



TECHNOLOGY HORIZONS PROGRAM

INSTITUTE FOR THE FUTURE

IFTF's Technology Horizons program illuminates future forces in science and technology (S&T) that will transform how we live, work, and create in the next decade. We evaluate discoveries and discontinuities that are likely to have major impacts on organizations, ordinary people, and innovators over the next 3–10 years.

By systematically thinking about the future, we help our clients navigate the convergence of technological and scientific disruptions, shifts in human identity, and the tides of social change. It is at this nexus where new needs, desires, and possibilities become clear. For organizations, that's the most fertile ground to plant seeds of resilience, growth, and success.

The first decade of the new millennium introduced a host of new dilemmas and increased uncertainty and volatility for many families and businesses. The second decade of this millennium will be about finding our footing to survive and thrive in this new reality. Science and technology will provide novel frameworks for managing many of the critical dilemmas we face, and a new innovation ecosystem will challenge traditional organizational models. However, all innovations also have a shadow side that can't be ignored.

As we begin the new decade, the 2011 Technology Horizons program will conduct a ten-year scan on the future of science and technology to identify the most important emerging conceptual and practical frameworks. We will also drill down into three areas that are poised for disruptive change: energy, manufacturing, and how children are experiencing new technologies. We will take a close look at innovative experiments in these spaces, and how they point to the coming changes in our everyday lives.

- › **AVOID BEING BLINDSIDED** by disruptive technologies with our trusted, independent forecast of emerging technologies.
- › **REDUCE UNCERTAINTY,** and ultimately costs, when making your technology and new product investment decisions.
- › **IDENTIFY FUTURE,** non-obvious large-market opportunities for discontinuous growth as well as competitive risks: "Where's the market that I don't currently see?"
- › **GAIN AN INSIDER'S VIEW** of the many innovations—technical, business model, social, and organizational—emerging in California's Silicon Valley, the San Francisco Bay Area, and other innovation hot spots.
- › **EXPAND YOUR OUTSIDE NETWORK** by interacting with and learning from individuals from a broad range of industries.

2011 RESEARCH AGENDA

THE S&T INTERZONE: FRAMEWORKS FOR NEW GROWTH

We will begin the year with a memo on Open Manufacturing—a set of radical new design, manufacturing, and production solutions that promises to upend manufacturing economies of scale and level the field of industrial production. In the spring, join us to explore a map of Alternate Energy Futures that pinpoints the critical scientific and commercial changes in energy generation and management, from turning garbage into fuel to re-thinking cement. How will alternate energy solutions change the way we work and live in 2021? Fall is the time for our Technology Ten-year Forecast, a broad effort to map the big stories for organizations, across biological, material, and information sciences. We close off the year with Kids' Tech, a foray into the lives of those under the age of ten.

In 2011, the Technology Horizons Program will explore four core research themes:

1. Open Manufacturing
2. Alternate Energy Futures
3. Technology Ten-year Forecast
4. Kids' Tech

SPRING › OPEN FABRICATION FUTURES

New approaches to manufacturing are set to take hold over the next few years, challenging the basic assumptions of industrial production. Traditional assembly lines have placed limitations on where and how objects can be produced. But emerging additive and flexible manufacturing technologies are opening up possibilities in personalization, democratization, and design that break free from traditional assumptions of what it takes to make something. While 3D printers have been around for some time, their capabilities are increasing as their prices plummet. Eventually, desktop fabs may be a relatively common home appliance. The entire realm of manufacturing—from gadgets to homes to food—is up for grabs.

DELIVERABLES

- › **OPEN ROUNDTABLE EXPERT WORKSHOP:** join us as we gather a wide range of experts to explore the edges of fabrication futures, and perhaps do some 3D design and printing ourselves.
- › **WHITE PAPER** on the far-reaching implications for traditional manufacturing, R&D, design, and consumption.
- › **CLIENT WORKSHOP:** April 2011.





Image Source: Makerbot Industries



Image Source: flickr user AgriLife

SUMMER > ALTERNATE ENERGY FUTURES

Clean, green tech promises to be an engine of growth, a driver of new scientific innovation, and one possible solution to global carbon emissions. Investors and entrepreneurs in Silicon Valley, China, India, Brazil, and northern Europe are racing to lead the way. What are the most important disruptive energy technologies, and how will they change daily life for ordinary people and the business landscape in different regions of the world?

