



SUSTAINABLE FUTURES, STRATEGIES, AND TECHNOLOGIES

At the World Future Society's 2010 annual meeting in Boston, minds meet and futures happen.

By Cynthia G. Wagner

PHOTOS BY AARON M. COHEN AND C.G. WAGNER





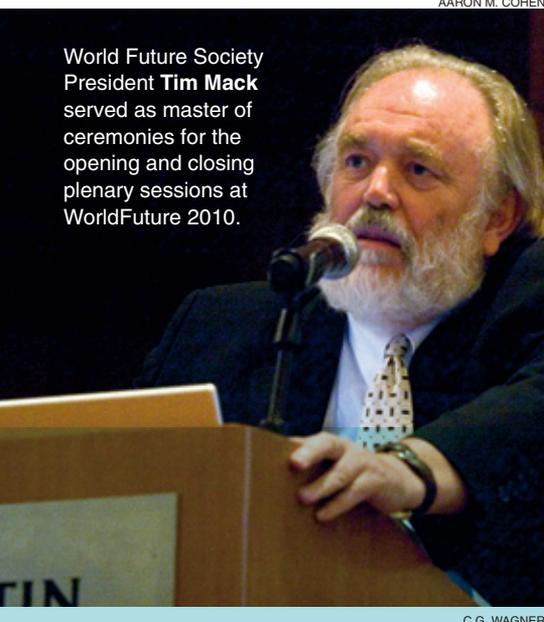
Bioethicist **Wendell Wallach** of Yale University describes himself as a “friendly skeptic” about the potential for machine intelligence to surpass that of humans.

AARON M. COHEN



Inventor **Ray Kurzweil**, author of *The Singularity Is Near* and the forthcoming *How the Mind Works and How to Build One*, offered an eye-opening overview of exponential growth in a wide variety of areas.

AARON M. COHEN



World Future Society President **Tim Mack** served as master of ceremonies for the opening and closing plenary sessions at WorldFuture 2010.

C.G. WAGNER



Palo Alto High School senior **Nittai Malchin** describes the organization he established for providing computers and computer literacy to Haitian schoolchildren.

C.G. WAGNER



Journalist **Michael Rogers** argued that the trend of more people living more of their lives “virtually” is as historically significant a change as the movement toward urbanization.

C.G. WAGNER



NASA chief scientist **Dennis Bushnell** (left) chats with a conference goer following his presentation on Technology Futures and Their Massive Potential Societal Impacts.



A Youth Forum was organized during the conference to solicit feedback from futurists under age 30 on what programs the Society could offer that would be of use to them. The discussion was moderated by **Ted Kahn** (back to camera), president of DesignWorlds for Learning and DesignWorlds for College and Careers.

The “meeting of minds” that typically occurs at World Future Society conferences illustrates the difference between “group think” and “collective wisdom.” At WorldFuture 2010 in Boston, the 800 “minds” came from a diversity of cultures and disciplines, and they converged not to come to one mind but to learn from one another. The lesson is that, to build a future that is sustainable for all, we need partners.

One of those “partners” is the machines that we are building, and the acceleration of technological development and convergence is a major force affecting the future. Yale University bioethicist **Wendell Wallach** opened the conference with an overview of revolutionary developments

in biotech, nanotech, and infotech, the convergence of which is leading to accelerated growth.

Wallach described himself as a “friendly skeptic” of forecasts for machine intelligence that matches or exceeds that of human intelligence within the next 20 years.

“We underappreciate the complexity of being human,” Wallach said. “We overembellish the acceleration of technological progress.” He pointed out that replicating human consciousness with machines is a complex challenge, and we don’t currently know enough about consciousness to even know if it is unique to carbon-based systems (i.e., life forms). Moreover, much of the thinking about the Singularity is technological determinism and does

not consider potential costs and perils.

Wallach advocated a new field of inquiry—machine morality—to address the complex issues arising from these converging technological advances: Do we need artificial moral agents, and if so, whose morality will they apply? And just how can morality be implemented in machines? A cautionary example Wallach cited was the potential for an “unmanned military.” There is little discussion in the military about applications of machine consciousness beyond meeting short-term goals, he charged. For example, how would a robot know if a surgeon with a knife wasn’t trying to kill a soldier/patient and then act to prevent the critical procedure?

