

# OUTLOOK 2011

Recent Forecasts from World Future Society for the Decade Ahead

## INTRODUCTION

In the next 10 to 30 years, society will have to learn to deal with “peak everything”—an epoch of critical scarcities of a broad range of resources. Unexpected sources of expertise—such as physicists advising us about the economy—will guide us through hard times. And genetic tampering with crops will gain more acceptance if it solves critical environmental and resource problems, such as resistance to climate change and reducing the release of carbon into the atmosphere.

These are just a few of the forecasts in the latest edition of the World Future Society’s annual **Outlook** report, in which the editors have selected the most thought-provoking forecasts and ideas appearing in *THE FUTURIST* over the past year. These are not “predictions,” but rather glimpses of what may happen, warnings of potential problems that could be avoided, or prescriptions for better futures we may wish to begin working toward.

The intent of the Outlook report is to provoke thought and inspire action. The opinions and ideas expressed are those of their authors or sources cited and do not necessarily represent the views of the World Future Society. For more information, please refer to the original articles cited. Back issues of *THE FUTURIST*, as well as additional copies of this Outlook report, may be purchased using the coupon in this report or online at [www.wfs.org](http://www.wfs.org).

As always, your feedback is welcome. Please e-mail your comments to [letters@wfs.org](mailto:letters@wfs.org). —THE EDITORS

PAVLINA ILIEVA / KUO PAO LIAN / WWW.PIKLSTUDIO.COM



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## BUSINESS AND ECONOMICS

● **Physicists could become tomorrow's leading economic forecasters.** Unlike mainstream economists, who rely on averages, econophysicists study complex systems, feedback loops, cascading effects, irrational decision making, and other destabilizing influences, which may help them to foresee economic upheavals. —*Future Scope, Sep-Oct 2010, p. 4*

● **The two decades between 2020 and 2040 will coincide with material scarcity as "peak everything" takes hold.** Supplies of antimony (a strategic mineral essential to the production of semiconductors) will peak between 2020 and 2040. Tantalum (essential to the production of capacitors and resistors) will peak between 2025 and 2035. Zinc (an important metal in the production of batteries) will peak between 2025 and 2035. —*Stephen Aguilar-Millan, Ann Feeney, Amy Oberg, and Elizabeth Rudd, "The Post-Scarcity World of 2050-2075," Jan-Feb 2010, p. 35*

● **The post-scarcity business environment of 2050 and beyond will give rise to new business models.** As more aspects of industrial production fall into the realm of information technology, the ability to digitize, or "convert atoms to bits," is increasingly removing scarcity from the business equation. —*Stephen Aguilar-Millan, Ann Feeney, Amy Oberg, and Elizabeth Rudd, "The Post-Scarcity World of 2050-2075," Jan-Feb 2010, p. 35*

● **U.S. companies will remain optimistic about China's markets.** An overwhelming majority (90%) of the American companies doing business in China are "optimistic" or "slightly optimistic" about the five-year growth outlook for China's domestic market, according to the American Chamber of Commerce in Shanghai (AmCham). Of the U.S. companies surveyed, 74% ranked China as a top-three investment priority, and nearly 20% ranked it as number one, AmCham reports. —*World Trends & Forecasts, Mar-Apr 2010, p. 11*

● **Emerging industries will lead a period of unprecedented global economic growth and development.** Such fields as nanotechnology, solar and wind power, water supply systems and desalination plants, space tourism, and environmental restoration projects could create billions of jobs around the world. —*McKinley Conway, "Coming: The Biggest Boom Ever!" May-June 2010, p. 21*

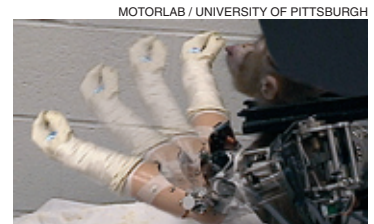


DAN DRIEGER / ISTOCKPHOTO

● **Beware of backlash against greenwashing.** Labeling products with meaningless terms such as "natural" without tangible environmental benefits could lead to a backlash from consumers seeking to support truly eco-friendly businesses. Manufacturers could begin by designing their products with sustainability in mind, such as using hydro-degradable plastic packaging, which dissolves in water. —*Erica Orange, "From Eco-Friendly to Eco-Intelligent," Sep-Oct 2010, pp. 28-32*

