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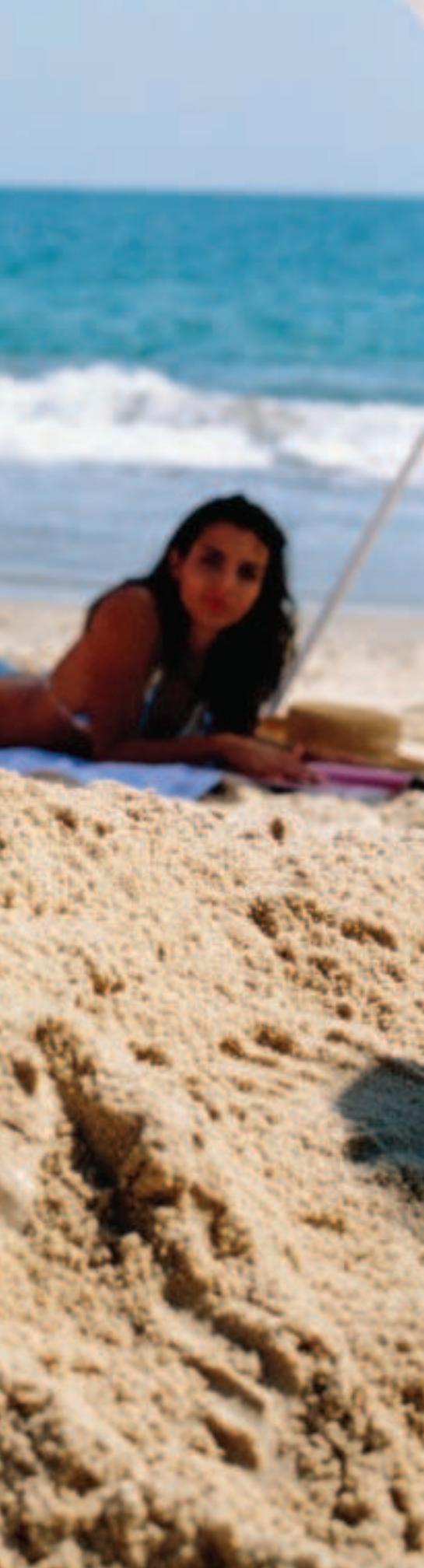
# Technology PUBLISHED BY MIT SINCE 1899 Review

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ADVANCED MEDICAL TECHNOLOGY THAT

HELPS PEOPLE LEAD RICHER,

FULLER LIVES

**NOW.**



imagination at work



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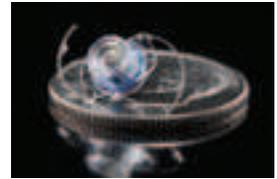
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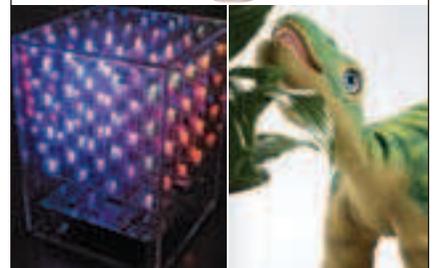
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*De Technologia non multum scimus. Scimus autem, quid nobis placeat.*

**A LOOK BACK AT THE TR10**

Your list of 10 emerging technologies (“TR10,” March/April 2009) was interesting, but sometimes implausible as well. Grant me an indulgence and do this one small exercise.

Revisit the technologies you’ve profiled in previous TR10 issues—say, in 2006 or 2007. I think it would be quite startling to look at how many of those technologies given high praise have died, mutated, or become terminally stuck in an incubation period. How good was *TR* at making the right picks?

The struggle to nurture a good idea from something theoretically possible into a working prototype is child’s play compared with the endless real-world demands one must break through to get something produced and into the public arena.

*Guy Munsch*

*Silver Spring, MD*

*The editors respond:*

If we do as Mr. Munsch suggests and look back at our 2006 and 2007 issues, we see that only a few entries (nuclear reprogramming for stem cells, augmented reality for cell phones) have made clear progress. But the TR10 are *emerging* technologies—which, as he says, are unlikely to be overnight successes. It’s not surprising, then, that when we examine the first TR10 lists we published, in 2001 and 2003, our performance looks better. Many of those technologies are well on their way to becoming commercial successes, if they haven’t already arrived: data mining, biometrics, micro-photonics, microfluidics, wireless sensor networks, grid computing, and mechatronic braking systems, to name a few.

**BUT WHO’S COUNTING WHAT?**

In his article about the difficulty of measuring online audiences (“But Who’s Counting?” March/April 2009), Jason Pontin made the

case that media companies, and the advertisers they wish to attract, need better tools for measuring how many people are visiting their sites. But while numbers of visitors are important, the most important numbers for advertisers come in the form of dollars, euros, and pesos. What we need is reliable measurement of how much money can be made from sales by advertising on a given media site. The lack of such information has enriched many a media-industry Madoff in my country of Mexico; a standard measure of the impact of



March/April '09

advertising online would help prevent this preposterous transfer of money.

