology transfer issues, Michael Schrage conducts research on the economics of innovation. His particular focus is on the role of models, prototypes and simulations in managing interactive iterative design -- an area in which he works with a number of companies.

UBIQUITY: Let's start by making the implausible assumption that our readers don't know who you are.

SCHRAGE: Oh, that's an easy assumption. I'm someone who is passionately interested in the economics of innovation and how individuals and organizations use simple models to manage the risk associated with investing in innovation. And when I say "investing in innovation" I don't mean investing in companies -- I mean investing in models, prototypes, and simulations that become platforms for innovating with the invention -- the idea itself -- and innovating with the actual users and customers for such inventions. It's not enough to come up with a great idea, you really have to focus on how that idea diffuses throughout the community.

UBIQUITY: Do you happen to have read the new book by Harold Evans about innovation, called "They Made America"?

SCHRAGE: I've scanned it but let me be blunt. Harold's book is a paradigm of how not to think about innovation and invention.

UBIQUITY: You know him?

SCHRAGE: I've interviewed him for a story. But I'm afraid Evans completely misses the most important point about innovation. He's basically talking about how inventors need to overcome numerous rejections and failure et cetera et cetera -- you know the line, sort of like "the passionate lunatic overcoming stubborn resistance and then ultimately finding acclaim." That's precisely the exact wrong way to view these things. Number one, you have

the statistical problem of survivorship bias, which is, yes, we know the survivors, but what of all the people with supposedly good ideas who perished. Who writes their biographies? The answer is nobody does. So you have an inherently statistically biased sample. But more importantly, the real story of American innovation is the folks who *adopted* these inventions and thereby transformed them from mere inventions to full-scale innovations? Who are the great *customers*?

UBIQUITY: Innovation is something customers do, rather than inventors or entrepreneurs?

SCHRAGE: Exactly. Who are the great clients? Which organizations made the inventions successful in the marketplace of reality, not just in the marketplace of ideas? In a talk I gave at Intel the other day I showed a crude schematic of the world's first microprocessor that was designed as a result of the single most important customer in Intel's history -- Busicom. Busicom was a Japanese company that wanted to compete against Texas Instruments and everybody in the electronic calculator business so they hired Intel to design the chips for them. Federico Faggin and Ted Hoff and one of the Japanese gentlemen from Busicom realized that instead of designing multiple dedicated chips for this calculator, all that computational functionality could be designed into a single programmable chip. And guess what? Once you do that you have a general-purpose calculator. Once you have a general-purpose calculator you have a computer. That first design became the Intel 4004, which soon became the 8008, which ultimately evolved into the breakthrough 8080. So it was Busicom as a customer that inspired the platform for Intel's entire business.

UBIQUITY: And so you see the customer as the main player in the achievement of innovations?

SCHRAGE: I do. And this is extraordinarily key. I want to see the biographies and the sociologies of the great customers and clients of innovation. Forget for awhile about the Samuel Morses, Thomas Edisons, the Robert Fultons and James Watts of industrial revolution fame. Don't look to them to figure out what innovation is, because innovation is not what innovators do but what customers adopt.

UBIQUITY: Do you think there is a common denominator among such adopter companies - a single principle explaining their success?

SCHRAGE: Yes, I believe there's an 80-20 principle at work here. The single most important thing is the obvious: which is that these customers almost always have a problem to be solved. But not a grand strategic problem of visionary proportions -- a problem of sharp and localized pain. They want an anesthetic. However, what then separates the great customers and clients from the mediocre ones is that the mediocre ones just want the pain to stop, whereas the great customers want to go on to deal with the underlying causes, rather than just treat the symptoms. In fact, the truly great customers and clients look at a nascent innovation and realize, "My God, this isn't just a platform for solving my little problem, this is a platform for innovation in many other strategic and tactical areas."

UBIQUITY: What's an example of that?