“Society needs to take responsibil-

Creating Intelligent Countries through Forward Engagement

By Wendy McGuinness

Leon Fuerth is a man who does not like surprises. A former National Security Adviser to Vice President Al Gore, he explained how during the Clinton/Gore era he noticed a significant change in the landscape, not only in terms of velocity and trajectory, but also in terms of complexity. He noted, for example, how no one in the United States had foreseen the debate about genetically modified food, and as a consequence the United States was unprepared for the European Union response.

He wondered, “Did Moore’s law also relate to the compilation and handling of data?” In which case, does the United States need a new form of intelligent system to cater for this new environment?

Fuerth had been impressed by the application of “forward deployment” by the military, and questioned whether this concept could form part of the solution when applied to the nonmilitary sector. “Forward engagement” seemed to fit the job description—

using a combination of soft and hard power to respond to emerging issues early, thus delivering big results for emerging issues at low costs.

But this was not the whole solution. Fuerth noted that the previous approach was based on at least three broad assumptions: that issues could be assessed in isolation, along linear lines, and that a clear end point did exist. Today, the contrary view exists. Issues tend to have a deeper context, are more uncertain (small changes can have big effects), are more integrated, and, rather than disappear from view, their importance tends to ebb and flow over time.

Fuerth puts forward three components necessary to create an intelligent system. First, there needs to be a formal foresight system for the whole of government; national security can no longer be seen in isolation. Second, there must be a networked approach to the formulation and execution of the policy; in other words, a flatter and faster



Leon Fuerth, former adviser to Vice President Al Gore, describes the need for “forward engagement” in governance.

response by delegating decision making further down the ranks. Lastly, and most importantly, countries need formal feedback loops, so that decision makers can learn from both their successes and their failures. See www.forwardengagement.org.

Wendy McGuinness is the founder of the Sustainable Future Institute, Wellington, New Zealand, www.sustainablefuture.info.

Challenges and Opportunities in Space Medicine

By Richard Yonck

Commercial space passengers will face many complex and interacting risk factors, according to **Melchor Antuñano**, director of the FAA Civil Aerospace Medical Institute. The medical considerations for commercial travelers will be very different from those of professional astronauts, who have been selected for optimum health, conditioning, and training.

To date, only the United States has established licensing requirements for manned commercial space operations. One of the very strict requirements of this is that passengers have to be fully informed about all of the potential risks of participating in space flights. This begs the question of how extensively the potential risks should be disclosed. On the one hand, proper disclosure is mandated. On the other, a commercial venture doesn't want to scare away all of its passengers.

In addition to this, our experience in space is still very limited; we simply don't know all of the potential risks, especially for the broader population. When all space flights were government-run, the issue of liability and litigation in the event of injury or death wasn't a significant matter. This will change entirely as we move into an era of commercial space ventures.

The risks to passengers are considerable. Potential operational and environmental risk factors include acceleration, barometric pressure, microgravity, ionizing and nonionizing radiation, noise, vibration, temperature and humidity, cabin air, and behavioral issues.

"We have to keep in mind that, for commercial orbital space flights, there will be limited medical intervention capabilities," Antuñano observed. "Any

preexisting medical condition could be made worse by exposure to the stresses of space flight."

Space medicine studies have yielded some unexpected observations. In preflight centrifuge training at Virgin Galactic, participants ranged from 22 to 88 years of age. Contrary to expectations, the older participants tolerated acceleration better, presumably due to having stiffer blood vessels from hypertension and arteriosclerosis. Nonetheless, these conditions still place the older passengers at greater risk from other factors they would face.

To date, space tourism has been limited to an elite few. The space tourism company Space Adventures has flown a total of seven commercial passengers to the International Space Station aboard Soyuz spacecraft. This level of exclusivity is about to change. In 2012, Virgin Galactic is scheduled to begin sub-orbital passenger flights, and Bigelow Aerospace plans to have its orbiting hotel operational that same year.

It's anticipated there will be significant growth of commercial space tourism during the coming decade. Futron/Zogby estimates that by 2021 there will be 13,000 suborbital passengers annually, resulting in \$650 million in revenue. Many companies are currently working to make commercial space flight a viable industry.