## COMPUTERS AND AUTOMATION

● **We may not be able to move mountains with our minds, but robots will await our mental commands.** Improved brain-computer interfaces could allow users to control a robotic arm. A longer-term goal is to build interfaces for robotic prostheses, so that users could use their minds to control their own artificial limbs. —*World Trends & Forecasts, Sep-Oct 2010, p. 7*



MOTORLAB / UNIVERSITY OF PITTSBURGH

● **The Internet will get smarter; you'll spend less time searching, more time finding what you want.** If you search the term "tank," the Internet doesn't know whether you mean an armed vehicle or something to hold oil. Search-engine developers such as SemanticV are teaching their programs to learn the meaning of words based on how they are actually used rather than their popularity among other searchers. —*World Trends & Forecasts, Nov-Dec 2009, p. 9*

● **A "Skinput" computer interface will let you carry a virtual "keyboard" in the palm of your hand.** The device, developed by a team of Carnegie Mellon researchers, consists of a tiny projector that creates the virtual keyboard display and sensors that recognize the sounds of your finger tapping on specific parts of your skin. —*Tomorrow in Brief, July-Aug 2010, p. 2*

● **Smart textiles will allow future musicians to "play themselves."** In prototype garments designed by students at the Swedish School of Textiles, sensors built into the fabric produce a harp-like sound when the user touches it. —*Tomorrow in Brief, Sep-Oct 2010, p. 2*

● **Future wars may be less deadly as fewer human troops are placed in high-risk positions.** Autonomous combat vehicles (drones) and robotic soldiers could perform a wide variety of dangerous missions, such as carrying cargo, sweeping mines, or guarding national borders, according to Missy Cummings, director

of MIT's Humans and Automation Lab. The result may be fewer war casualties. —*World Trends & Forecasts*, Nov-Dec 2009, p. 12

● **Hopping robots could see combat duty.** Small, portable, and light, Precision Urban Hoppers are mainly intended to aid the U.S. Army in urban combat and help decrease soldier casualties.

Guided by GPS, they can bound over obstacles up to 25 feet in height and deliver various "payloads," including small video cameras and microphones for surveillance. —*World Trends & Forecasts*, Mar-Apr 2010, pp. 13-14



RANDY MONTOYA / SANDIA NATIONAL LABORATORIES

## EDUCATION

● **The notion of class time as separate from non-class time will vanish.** The era of hyperconnectivity will require most professionals to weave their careers and personal lives into a blended mosaic of activity. Work and leisure will be interlaced throughout waking hours every day of the week, and student life will reflect the same trend. In this way, self-directed learning will be the most important taught skill of the future. —*Janna Anderson, "Remaking Education for a New Century" (interview), Jan-Feb 2010, p. 22*

● **The future is crowded with PhDs.** The number of doctorate degrees awarded in the United States has risen for six straight years, reaching a record 48,802 in 2008, according to the National Science Foundation's Survey of Earned Doctorates. Approximately a third of those degrees went to temporary visa holders. Computer science and engineering doctorates increased by more than 20% in the past decade. Humanities PhDs declined except in the field of education. —*Trends in Brief, Mar-Apr 2010, p. 9*

● **China may pioneer large-scale Internet education.** Faced with the challenge of educating an impoverished rural workforce, but free from the influence of teachers' unions, China may be the first country to succeed in educating most of its population through the Internet. From 2003 to 2007, China spent about \$1 billion to implement distance-learning projects in the rural countryside. —*John Naisbitt and Doris Naisbitt, authors of China's Megatrends, reviewed by Patrick Tucker, May-June 2010, pp. 55-56*

● **Social networking could facilitate a more collaborative form of learning.** The Net generation uses technologies both for socializing and for working and learning, so their approach to tasks is less about competing and more about working as teams. Therefore, teachers should abandon the "drill and kill, sage on a stage" model of pedagogy, and managers should encourage greater freedom among employees to self-organize. —*Don Tapscott, cited in "Innovation and Creativity in a Complex World," Nov-Dec 2009, p. 53*

● **Future curricula will broaden to include interpersonal skills.** The age of social networking has brought on a critical need for social skills such as self-discipline, responsibility, and media literacy, in addition to the "three R's." Education should incorporate more active learning styles, such as group exercises, class discussions, and other exercises that allow students to interact with course material. —*Gary Marx, cited in "Education for a New Age," Nov-Dec 2009, p. 57*

● **In 2020, schools will carve out nondigital preserves for students to read and write with books, pens, and paper.** Educators and students will see nondigital space as a crucial part of the curriculum, recognizing that aspects of intelligence are best developed with a mixture of digital and nondigital tools. —*Mark Bauerlein, "Literary Learning in the Hyperdigital Age," Jan-Feb 2010, p. 24*