*José Luis López-Léautaud*

*Cuajimalpa, Mexico*

**A NUCLEAR DEBATE**

I was heartened to read Andrew Kadak’s short piece arguing that nuclear power must be understood as environmentally friendly (“Green Nuclear,” March/April 2009). When I managed plutonium manufacturing at the Nuclear Materials and Equipment Corporation (NUMEC) during the late 1960s and early 1970s, we proved that fuel recycling was accomplished easily and that breeder reactors were well suited to that end. We provided fuel for the Fast Breeder Critical Assembly in Japan and for the Zero Power Plutonium Reactor and the Fast Flux Test Facility in this country. Fuel recycling is the way to go!

*Bill Frankhouser*

*Elizabethtown, PA*

As a student of nuclear energy at MIT, I am as pro-nuclear as anyone, but I find fault with the assertions of Andrew Kadak and John Gilleland (“Traveling-Wave Reactor,” March/April 2009) that we need to develop new breeder reactors to extend the resource base of nuclear power. Fuel composes only 10 percent of the leveled cost of nuclear power,

and of that 10 percent, only half is spent on the uranium itself. Furthermore, with uranium at under \$130 per kilogram, we have nearly a century’s worth of reserves. With minimal exploration, we could easily discover another century’s worth at that price; from 2003 to 2005, the world’s known reserves doubled thanks to just such an effort.

When will the uranium misers realize that they’re solving the wrong problem? Their efforts would be better spent on reducing the capital costs of nuclear power and leaving fuel utilization to another day.

*Keith Yost*

*Somerville, MA*

**OUT OF THIS WORLD**

I read the January/February 2009 issue on my flight home from South by Southwest (the magazine was part of the conference’s swag bag). There wasn’t a weak story on any page, but one was out of this world: Adam Fisher’s oral history of space tourism (“Very Stunning, Very Space, and Very Cool”).

While I’ll probably never have the millions to afford a flight to the International Space Station, I can rest easy knowing that my \$300 three-hour flight in a cramped coach seat was more comfortable than the accommodations afforded professional space travelers. I only wish I had the window seat they had.

*Mike Maney*

*Doylestown, PA*

*Clarification:* The March/April 2009 feature “A Zero-Emissions City in the Desert” does not identify the designer of the Masdar headquarters building. It is the Chicago-based firm Adrian Smith + Gordon Gill Architecture.

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DAVID ROTMAN, who wrote this issue's cover story ("Can Technology Save the Economy?" p. 44), interviewed some of the world's leading experts on innovation and economic growth to learn how technology investments in this year's stimulus bill might affect the economy. "Economists generally agree that innovation is in fact the leading factor in creating a wealthy nation," says Rotman. "But I found a huge amount of disagreement on whether the stimulus spending on technology is a great way to help the economy and lay the foundation for future growth or a wrong-headed conflation of fiscal and technology policies. I don't know which position is correct, but I was left with a couple of conclusions. The increase in federal funding for technology and R&D was long overdue. And it is now up to the nation's engineers, scientists, entrepreneurs, and venture capitalists to make sure the money is well spent." Rotman is the editor of *Technology Review*.

DAVID DEAMER has written an essay that is part detective story—recounting his efforts to figure out how life on Earth began—and part thriller: a look at what might be possible if the origins of life were better understood ("First Life and Next Life," p. 66). "My research interest is about how cellular life arose on Earth nearly four billion years ago," says Deamer. "I particularly focus on the self-assembly processes that produce protocells, which have some of the properties of life. As a reality check on my laboratory findings, I've traveled to volcanic sites in Russia, Hawaii, Iceland, and northern California, where I test whether the self-assembly processes that are studied in the laboratory can also



work under conditions similar to the prebiotic environment on a hot, early Earth." Deamer, who spent his childhood exploring caves in Kentucky, is a research professor in the Department of Biomolecular Engineering and the

Department of Chemistry and Biochemistry at the University of California, Santa Cruz.



MICHAEL ROSENWALD reviews a new procedure that enables remarkably nimble use of a prosthetic by rewiring arm nerves into chest muscles ("A Lifelike Prosthetic Arm," p. 76). "Growing up, I always obsessed about my left arm—my throwing arm," says Rosenwald. "I dreamed that that arm would lead to a career as a major-league baseball player. I iced my arm. Used Bengay. Heating pads. I wore a jacket to keep it warm even in the summer. But I never became a major-leaguer and pretty much stopped thinking about my arm until I learned about Todd Kuiken's research. When I saw video of amputees using their prostheses to cook dinner or just put on a belt, I was tremendously moved, and I felt lucky to have two working arms, even if they couldn't get me a pro-baseball career. It was also an example of

the kind of technology I find most fascinating to write about: leaps of ingenuity or discoveries that change lives dramatically." Rosenwald, who is based in Washington, DC, has written about the world's most famous bird-flu hunter, a psychiatrist who believes that cats cause schizophrenia, and a doctor trying to regrow body parts with pig bladders. His work has appeared in *Esquire*, the *New Yorker*, *Popular Science*, and *Smithsonian*. He is a staff writer at the *Washington Post*.