DELIVERABLES

- > **OPEN FUTURE SCENARIOS EXPERT WORKSHOP:** join us as we gather a wide range of experts to map out the core forecasts and assumptions underlying the map.
- > **ALTERNATE ENERGY FUTURES MAP** that forecasts the impact of four alternative future scenarios on households, markets, organizations, and other institutions. The focus will be on understanding the key enabling technologies, from jet-fuel producing algae, to solar lanterns in rural India, that will change the way we use our resources and create new markets.
- > **CLIENT WORKSHOP:** May 2011.

“Once you start realizing that the world is a hackable platform, you see all sorts of possibilities.”

—Mark Frauenfelder, BoingBong.net

FALL > TECHNOLOGY HORIZONS TEN-YEAR FORECAST

We'll scan the horizon of materials science, information technology, life sciences, and energy R&D for the emerging paradigms and practices that will transform our lives over the next decade. We'll focus on those developments expected to profoundly alter our workplaces, business models, consumption, and social lives. Early possible topics include: green computing, public technologies, micro-gravity, and collaborative consumption solutions.

DELIVERABLES

- > **TEN-YEAR FORECAST MAP** of critical hotspots and innovation in the 2020 technology landscape.
- > **REPORT** with 10-12 deep-dive forecasts and analysis.
- > **CLIENT CONFERENCE:** September 2011.

WINTER > KIDS' TECH

Toys and play have always helped to prepare kids for the world that they would face as adults. What does "technology" look like for today's young digital natives? What new forms of play and learning might we see emerge by 2020? How will tomorrow's young people use technology to remake their world?

DELIVERABLES

- > **MEMO**
- > **CLIENT WORKSHOP:** November 2011.





Image Source: flickr user Soopahrover

PROGRAM COSTS

The Technology Horizons Program is an ongoing, cost shared research effort. Each member pays \$65,000 per year. Membership includes attendance at two cross-industry conferences, print copies of all program deliverables, and electronic access to the Technology Horizons Program website.



Image Source: aldebaran-robotics

PROGRAM MEMBERS

as of January 2011

General Mills
General Motors
Hallmark
Greetings
Humana
Intel

Kraft Foods
National Semiconductor
Nokia
North Atlantic Treaty
Organization (NATO)
PepsiCo

Procter & Gamble
Company
Shaw
Communications Inc.
Siemens
SK Telecom

2011 RESEARCH TEAM

Lyn Jeffery Program Director



Lyn Jeffery is a cultural anthropologist whose research focuses on the new social relationships forming at the intersection of technology and daily life. She has a special interest in immersive experience, personal data, and the Chinese-language Internet. She also works with corporate and government clients on mobility, social media, and the future of work. Lyn has led the Global Ethnographic Network, a multi-year ethnographic research program that experiments with reflective personal forecasting methodologies with

families in Brazil, Russia, India, China, and Silicon Valley, in order to integrate their voices more fully into IFTF's forecasts. Additional methodological interests include group processes for collaborative creativity and analysis, online ethnography, and participatory community forecasting.

Lyn is fluent in Mandarin. In the mid-1990s she was awarded a Fulbright doctoral dissertation grant and in 2001 she received a Ph.D. in anthropology at the University of California, Santa Cruz, where her research explored the cultural construction of Chinese capitalism. In addition, she taught classes in globalization and the anthropology of contemporary China. She is the co-editor of *China Urban: Ethnographies of Contemporary Culture*, as well as author of articles on post-socialist entrepreneurialism and Chinese network marketing.

Mathias Crawford Research Manager



Mathias has been integrally involved in development of Foresight Engine, IFTF's platform for massively collaborative thought experiments that address provocative scenarios about the future.

As a member of the Technology Horizons program, Mathias has written extensively about the future of education, and has participated in research into the technological forces that are contributing to changing structures of community support; the nature of collaboration, especially as it is practiced in open source communities and by youth; and changing patterns of retail and banking.

With an A.B. in History of Science from Harvard College, Mathias is interested in the convergence of social and technological forces: how they shape our individual behaviors and the structures of our communities, and in how technologies develop in response to, and exert influence on, social, political, and individual concerns.

Devin Fidler Research Manager



Devin's interests center on the application of foresight to organizational strategy and strategic planning. In particular, he advocates focusing on organizations as systems for activating "know how" in the right places and at the right times. From this perspective, he argues that in a post-globalization world "all management is knowledge management."

Prior to joining IFTF, he was involved with a number of projects in the areas of technology assessment and the future of global

business, including work in the U.S. Chamber of Commerce's Research and Analysis Center and as an Analyst for the Royal Bank of Scotland in Edinburgh. He has lived and worked in several countries throughout his career and approaches projects from a strongly international perspective.