● **Texting, microblogging, and overuse of online tools will have a negative effect on student writing and academic performance.** When students sit down and compose on a keyboard, they slide into a harried mode of writing. As more kids grow up writing in snatches, and writing poorly, colleges will put more first-year students into remedial courses and businesses will hire more writing coaches for their employees. —*Mark Bauerlein, "Literary Learning in the Hyperdigital Age," Jan-Feb 2010, p. 25*

● **On the college campus of tomorrow, classes won't matter.** The next generation of college students will be living wherever they want and taking many (if not all) of their courses online. They will earn degrees that are accredited by international accrediting agencies. But even in a globalized, educational environment, students will still want to join fellow students in a campus community. —*John Dew, "Global, Mobile, Virtual, and Social: The College Campus of Tomorrow," Mar-Apr 2010, p. 30*

## ENERGY

● **Switching to electric vehicles won't solve the energy problem.** Though it would reduce carbon-dioxide pollution, a massive transition from fossil fuels to elec-

trically powered vehicles would create even more demand for electricity. Other sources of increasing electricity demand include household appliances, computers, cell phones, and other consumer electronics. —Richard Stieglitz with Rick Docksai, "Why the World May Turn to Nuclear Power," Nov-Dec 2009, p. 19

● **Fission versus fossils: Nuclear power may soon trump petroleum.** Demand for energy, especially electricity, will continue to soar, but what source will supply that power? Fossil fuels are blamed for 90% of carbon-dioxide pollution, and renewable sources like solar and wind power are not yet reliable as baseloads, so nuclear power is experiencing a renaissance. Nuclear energy is projected to supply nearly 30% of the world's electricity by 2030, up from 16% today. —Richard Stieglitz with Rick Docksai, "Why the World May Turn to Nuclear Power," Nov-Dec 2009, p. 17

● **Electric cars could make fossil-fuel-powered cars obsolete.** The United States may completely transition from gasoline-powered vehicles to more reliable electric ones that last longer and require less maintenance by the middle of the twenty-first century. —Michael Horn, "Roadmap to the Electric Car Economy," Mar-Apr 2010, pp. 40-45



TESLA MOTORS

● **Alternative energy will overtake fossil fuels by the 2020s.** This will happen even if China and India retain coal-fired power plants. If handled poorly, such recalcitrance may end up being a driver for significant global tension. If handled well, it could be an engine for new markets and development. —Jamais Cascio, "The Potential and Risks of Geoengineering," May-June 2010, pp. 27-28

● **Solar power could come from glitter.** Photovoltaic cells the size of a piece of glitter could be embedded in textiles to provide a nearly ubiquitous source of mobile energy. Developed at Sandia National Laboratories, the tiny cells could also lower the costs of solar power, as they could be mass produced using common microelectromechanical systems (MEMS) techniques. —Tomorrow in Brief, July-Aug 2010, p. 2

● **Oil price rises will be checked by growing competition from alternative sources of energy.** Nuclear power is growing rapidly around the world; in Russia, for instance, plans call for 26 more nuclear plants to be built by 2030. Solar, geothermal, wind, and wave energy

will also help reduce reliance on oil. By 2060, a pollution-free hydrogen economy may become practical, though costly. —Marvin J. Cetron and Owen Davies, "Trends Shaping Tomorrow's World: Forces in the Natural and Institutional Environments," July-Aug 2010, p. 40

## ENVIRONMENT

● **More nuclear reactors are being built, but they may not be enough to reduce pollution from carbon dioxide.** By the end of 2007, the world had 439 operating nuclear reactors. Worldwide, 112 new reactors in 25 countries are planned, but in order for nuclear power to significantly contribute to reductions of carbon emissions, some 2,000 new reactors are needed, critics argue. —Richard Stieglitz with Rick Docksai, "Why the World May Turn to Nuclear Power," Nov-Dec 2009, p. 20; Michael Mariotte, "Second Thoughts on Nuclear Power," Nov-Dec 2009, p. 23

● **Dead zones in the world's oceans are a rapidly growing environmental crisis.** Industrial agriculture that allows too much animal manure and crop fertilizer to contaminate freshwater and coastal ecosystems is blamed for the growing phenomenon of eutrophication, which is the depletion of oxygen to support fish, crustaceans, and other marine life. —World Trends & Forecasts, Nov-Dec 2009, p. 7