GÉRARD DUBOIS illustrated a feature by Emily Singer, *TR*'s senior editor for biomedicine, on how a pill could dim the emotional distress of our worst memories ("Manipulating Memory," p. 54). DuBois, who lives in Montreal, is working on two books of illustration, preparing for an exhibition in Paris, and illustrating a regular column in *Time* magazine. He has received numerous awards for his work, including two gold medals from the Society of Illustrators.

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# A Manifesto

NEWSPAPERS AND MAGAZINES WON'T VANISH. BUT THEY WILL CHANGE.



Even 15 years ago, Joseph Addison and Sir Richard Steele, those 18th-century London gallants and the founders of the *Spectator*, would have recognized the modes of business that characterized our newspapers and magazines. Not now.

For 300 years, two related sources of revenues sustained journals: subscriptions and advertising. But the Internet taught readers they might read stories whenever they liked without charge, and it offered companies more-efficient ways to advertise. Both parties spent less. Today, media companies are sickly.

As I write, the New York Times Company is threatening to close the *Boston Globe* if the latter will not produce \$20 million in union concessions. But those cuts could not make the paper profitable. The *Globe*, which the Times Company bought for \$1.1 billion in 1993, would lose \$85 million in 2009 without the concessions. Everywhere, newspapers and magazines are going broke.

What can be done to save them? Among those who write about new media, a fashionable wisdom has emerged, expressed most energetically by Clay Shirky, a professor at New York University. In “Newspapers and Thinking the Unthinkable,” a much-distributed post on his blog, he writes, “Round and round [it] goes, with the people committed to saving newspapers demanding to know ‘If the old model is broken, what will work in its place?’ To which the answer is: Nothing. Nothing will work.”

The *Götterdämmerung*-of-mainstream-media argument has a weak and strong formulation. Shirky himself is an eloquent exponent of the gentler version. He argues, “Society doesn’t need newspapers. What we need is journalism.” Shirky believes that the coming decades will see a variety of nonprofit experiments whose funding sources will be similar to those that have sustained *him* as an academic, such as endowments, sponsorships, and grants. One day, some innovator will stumble upon something that will reliably subsidize the journals of the future.

The strong version is most associated with Dave Winer, a grumpy California software programmer best known for helping to develop the Web-feed format RSS and for his blog, Scripting News. Winer has written, and not without glee, “Fifteen years ago I was unhappy with the way journalism was practiced in the tech industry, so I took matters into my own hands. And then dozens of people did, and then hundreds followed, and now we get much better information about tech. It will happen everywhere, in politics, education, the military, health, science, you name it. The

sources will fill in where we used to need journalists. ... Everyone is now a journalist.”

If media companies can’t earn money, and everyone is a journalist, it follows that “amateurs” (Shirky) and “sources” (Winer) will be part of a “decentralized” media (Winer), whose stories will be distributed by “excitable 14-year-olds” (Shirky).

This is all folly and ignorance. Shirky, Winer, and other evangelists know nothing about the business of media. True, the journalists who write about these matters for mainstream media often know as little; I didn’t understand much until I became the publisher of *Technology Review*. But Shirky and Winer are disgruntled consumers and, as bloggers, advocates for an insurrection. Thus, they are to be read skeptically. Their prescriptions would be more convincing if they were less polemical and better informed by some knowledge of what publishers sell.

Shirky and Winer share the conviction that media-as-a-business, with its attendant professional writers, editors, art directors, directors of consumer marketing, and advertising salespeople, is dying. That’s because they conflate mainstream media with printing presses. As Shirky explains, “Printing presses are terrifically expensive to set up and to run. ... [But] the competition-deflecting effects of printing cost got destroyed by the internet, where everyone pays for the infrastructure, and then everyone gets to use it.”

For decades, most print publications have cheaply rented presses owned by third parties—but let that go. The printing press stands here as an objective correlative for the material production and distribution of media. Shirky and Winer’s real error is that the physical is the *least* of it. The creation of good journalism is a tremendously laborious process, requiring an infrastructure more expensive than any press. The illustration and design of stories has an infrastructure, too. Developing an audience that will attract particular advertisers requires another infrastructure. Selling advertising requires yet another. These structures, which allow publications to reach large, coherent audiences, can exist only within complex organizations, mostly businesses.

Some of those structures must be reinvented for the Internet. Others, particularly editorial, still work well. I am sure of this, because the number of people who read newspapers and magazines is *growing*. Of course, with few exceptions that growth is all digital. To take one example, between 14 million and 22 mil-