SCHRAGE: My favorite example of this belongs to the class of what I call "twofer" technologies, which give you two for the price of one. My paradigmatic example of this is Dan Bricklin's software spreadsheet. You get two things for the price of one: you get the ability to do all that hideous crank-and-grind mindless monkey-at-the-keyboard calculation that you have to do, but you can also do elegant "What if?" scenarios with just the tap of a key. That's why computer-aided design and engineering -- and for that matter the whole digitalization and virtualization trend -- is so fascinating. They're the symbol and substance of the economics of "twofer" technologies. Yes, you have to do the hard work, but then you also get to do the speculative and innovative work as well. The serious play. That's the real source of innovation, and the way to give more bang for the buck, two things for the price of one.

UBIQUITY: What you're arguing is that economics are a crucial component of innovation, just as crucial as creativity and playfulness.

SCHRAGE: Absolutely. I'll put it in even harsher terms. Yes, you can do business in a playful way, but if it's expensive to play you can't afford to do it very long. You have to do it in a playful way that's *cheap* and *safe*. Play that's safe and cheap: Oh my gosh, that is a business Holy Grail. Because when play becomes expensive, you literally can't afford it. So what interests me are technologies that do more than just move you along the curve; I'm interested in technologies that shift the curve and completely transform the underlying costs, actually displacing the curve. Instead of just calling this "disruptive innovation" the

way Clay Christensen does, let's call it "displacement innovation." Because what's being displaced is the traditional economics of innovation. What's important is not just that you have a great idea but that your great idea actually changes the economics -- i.e., changes the whole game.

UBIQUITY: What kinds of problems do you confront most often in your consulting work?

SCHRAGE: Well, as a general rule, organizations that invite me to work with them tend to be smart and open to ideas (because otherwise I wouldn't be invited), and as a result I'm not brought in to evangelize. Rather, I'm brought in because people realize, "Gee, we have to deal with this innovation issue and this is a guy we think will be good for helping us deal with it." So I am probably facing less of a coefficient of friction and resistance than do many consultants. So that's number one. Number two, when I go into an organization and there is resistance, the problem is never a failure of good ideas, it's always -- always! -- a failure of will.

UBIQUITY: Expand on that.

SCHRAGE: In twenty years of doing this, I've never gone into an organization that's suffered from a shortage of good ideas and never been invited to an organization that didn't have several really, really good ideas about how to be innovative and what to do. At the same time, I should add that I've also never gone into an organization that didn't have real problems with implementing those good ideas in a cost-effective way. But ideas are never the problem. There is no shortage of good ideas.

UBIQUITY: Would you call those organizations dysfunctional?

SCHRAGE: Not necessarily. Oftentimes there are very good reasons for difficulties in implementation. Let's say you're HP and you look at what Dell is doing with build-to-order manufacturing and direct sales. Well, you could replicate that kind of infrastructure but if you do you're going to piss off every single one of your dealers and channels. Let's be blunt -- evading a problem like that is not a bad reason to stay out of BTO. The problem that you run into, particularly in the larger organizations, is that there are almost always more good reasons *not* to do something than to *do* something.

That's an inherently biased or kinked indifference curve, and that creates problems. The most important thing an organization needs to ask itself is what it's actually willing to do -- because the culture of innovation is not the quality of ideas it has and not the quality and creativity of the people it has. The better measure of an organization's innovation culture is the nature and amount of resistance it puts in the way of good ideas.

UBIQUITY: Let's take a specific example. What about the AOL TimeWarner debacle?

SCHRAGE: Well, the answer is embedded in your question. I'm very familiar with the issues, and I've known Steve Case since before AOL was AOL -- since back when it was Control Video Corporation. And I'd say it was certainly a very good business maneuver by Steve Case to effectively 'sell' AOL at the height of a bubble, it was brilliant. But this is the classic problem you have with innovation and business, which is that just because something is a good innovation doesn't mean that it's a good business and just because something is a good business doesn't mean that it's innovative. There was no cultural compatibility between AOL and TimeWarner, there was no technical compatibility, there was no congruence in the nature of the markets they were seeking to serve, there was no congruence in the underlying business models that were used to support the innovations in the markets that they were seeking to serve.