● **Many of today's protected species could die out from a sudden catastrophic event.** Any species with a population of fewer than 5,000 is just one cataclysm away from disappearance, according to a study by the University of Adelaide and Macquarie University. This finding puts the giant panda, which numbers 1,000–2,000, and the California condor, of which there are only 170 living, deep in the danger zone. Programs that restore large amounts of habitat and strict protection of remaining specimens may bring many back from the brink. —World Trends & Forecasts, Mar-Apr 2010, p. 6



GARY KRAMER / U.S. FISH AND WILDLIFE SERVICE

● **A collapse in the Arctic's collared lemming population—a growing possibility due to climate change—would have ripple effects the world over.** Longer summers will mean less time for the animals to breed. They're a staple food for a variety of predator

species, such as the snowy owl and the seagull-like skua among other animals, according to researcher Olivier Gilg. Rapid climatic and biota shifts playing out in the Arctic provide a window into how animal behaviors will shift as a result of climate change. —*World Trends & Forecasts, Jan-Feb 2010, p. 9*

● **As the Arctic melts, Europe will freeze.** The effects of climate change differ by latitude; loss of sea ice in the Arctic region will likely yield colder and snowier winters in Europe, eastern Asia, and eastern North America, according to NOAA researcher James Overland. —*Tomorrow in Brief, Sep-Oct 2010, p. 2*

● **Rising levels of CO<sub>2</sub> are benefiting GM crops and weeds.**

Atmospheric carbon dioxide has been shown to stimulate growth in genetically modified soybeans—and the weeds that they've been modified to resist. Fast-growing invasive weeds could become even more troublesome as CO<sub>2</sub> levels increase to a predicted 550 parts per million by 2050. —*Tomorrow in Brief, Mar-Apr 2010, p. 2*



● **The Aral Sea will dry out by 2020 if conservation efforts don't work.** Once the fourth-largest lake on Earth, the Aral has shrunk dramatically in recent decades. Efforts to restore it have included the construction of a dam to sequester the smaller but less-polluted and salty northern Aral from the southern part. —*World Trends & Forecasts, Mar-Apr 2010, p. 12*

## FOOD AND AGRICULTURE

● **Crops will be genetically modified to be impervious to climate change.** Agricultural scientists believe they have isolated the “thermometer” gene in plants that allows them to sense and adapt to temperature changes. Tweaking the gene could create crops that would grow in any climate condition. —*Future Scope, May-June 2010, p. 4*

● **Environmentalists may embrace genetically modified crops as a carbon-reduction technology.** Like nuclear power, genetically modified crops have long been the bane of environmentalists, but Stewart Brand, author of *Whole Earth Discipline*, argues that there are myriad benefits to them. For example, crops modified to grow without being tilled (achievable through the creation of genetically novel crop strains) could prevent

carbon on the soil from being released into the atmosphere. —*Stewart Brand, author of Whole Earth Discipline, reviewed by Aaron M. Cohen, Jan-Feb 2010, p. 55*

● **Indoor vertical farming will make cities more self-sustaining.** “Living” skyscrapers with entire floors dedicated to growing food could soon appear in city skylines. In an increasingly urbanized future, they will bring food growers and consumers closer together, and also extend “farmland” into a third dimension: skyward. A 30-story skyscraper on one city block could potentially feed 50,000 Manhattanites, using technologies available now. —*Cynthia G. Wagner, “Vertical Farming: An Idea Whose Time Has Come Back,” Mar-Apr 2010, pp. 68-69*

● **The world has entered a new era of food insecurity.** Higher food prices, rapidly growing numbers of hungry people, and intensifying competition for land and water resources mean that nations must better manage their limited resources or face possible food shortages. —*Lester R. Brown, “How to Feed 8 Billion People,” Jan-Feb 2010, p. 28*

● **A potential food collapse may result from aquifer overpumping.** Water tables are now falling in countries that together contain half the world's people. An estimated 400 million people (including 175 million in India and 130 million in China) are currently being fed by farms and processes that rely on overpumping. Saudi Arabia has announced that, because its major aquifer is largely depleted, it will be phasing out wheat production entirely by 2016. —*Lester R. Brown, “How to Feed 8 Billion People,” Jan-Feb 2010, p. 30*

## HABITATS

● **Redesigning the automobile could help create more-sustainable cities.** With 800 million cars on the planet to serve 7.8 billion people, personal transportation is a dominant force in our lives. But by 2020, we will be shifting from privately owned gas-powered cars to shared electric vehicles. By engineering far smaller, lighter, and energy-efficient vehicles for city use and creating networks that make it easier for such vehicles to be shared rather than owned, urban design could be radically transformed. —*Ryan Chin, “Sustainable Urban Mobility in 2020,” July-Aug 2010, pp. 29-33*