But even once the hurdles of developing commercial spacecraft have been overcome, there will still remain many challenges to protecting the health and well-being of paying space travelers.

Richard Yonck is a foresight analyst with Intelligent Future LLC. He was a participant in the Futurist Writers Workshop during WorldFuture 2010. E-mail ryonck@intelligent-future.com.

ity for the futures it creates," Wallach concluded.

THE COMING SINGULARITY

While Wallach said he did not believe a technological Singularity (when machine intelligence matches or surpasses human intelligence) would occur within the next 100 years, he anticipated that we would see "brilliant computers" in the next 10 to 30 years. However, it would be a mistake to believe they are smarter than they are.

Inventor **Ray Kurzweil** argued that the pace of technological advance-

ment is exponential and that this will give humans enormous new opportunities. For example, he noted that Facebook and Google were started by a couple of kids with an idea. He emphasized that the success of such enterprises were a result of collaborative decision making.

Kurzweil's presentation focused on the future of human intelligence, which is the topic of the book he is working on, *How the Mind Works and How to Build One*. "What's really important is that we are gaining exponentially in understanding our own intelligence. ... I do consider it *human intelligence*," he stressed. "I do

have a little problem with the term *transhumanist*, which implies we're going to transcend humanity. I actually think we are going to transcend biology, but not humanity. We're going to enhance humanity. That, anyway, is the goal of developing artificial intelligence and merging with it. It's not an alien invasion of intelligent machines from over the horizon."

What these developments will lead to for the human future is not a replacement of human beings, but an enhancement of them, he argued, and the merging of humans with machines will create an augmented reality, which will surround us all



Conference chair **Carol Rieg** chats with a participant as WorldFuture 2010 opens. Rieg is the corporate foundation officer for Bentley Systems Inc., a sponsor for the conference. Among Bentley's contributions was a series of webinars with speakers designed to showcase the conference themes and activities to prospective attendees.

the time, according to Kurzweil.

"When we get to 2029, this will really be an intimate merger," he said. "These devices are going to go inside our bodies and brains, they're going to keep us healthy from inside, they're going to directly augment our intelligence. So I don't think it's a matter of, 'Well, gee, when we create these machines that are more intelligent than we are, they will have no use for us and it's going to be this conflict between man and machine.' We are the human-machine civilization already. We create these devices to make ourselves more intelligent."

Journalist **Michael Rogers** weighed both the negative and positive sides of accelerating technological developments. On the positive side, our devices are learning how we live and how to become more helpful companions to us. For instance, cars could monitor your driving habits, allowing your insurance company to bill you by the mile and by your behavior.

However, a key challenge to this new era will be the need to develop the rule of law. "So far, most governments have been *laissez faire*" about the issues surrounding technology's impacts on society, and "it's now lawless," Rogers noted. He pointed out that identity theft has become so easy and so common that there was recently a "fire sale" at the international online bulletin boards that traffic in stolen credit card numbers.

The joke about nobody knowing you're a dog on the Internet has got to end, he said, and we may see a call for such things as national identity

AARON M. COHEN



The Unemployment Conundrum

At WorldFuture 2010, business futurists **Arnold Brown** and **Edie Weiner** provided an overview of the major trends altering the landscape for workers, focusing on the areas of highest potential growth.

Brown noted that people's expectations have increased because of advanced education, and the promise that jobs would be there for them has not been realized in most places. Historically, jobs often emerge to replace other jobs, but now many jobs are being replaced by artificial intelligence. As a result, middle management is disappearing, and long-term unemployment even among workers with a bachelor's degree is a growing problem.

The recent recession, according to Weiner, was a fundamental economic transformation, generated by a confluence of technologies that are creating whole new businesses—and thus new jobs. For instance, neuroscience is bringing better understanding of how the mind works, opening up new career areas like neuro-design and neuro-education, she said. Monetizing people's need for more time and storage space will also yield new business and job prospects.

cards and licensing of Internet use.