UBIQUITY: Sound and fury signifying, ultimately, nothing?

SCHRAGE: Exactly. It was a huge strategic gamble, not dissimilar from that of Sony's acquisition of Columbia. Was it an integration play or a conglomerate play? They positioned it as an integration play, which now we know for a fact could never have worked as opposed to a conglomerate play. It was a bad business move divorced of any kind of innovation imperative. It was a humongous deal that had nothing to do with innovation or the future of innovation or the nature of innovation. It had everything to do with trying to monetize the speculative frenzy around a bubble, driven mad by perceived revolutions in technological innovation.

UBIQUITY: What's left of it all?

SCHRAGE: Well, I think AOL's a good business. I was on the Board of Ticketmaster, which is now a wholly-owned subsidiary of Interactive Corp, Barry Diller's company. The guy who

was the President of Interactive Corp, John Miller, is now the president of AOL. He was brought in by Parsons to be the President of AOL. In any event, AOL is a good business, and it's not like Steve Case is a stupid guy or evil guy or a bad business person or somebody who doesn't appreciate the underlying dynamics of technology or innovation. But the way you're asking the question really underscores one of the issues here, which is that there are a lot of business people who confuse changes in technology with changes in their business, and that's not necessarily the case. In fact, as we look back on it, what was the reason why Gerry Levin and Steve Case had to merge TimeWarner and AOL? Why? What was the underlying business imperative?

UBIQUITY: Ego?

SCHRAGE: Yes. What you've really done is underscore a point I'm making, which is that the imperatives of individual behavior can trump the economics of innovation, and that business innovation and technical innovation are not necessarily the same thing. The real challenge for business people is, "How do we create alignment between business model innovation and technical innovation?" Most organizations fail abysmally in achieving that kind of alignment. There are guys like Michael Dell and Steve Jobs who are superb at meeting half of that challenge, but not the other half. Michael Dell doesn't really make real investments in product innovation, though he's a superb process innovator. At Apple, Steve Jobs appreciates process innovation but for all intents and purposes his genius is in driving new product innovation and packaging it. What we might call the 'Axis of Innovation' between Dell and Apple embraces fundamentally different mindsets. The two companies invest in their infrastructures and invest in their people accordingly.

UBIQUITY: As a gambling man, what would you expect Apple and Dell to be in ten years? Will they be alive and kicking?

SCHRAGE: Whenever I get asked a ten-year question I always say, OK, what's happened over the past ten years -- and could I have predicted it? My answer is always, no, I couldn't have. That said, do I see Dell's business model being more resilient than Apple's business model? Yes, although there's a big challenge coming up for Dell, which is: Can we do for IT services what we've done for IT product? Can we build networks-to-order, do remote diagnostics, network upgrades, software upgrades, telecommunications upgrades, and refinements in the same way we manufacture and sell build-to-order products? That's easily

a \$100 billion question for Dell. If the answer to that question is yes, then we're going to see Dell not just move up the food chain with printers and servers but with 'smart' servers, services and networks. We're going to see interesting collaborations and co-operations between the Dells and the Ciscos and the Accentures of the world, both in the big business and the small-to-medium enterprise range. We'll have 'premier pages' for Dell-designed IT processes, and not just 'premier pages' for Dell products.

UBIQUITY: Is there a different question to be solved in the case of Apple?

SCHRAGE: Yes. One question is whether Steve becomes a Henry Ford or more like a guy who he very much admired -- Polaroid's Edwin Land, who has a superb taste for the intersection between product and technical innovation and can always come out with a hit. In the first and final analysis Steve does two things extraordinarily well: he is the finest talent scout for digital innovation in the postwar era. He is superb at packaging it in economic terms and finding the best people who can do that. So you can think of him as a 'hits' producer, someone who consistently produces hits. But is he as capable of creating innovative infrastructures as he is capable of producing innovative hits? I don't know. He certainly did a good job managing the software OS transition from NextStep.