● **Cities in developed countries could learn sustainability from informal cities in the developing world.** Dwellers in slums, favelas, and ghettos have learned to use and reuse resources and commodities more efficiently than their wealthier counterparts. The neighborhoods are high-density and walkable, mixing commercial and residential areas rather than segregat-

ing these functions. —*Paulina Ilieva and Kuo Pao Lian, "Learning from Informal Cities, Building for Communities," Sep-Oct 2010, pp. 24-26*

● **Future buildings may be more conversation-friendly.** Architects using sound-mapping software developed at Cardiff University in Wales can see the noisy hot spots where conversations in a room might become unintelligible. By altering room shapes and materials, they will be able to make meeting spaces, open-plan offices, and even cafés more compatible for conversations. —*Future Scope, July-Aug 2010, p. 4*

● **New approaches to building design and landscaping will protect homeowners in fire zones.** With increasing human settlement in woodlands and savannas, architects should use "firewise" construction, such as nonflammable building materials, abundant ventilation, and thermal-resistant windows, advises University of Wyoming ecologist William Baker. Landscapers can keep the areas surrounding the building free of plants that fuel and spread flames. —*World Trends & Forecasts, July-Aug 2010, p. 7*



● **In tomorrow's smart house, the walls will talk—to each other, and to the windows, TV, and fridge.** The key to making the long-fantasized dream of a smart house real is the creation of an Internet of things—networking among the many devices that keep our households running. The Hydra Project in Europe is aiming to create an open-source middleware network that would be compatible with devices manufactured by many different companies, from gaming platforms to refrigerators. —*World Trends & Forecasts, July-Aug 2010, p. 10*

● **"Smart cities" may soon emerge.** Sensor dust, embedded computing, augmented reality, and a host of other emerging technologies hold the potential to "awaken" cities as digital environments. —*Jamais Cascio, "The Potential and Risks of Geoengineering," May-June 2010, pp. 27-28*

● **Architects may need to consider climate models in their building designs.** Most buildings are constructed according to a location's historic weather conditions. However, as climate change is projected to make places like the United Kingdom hotter by mid-century, buildings will need to adapt to dramatically altered needs for energy consumption, flood defense, and other

climate-related impacts, warns physicist David Coley of the University of Exeter. —*World Trends & Forecasts, Sep-Oct 2010, p. 11*

## HEALTH AND MEDICINE

● **Top-of-the-line medical diagnostic equipment will be available on your phone.** A new application uses an iPhone's built-in microphone to collect clear signals of a user's heart beat, which can then be transmitted in real time to a cardiologist. Peter Bentley, inventor of the iStethoscope, sees diagnostic applications becoming more powerful and cheaper than traditional medical equipment, eventually putting an array of instruments in everyone's pockets. —*Trends in Brief, Jan-Feb 2010, p. 8*

● **Citizen scientists may play as big a role in curing breast cancer as multibillion-dollar drug companies.** Volunteers all over the world will connect online to work on a single problem, revolutionizing drug development. Open access will make it easier to share ideas, publish protocols and tools, verify results, rule out bad designs, communicate best practices, and more. —*Andrew Hessel, "Reinventing the Pharmaceutical Industry Without the Industry," Jan-Feb 2010, p. 19*

● **Genetically individualized medicines will lower the cost of drug development.** Synthetic biology, a genetic engineering technology founded on DNA synthesis that amounts to writing software for cells, will drop the cost of doing bioengineering by several orders of magnitude. —*Andrew Hessel, "Reinventing the Pharmaceutical Industry Without the Industry," Jan-Feb 2010, p. 20*

● **A vaccination may vanquish phobias.** In tests with goldfish at the University of Hiroshima, injections of the anesthetic lidocaine were found to temporarily steady heart rates, offering hope for helping humans overcome their irrational fears. —*Tomorrow in Brief, July-Aug 2010, p. 2*

● **Clinical treatment using advanced nanorobotic medicine could begin sometime during the 2020s.** Rather than prescribing drugs that have the same generic effects, doctors in the future will prescribe nanorobotic treatments that act with digital precision, have no side effects, and can report exactly what they did back to the physician. —*Robert A. Freitas Jr., "The Future of Nanomedicine," Jan-Feb 2010, p. 22*