CO-CREATING THE FUTURE

One goal of professional futurists is helping organizations and communities deal with the impacts of change

such as those described by Wallach, Kurzweil, and Rogers. Consultant **Janine Cahill**, managing director of Future Journeys in Sydney, Australia, outlined the Live Futures methodology used in her work with corporations to inspire and create the future.

“Global Megacrisis” Survey: How Big? What’s Likely by 2020?

By Wilton A. (Bud) Roberts

In 2009, futurists **Michael Marien** and **William Halal** engaged in a dialogue on the “global megacrisis,” published in *World Future Review*. To “resolve” the debate, they created a survey, hosted by Halal’s TechCast project (www.techcast.org).

At WorldFuture 2010, Marien, director of the New and Forthcoming Books Website project, presented the results from the questionnaire on how severe the pending “global megacrisis” might be, and several participants offered their feedback on the survey and on the forecasts underpinning the megacrisis.

Nicole Schwartz-Morgan, a professor at the Royal Military College of Canada, Ottawa, said that her answers to the questionnaire were forced by the questions. Her real answer is that we have no clues whatsoever. “The future is not what it used to be.” We are

seeing unprecedented changes: destabilization of the climate (which has been basically stable for the past 20,000 years); population demographics (age, ratio of the sexes); and technologies. We are reminded of prehistoric wild cards by the recent Iceland volcano eruption.

“Our ability to react is inversely proportional to the scale of the problem,” she said. We see catastrophe with rejoice (religious) or as a good show, not as a personal reality. It is easier to sell. We want a common good. We are immortal phoenixes.

Miguel Angel Gutierrez, director of the Latin American Center of Globalization and Futures Studies in Buenos Aires, predicts the collapse of the U.S. economy (technology without supervision), cycles of boom and depression, reality of globalization (not expansion), and crisis of gover-

nance. Technology is not enough to deal with these problems, he said.

Schwartz-Morgan added that we can expect to see more failed states. In Africa, 80%–90% have no electricity and only 15% have connectivity to the Internet. Things are slowly getting better there. In a muddle, technology can be used to simplify where we fit. The choices to be made are human. Big issues include inequities, especially with the urbanization of the world’s populations. Exacerbation is a worry.

Marien further commented that we should concentrate on what we can do instead of trying to deal with “2012” or other problems that are unknown.

Wilton A. (Bud) Roberts was a participant in the Futurist Writers Workshop, a pre-conference course offered at WorldFuture 2010. E-mail wilton.roberts@gmail.com.

AARON M. COHEN

Men and Women: The Battle for Supremacy

Consultant **Karen Moloney** offered insights on the social, cultural, and economic impacts of changing gender roles and sexuality.

Three possible scenarios she described were “Carry On Carrying On,” in which the workforce becomes increasingly feminized but “male” and “female” jobs still exist; “Back to the Kitchen,” in which housework remains “women’s” work, largely by choice among younger generations who do not equate domesticity with servitude; and “Parallel Worlds,” in which attempts for men and women to work together largely fail, leading more women to start their own businesses.

Moloney concluded that, should women achieve “supremacy” in the battle of the sexes, they are unlikely to seek revenge against males despite millennia of hegemony.

Karen Moloney, consultant and writer on the changing nature of work.



Experiences are unique to individuals, so it is “important to gather and work with others to create a sustainable future,” Cahill said. The new technologies of social media are enabling this co-creation by allowing individuals to participate “in more conversations in more places at once, all contributing ideas and links,” she said.

Social innovation and networking are also facilitating the development of more sustainable cities, according to **John Mahaffie** and **Jennifer Jarratt**, principals of Leading Futurists LLC. For example, Web sites like NeighborGoods.net and FreeCycle.org enable neighbors to borrow or rent items from each other, thus reducing costs as well as waste in the community.

The opportunity for bonding that such social innovation offers should not be lost on organizations and institutions, because “the public is

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Susan Avery, president and director of Woods Hole Oceanographic Institution.

Oceans and Our Global Future

Humans have only had the technology to study the oceans for the past 150 years, and it is now time to think about what we want the ocean to look like in the next 50 years, said **Susan Avery**, the first atmospheric scientist (and first woman) to head an oceanographic institute.