Devin was awarded highest honors for his MBA work focusing on innovation in emerging markets undertaken at the Budapest University of Economics (Budapesti Közgazdaságtudományi Egyetem), and the Institut des Hautes Études Économiques et Commerciales in Paris. Devin was also a participant in the inaugural class of Singularity University, a NASA and Google sponsored program focused on the evaluation of emerging technologies.

Jake Dunagan Research Director



Jake's research examines the role of emerging technologies in transforming subjectivity, culture, and governance, and he has been leading explorations into new methods for communicating foresight. Jake is currently completing his Ph.D. at the Manoa School of Futures Studies on neuropolitics, neuropower, and alternative futures for the extended mind.

Before joining IFTF, Jake was a researcher at the Hawaii Research Center for Futures Studies, leading and participating in major foresight projects with the city of Honolulu, State of Hawaii, and the Republic of South Korea. At the University of Hawaii, he taught courses in visual anthropology and futures studies, and co-organized the Honolulu Futures Salon.

In 2007, along with Stuart Candy, Jake launched FoundFutures, a series of public multimedia interventions that tangibly manifest alternative futures and create meaningful encounters with possibility. Besides distributed installations such as the "Postcards from the Future" project, FoundFutures has exhibited at well known galleries in Hawaii and California, including the Arts at Mark's Garage in Honolulu, and the Wattis Institute for Contemporary Arts in San Francisco.

Jake holds an M.A. from Temple University, and a B.A. from Auburn University, both in Visual Anthropology. His Master's thesis, "Alternatives in Anthropological Communication: Ethnographic Surrealism and Fake Documentary," examined cultural representation and the role of media conventions in the construction of truth.

Mike Liebhold Distinguished Fellow



Mike Liebhold is a Distinguished Fellow focusing on the mobile web, abundant computation, immersive media and geospatial foundations for context-aware and ubiquitous computing. Previously, Mike was a Visiting Researcher, Intel Labs, working on a pattern language based on semantic web frameworks for ubiquitous computing.

Before that, during the late 1990s Mike worked on startups building large scale international public IT services and IP networks for rural and remote regions, and for GPS enhanced precision agriculture, a complete IT architecture for schools in Shandong Province China, satellite networks in India, Europe, and Latin America, and was a Principal Investigator for a National Science Foundation project to bring Internet2 broadband IP networks to seventy rural low income communities in the United States.

In the 1990s, Mike was a senior consulting architect at Netscape Communications and a founding member of Netscape's Strategic Investors board. Previously, Mike was Vice President, Chief Technology Officer for Times Mirror Publishing. For ten years prior, he was Senior Scientist for Apple Computer researching and developing media technologies, geospatial information systems, and high-speed communications. Mike served as principal technology policy adviser for Apple Chairman John Sculley and drafted core recommendations on the National Information Infrastructure, which were later incorporated directly into the Clinton-Gore Technology Initiative.

Mike is a frequent speaker and has authored a number of papers, including one recently published in the Nieman Reports, the Harvard Journalism Review, entitled "Digital Immersion: Augmenting Places With Stories And Information" and an earlier co-authored paper published in a special edition of the IEEE Journal on Pervasive Computing, "Data Management in the World-Wide Sensor Web."

Lisa Mumbach
Program Coordinator



Since joining IFTF in 2007, Lisa has played many roles at IFTF. She has worked mainly in the Creative Services department, managing projects and editorial work, and providing a bridge between research and production. Lisa has also been managing content on iftf.org, as well as writing and blogging.

In 2011, Lisa moved to the research side of IFTF, joining the Technology Horizons team as Program Coordinator. Working on the Tech Horizons team enables Lisa to become more deeply involved with the research and development of IFTF's forecasts, as well as more opportunities to interact with clients.

Lisa's interests lie in all things language-related, from the future of the written word to how people communicate with each other online. Lisa holds a BA in English literature, with a specialization in 18th Century British fiction, from Mills College in Oakland, CA..

David Pescovitz
Research Director



David Pescovitz is co-editor of the popular weblog BoingBoing.net and also editor-at-large for MAKE., the DIY technology magazine. Pescovitz co-wrote the book *Reality Check* (HardWired, 1996), based on his long-running futurist column in *Wired* magazine where he remains a correspondent. He has also written for *Scientific American*, *Popular Science*, *New York Times*, *Washington Post*, *Salon*, and *New Scientist*, among many other publications. In 2002, he won the Foresight Prize in Communication, recognizing excellence in educating the public

and research community about nanotechnology and other emerging technologies. Pescovitz holds a Bachelor of Fine Arts in Electronic Media from the University of Cincinnati and a Master's in Journalism from UC Berkeley.