UBIQUITY: How might it all play out?

SCHRAGE: The obvious question will be who replaces Steve Jobs. Has Steve Jobs become the indispensable man in a way that Michael Dell has deliberately *not* become the indispensable man in his organization?

But let's look at where this conversation has led us. By recognizing the danger of having indispensable men we've come full-circle and are dealing once more with the idea that what's important is not the technology 'stars' but the customers whose existence and actions support those stars. The interesting thing is that the demographic of the Apple consumer and corporate customer is radically different than that of the Dell consumer and corporate customers. Now part of that is brand and part of that is the nature of innovation. We need to spend as much time thinking about the future of customers as we do about the future of invention, inventors and innovators. Why? Because customers -- not innovators -- ultimately pay the bills.

UBIQUITY: As we go back to the future, let's push our time-frame out 50 years. Will these issues make any sense 50 years from now?

SCHRAGE: Yes, but they will be discussed in Hindi and Chinese.

UBIQUITY: Talk about that.

SCHRAGE: Well, this is going to sound like a schmuck thing to say, but I'm going to say it. I'm at MIT. My colleagues and I get to see the brightest technical people from all over the world. They come to MIT. That's nothing new, it's been a fact for years and years and years. More than half of the top-quality doctoral students in the United States are not native-born Americans. It's clear to me we're seeing a democratization of digitalization and of digital innovation, of every kind (and I should note, sadly, that some of the best viruses in the world coming from overseas, and denial-of-service attacks don't seem to originate in Silicon Valley, they seem to originate from other parts of the world). I think we're going to see an explosion of value-added innovation in various parts of the world, because the cutting edge of invention has always been global. What's been predominantly American is the "businessification" to coin a word.

UBIQUITY: Why is that?

SCHRAGE: Because we understand markets and entrepreneurship in a way the rest of the world does not. Although the rest of the world is absolutely catching up in that regard: China is becoming more and more a global marketplace and India is becoming more and more of global marketplace. They're not just supply chains. The economist who has done the best writing on this is Reuven Brenner, a Canadian, whose book, 'The Force of Finance,' which I reviewed a couple of years ago, is well worth reading. His ideas about rivalry as the driver of innovation are extremely interesting, and he also has a provocative grasp of the link between immigration and innovation. The bottom line is that we're moving away from the globalization of invention in R&D to the globalization of innovation infrastructures. So we're seeing not just call centers in India, but software factories in India, as well as in China, and we'll be seeing more and more of it in Latin America and Central Europe. Most important of all, we're seeing the global production of a middle class.

UBIQUITY: What will the impact of these trends be on the United States?

SCHRAGE: The United States never, ever had a monopoly on brains and ingenuity: what the United States has had is a monopoly on is an economic and cultural environment where certain kinds of risk-taking in market and research contexts are rewarded as opposed to punished.

Contrast that to the UK: The Cavendish Lab had extraordinarily bright people, and academic risk was highly valued, but how much commercialization came out of Cavendish? One of the things we take very seriously at MIT, is that there are a number of students from China and India who, when they finish with their post docs, don't go to IBM, they don't go to HP Labs, they go back home to launch a company. Venture funds are investing heavily in China. I am not worried about a shortage of invention in the next 50 years: there will be more bright people doing more brilliant research than ever in the history of the world. So the rate-determining step is going to be the adoption of innovation; the 'consumption' of innovation.

So will customers become more likely to welcome new technology with open arms, or do we end up with a situation where nobody wants to be an early adopter because in less than a year a consumer will be able to get 80 percent of that once-hot product for 20 percent of the cost.

UBIQUITY: What's in the best interest of America?

SCHRAGE: Particularly if we're looking 25 to 50 years out, it's probably in the best interests of America as a nation and Americans as individuals to encourage this worldwide explosion of invention and opportunity because everyone everywhere will have greater choices for less money. The challenge is the Wal-Mart phenomenon. Look, let's go back to Henry Ford, who did something brilliant when he came up with the affordable automobile, the Model T, and then did something extraordinary that people, except for sociologists, don't talk as much about: he invented the five-dollar day for his employees (a huge pay increase!) so they could actually afford to buy the automobiles that they made.