The impacts of changes in the ocean, including fish catches and sea levels, will be felt differently around the world, she noted. Fish catches are down, despite improving technologies, but the wealthier economies such as the United States, Japan, and Europe will likely continue to reap most of the supply.

We need a better understanding of human interaction with the oceans and the environment, which cross geopolitical boundaries, Avery said. She argued that scientists around the world need to join together, along with industries, to promote the legislation and economic stimulation needed to live sustainably.



Theodore J. Gordon

Futurist of the Year:

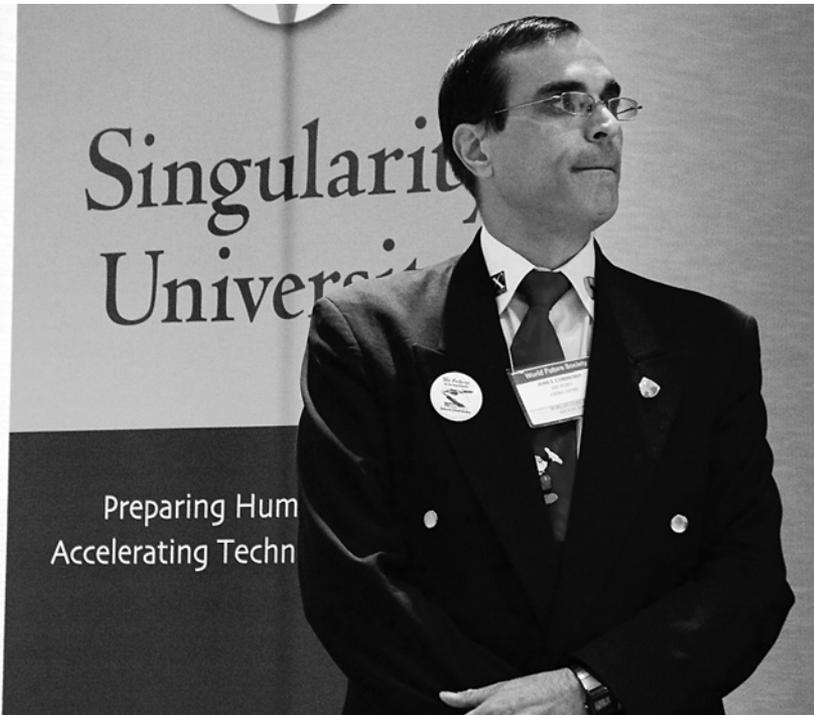
Theodore J. Gordon

Millennium Project senior fellow **Theodore J. Gordon** was honored during the closing session of WorldFuture 2010 as recipient of the first Edward Cornish Award: Futurist of the Year.

Gordon was nominated for his work in 2009 with the Millennium Project's *Futures Research Methodology Version 3.0* and the *State of the Future* annual report, yet his outstanding career truly merits acclamation as a futures pioneer.

During the conference, Gordon also presented at the session on Collective Intelligence, a methodology developed by the Millennium Project for sharing data and knowledge among decision makers.

José Cordeiro (bottom left), founder of the World Future Society's Venezuela Chapter, moderates a session showcasing the team projects of students at Singularity University. Participants include (clockwise from top left) **Luke Hutchison**, **Justyna Zander**, **Jessica Scorpio**, and **Nitesh Banta**.



PHOTOS: AARON M. COHEN

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smarter than they think," said **Art Stewart**, president of Stewart Strategies Group. From the mismanagement of responses to natural disasters such as Hurricane Katrina to the recent Gulf of Mexico oil catastrophe, breaches of social contracts have become legion, and new modes of engaged "DIY" (do-it-yourself) citizenship and politics are emerging as a result.

We are entering a "new era of recalibration," from isolation to affiliation, and a lot is riding on organiza-

tions' ability to cope with liabilities they never had before, Stewart said. Reputation matters, and corporations will increasingly need to analyze "the reputational impacts of everything they do."

YOUNG FUTURISTS HAVE THEIR SAY

The World Future Society's annual meetings allow futurist organizations of all sorts to show off their products and services, and among the most exciting showcases are those of educational institutions pro-

ducing new futurists.

At WorldFuture 2010, participants heard from students of the **University of Houston's Futures Studies** program (session led by **Peter Bishop**), demonstrating the use of alternative scenarios on topics such as neuroscience and health technologies.