Pescovitz has also contributed to the *Los Angeles Times*, *IEEE Spectrum*, *Industry Standard*, *Spin*, *MTV Online*, *Discovery Channel Online*, and *Encyclopaedia Britannica Online*. His writings on technology and culture are featured in the books *What Are You Optimistic About?* (Harper, 2007), *The Happy Mutant Handbook* (Riverhead, 1996), and *The 'Zine Reader* (Holt, 1997). In 1996, Pescovitz created Nrrrd, a critically acclaimed technology and youth culture Web site for Turner Entertainment. Pescovitz is a member of the International Academy of Digital Arts & Science and has appeared on numerous television and radio programs and networks including CNN's *Sonya Live*, NPR, Fox News, ZDTV, and CNET.

Jason Tester
Director of Human-Futures Interaction



Jason Tester's interests in interactive technology began the old-fashioned way, tinkering one-on-one with the equipment he had at hand. With his work on technological voting, however, he saw the possible effects of computer-human interaction on the future of society as a whole.

At IFTF, Jason focuses on three areas: research into how people use emerging technologies, the application of design to futures research, and facilitating groups to stimulate insights and implications about the future. Jason strives to look beneath the surface of society and its artifacts for hidden layers of meaning.

Jason has long been interested in researching and designing the ways people interact with technology, expertise he brought to IFTF's ongoing effort to broaden the ways in which its findings are visualized and presented. To this end, he developed one of IFTF's current methodologies called "artifacts from the future." Most recently, he has been interested in moving futures thinking out of the think tanks and into the street by developing a platform called human-future interaction. Such a platform is designed to make futures thinking part of daily life by using immersive experiences and new media tools to provoke and capture citizens' thoughts about the future.

Before IFTF, Jason was in the founding class at the Interactive Design Institute in Ivrea, Italy, where he undertook the "Accelerated Democracy" project, a series of scenarios that uniquely illustrate potential future—positive and negative—for technological voting. This project has been widely featured in the press and formed the basis of his focus on new methods for integrating design with long-term futures research. When he was at Stanford, Jason helped found the Stanford Persuasive Technology Lab, the only research and design group focused on the new field of persuasive technologies—technologies that influence users' thoughts or activities as they use them.

Jason holds a B.S. in human-computer interaction design from Stanford University, and a master's degree from the Interaction Design Institute in Ivrea, Italy.

Anthony Townsend
Research Director



Anthony's research focus is on the impact of new technology on cities and public institutions. His interests span several inter-related topics: mobility and urbanization, innovation systems and innovation strategy, science and technology parks and economic development, and sustainability and telework.

Anthony believes that foresight can play an important role in shaping public policy, and is involved in policy and planning networks throughout the United States, Europe and Asia. He

testified at a United States Senate hearing on "Research Parks and Job Creation" on December 9, 2009, and serves as a member of the National Foreign Trade Council's Global Innovation Forum Brain Trust. He has served on mayoral municipal broadband advisory boards in both New York City and San Francisco.

Before joining IFTF, Anthony enjoyed a brief but productive academic career at New York University, where he directed research sponsored by the National Science Foundation and the Department of Homeland Security. He received a Fulbright scholarship in 2004 to study the social impacts of broadband in South Korea. He was one of the original founders of NYCwireless, a pioneer in the municipal wireless movement that promotes the use of public-access Wi-Fi in the development of local communities.

Anthony directs the Institute's strategic investments in collaborative forecasting platforms, futures media and visualization technologies, and web communications tools. By applying emerging practices like agile development, extreme programming and open data infrastructures to the creation of forecasting tools, he seeks to provide platforms for the Institute to develop rich and wide-reaching forecasting networks.

Anthony holds a Ph.D. in urban and regional planning from Massachusetts Institute of Technology, a master's in urban planning from New York University, and a B.A. in urban studies with a minor in physics from Rutgers University.

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For more information about the Institute for the Future
please visit our Web site at www.iftf.org or contact:

Sean Ness at 650-233-9517 or sness@iftf.org

ABOUT THE INSTITUTE FOR THE FUTURE

The Institute for the Future is an independent, nonprofit strategic research group with more than 40 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research generates the foresight needed to create insights that lead to action. Our research spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is based in Palo Alto, CA.