UBIQUITY: And you're saying the same idea needs to be applied to the developing world.

SCHRAGE: Absolutely. I'm doing work with Intel, and with Microsoft, and with Cisco, and they're all looking hungrily and with fear at the developing world. So the most important

product Cisco, Intel, and Microsoft need to create in China and India is not hardware or software or services, the most important product would be the creation of a Middle Class.

UBIQUITY: And what are the prospects of them doing that?

SCHRAGE: I think the prospects are excellent. I'm hopeful. The idea that what we'll do is create a new kind of mercantilism wherein we exploit the poverty of the developing world to subsidize the middle-class and wealthy of Europe and America is insane. I can tell you that none of the high-tech organizations I work with, or any of the retail organizations I work with, feel that way at all. Their concern is how do we create markets that are capable of *buying* our goods as well as producing our goods? If you create a different kind of middle-class in India or Asia, or in Latin America, you create different kinds of incentives for new inventions.

UBIQUITY: Let's change the topic from innovation to you as a student of innovation. How did your interest develop? Tell us something about your background.

SCHRAGE: I have always been interested in novelty, and always been interested in the gap between what people say and what people do. Computer science has always been interesting to me as an intellectual exercise and challenge, and I knew that's where technology was going. But what I found much more interesting than computer science was the people who took computer science.

UBIQUITY: Where did you go to school?

SCHRAGE: The University of Illinois. I found a great group of people there, but it occurred to me that these guys were all control freaks. They hated ambiguity. The reason they loved dealing with computers is that computers don't give you the kind of problems that people give you. You program the computer in a way you can not program your life or another human being. Whereas in economics the assumption is that people are always busy maximizing utility, though there are enormous gaps between what people actually are supposed to do "economically" and behaving rationally versus how they actually do behave. Of course, if you believe in the Efficient Market hypotheses blah blah blah then you don't get Internet Bubbles or any other kinds of Bubbles -- nor do you get busts. So then why do you get these kinds of cycles? At school they tell you to study the equations and

look at liquidity traps rather than booms and busts and business cycles, unless you want to do astrology. OK? You know, I mean behavioral finance? So there was this gap between the normative and the actual, between how people are supposed to behave versus how they actually behave.

UBIQUITY: How do you struggle to close that gap?

SCHRAGE: Mightily; you struggle mightily. Let me tell you one of the founding anecdotes of my sensibility. I'm a child of a professor (that will come as no shock to you), and I've always been impressed by a story about the great mathematician Carl Friedrich Gauss, who as a child, used a clever mental trick to, effortlessly and instantaneously solve a problem: add up all the numbers from 1 to 100. Was he an idiot savant? No -- what's $1+100$? Ok, what's $2+99$? $3+98$? Get it?

Why did this story impress me so much? The honest answer is that I'm fundamentally a lazy bastard. I realized that you can look at something that looks like a horrendous piece of work but if there's a pattern there, it can become incredibly easy to do. God, that appeals to me. So whenever I'm confronted with what appears to be enormous complexity or enormous drudgery, I look to see if there's an underlying pattern that can be used to simplify the problem. I'm not interested in multivariate regression analysis, where you do all these incredibly data-dump sorts of things. No, no, no, that's too much. What are the simple models? What are the simple experiments? What are the simple things that we can do that allow us to transform the economics of a business? Those are the things that I am really, really interested in. The reason I got to be where I am -- the reason I study and explore the things I do -- is that I've always been fighting a fierce, mighty, wonderful battle between the need to be rigorous and the desire to be lazy. There's no better place to wage this lovely battle than on the field of digital media, where we're creating a new economics of improvisation, and play, and modeling, and simulation. You know what? I find that pretty bloody attractive.

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