At the **Singularity University** session (moderated by **José Cordeiro**), team projects to develop new enterprises were described by **Nitesh Banta**, **Luke Hutchison**, **Justyna Zander**, **Jessica Scorpio**, and **Marianne Ryan**. The Acasa project

In Memoriam: Susan Echard

As many attendees at WorldFuture 2010 observed, our longtime conference and membership director, **Susan Echard**, was missing. Sue had been battling lymphoma for the past year, and though she actively participated in organizing this year's conference, she was unable to attend. Just a few short weeks after it was over, on July 29, Sue passed away. She was 65.

Born in Cleveland, Ohio, Sue pursued her education at the University of Maryland (graduating magna cum laude) and Hood College (master's degree in guidance and counseling), initially becoming a public schoolteacher.

She found her calling at the World Future Society, where she was hired in 1977 as a temp for the membership department by then-Secretary/Treasurer **Peter Zuckerman**. She gradually took over as director of both the membership and conference planning departments. In 2004, she was named Vice President for Membership and Conference Operations.

Despite illness, Sue continued to support the Society's programs and services throughout the first half of 2010, including session planning for WorldFuture 2010 and evaluating essays submitted to the annual High School Essay Contest.

Sue is survived by her husband, **Paul Echard**; sister, **Kathleen Zellmer**; brother, **Jeffrie Zellmer**; and two stepchildren and two step grandchildren. Interment took place August 23, 2010, at Arlington National Cemetery, Arlington, Virginia.

News of Sue's death has provoked much sadness throughout the World Future Society community, as "her ability to work with a variety of people, her loyalty to WFS, and her genuine concern for others will not be matched," in the words of her sister, Kathleen.



Susan Echard. The Society's student scholarship program for future conferences has been renamed in her honor.

DAVID MACK

At the 2010 conference, members of the **Police Futurists International** presented the Society a plaque of appreciation for her. And longtime professional member **John Mahaffie** described her as the "heart, soul, and energy of the World Future Society."

Sue's strength and dedication were an inspiration to those who worked with her. She will truly be missed.

The World Future Society's board of directors has renamed

the conference's student scholarship program in her honor. Donations received for this program enable the attendance of youth and full-time students under the age of 30. The program will now be known as the **Susan Echard Student Scholarship Program**.

(Ryan), for instance, focuses on using 3-D printing technology to create affordable housing, and the Gettaround car-sharing program (Scorpio and Banta) uses peer-to-peer networking for individuals to rent their personal automobiles to neighbors or co-workers.

Another session focused on a unique project for high-school students, the **Virtual Museum and STEM Careers Collaboratory of the Future**, and was moderated by **Ted Kahn**, CEO of Design Worlds for Learning Inc. Among the projects showcased were Palo Alto High School senior **Nittai Malchin's** organization One Love Advocates, a social entrepreneurship start-up he created after the Haitian earthquake to help children of Haiti learn to use computers.

Kahn also helped organize an ad hoc **Youth Forum** for futurists under age 30 to give the World Future

Society feedback on programs that would be useful to them for planning their lives and careers. Among the services that the participants suggested were mentorship matching and face-to-face networking opportunities.

This emphasis on the need for face-to-face networking somewhat contradicts the assumption that the younger generations are more interested in communicating virtually. Social networking technologies, it appears, are a valuable tool, but not the only (or even the best) tool for such meetings of the mind. □

About the Author

Cynthia G. Wagner is managing editor of THE FUTURIST magazine. She also served as the editor of the WorldFuture 2010 conference volume, *Strategies and Technologies for a Sustainable Future*. E-mail cwagner@wfs.org.

For More Information

- *Strategies and Technologies for a Sustainable Future*, edited by Cynthia G. Wagner, is a volume of essays prepared for WorldFuture 2010 and distributed to all attendees. The volume is now available for \$29.95 (\$24.95 for Society members). Order from www.wfs.org/node/64
- Audio and slide presentations from most sessions are available from IntelliQuest Media as playable CDs or data DVDs. Order from IntelliQuest Media at www.intelliquestmedia.com/store/search.php?a=E&c=201026