● **Providing more safe places to play could reverse childhood obesity trends.** A lack of playgrounds within walking distance is part of the reason that two-thirds of American children now fall short of the recommended 60 minutes a day of physical activity, according to the nonprofit organization KaBOOM! The group re-

cently launched a campaign to honor imaginative ways that local groups have promoted play. —*World Trends & Forecasts, Jan-Feb 2010, p. 16*

● **Psychiatrists will treat character deficiency and acute lack of self-directedness instead of depression.** Mental-health doctors have plied patients with psychotropic drugs for decades to little effect, says Robert Cloninger of Washington University in St. Louis. Some people may just be genetically predisposed toward greater happiness. Where clinical treatment can make a difference, he says, is in enhancing patients' character development and self-directedness to achieve better overall life satisfaction. —*Tomorrow in Brief, Jan-Feb 2010, p. 2*

## INFORMATION SOCIETY

● **No more digital trails?** Communications technologies make it easy to blurt out words you immediately regret, so computer scientists at the University of Washington have created a way to put expiration dates on e-mail, chat messages, and Facebook postings. The system, dubbed Vanish, encrypts messages and spreads the data among different computers on file-sharing networks. As turnover occurs in the network, users take their portion of the encrypted key with them, rendering the message undecipherable. —*Tomorrow in Brief, Nov-Dec 2009, p. 2*

● **The written word could become obsolete by 2050.** The growth of Web surfing, Internet video, computer games, texting, and Twitter will lead to a significant global decline in text literacy, according to futurist William Crossman. This trend away from traditional reading, thinking, and research skills is likely to cause a shift toward more visually based media in the coming decades. Younger generations of users will be increasingly inclined to abandon older information technologies, including the written word, as new media are developed. —*Patrick Tucker, "The Dawn of the Postliterate Age," Nov-Dec 2009, p. 45*

● **Search engines will soon include spoken results, not just text.** Television broadcasts and other recordings could be compiled and converted using programs developed by the Fraunhofer Institute for Intelligent Analysis. As more people spend more time under the lenses of cameras and in the presence of microphones, and as more footage from those devices goes online, a spoken-word search engine could allow someone with a smart phone to look up any recorded conversation between two people that's occurred anywhere a microphone was present. —*World Trends & Forecasts, Jan-Feb 2010, p. 12*

● **New types of crimes will emerge as we spend more of our lives online.** Social networking sites and other online communities permit people to behave and misbehave in ways that mirror real life. Harassment, fraud, and other crimes that cause harm, whether physical, financial, or emotional, will proliferate online. Society and law enforcement will be forced to broaden the understanding of personal and institutional responsibility and of what are considered criminal acts. —*Eric Meade, "Scanning the Future of Law Enforcement: A Trend Analysis," July-Aug 2010, p. 23*

● **Heavy and prolonged reliance on the Internet for communication may degrade our ability to think.** Web surfing and "googling" are having neurological impacts that are observable and measurable, according to critic Nicholas Carr. While we may be more adept at finding what we're looking for, we are less able to reflect, synthesize, and analyze the content and its deeper meaning. "The more we use the Web, the more we train our brains to be distracted," he charges. —*Nicholas Carr, author of The Shallows, reviewed by Patrick Tucker, July-Aug 2010, p. 61*

## LIFESTYLES AND VALUES

● **More atheists will "come out of the closet" as society increasingly recognizes common values that transcend religion.** In 2020, most people will no longer regard religious ideas as beyond criticism. Respect for various gods will diminish, but respect for parents, teachers, and others who've accumulated knowledge should increase. As more of the 10% to 15% of the U.S. population who are atheists and agnostics confess their lack of religious beliefs to their friends, family, and neighbors, it will be difficult to hold to the claim that so many lack the ability to lead productive, moral lives. —*Roy Speckhardt, "Finding Faith in Humankind," Mar-Apr 2010, p. 37*

● **Religious practitioners will prefer to connect with one another in person, rather than just online.** Religious leaders will increasingly utilize the Internet and social networking technology to connect with people in need of spiritual counseling. However, more and more people will visit their priests, rabbis, and pastors in person because the technology will not be able to replace warm gestures from real, live human beings. —*Ayyā Gotamī, Dr. Rev. Prem Suksawat, "Nurturing the Spirit in the Age of the Web," Mar-Apr 2010, pp. 38-39*

● **Communities may build a better form of capitalism than corporations.** The growth of corporations and their power over the market economy may have left people feeling helpless in the face of the recent financial meltdown. In the future, communities could create their

own market economies and even their own currencies, such as “Life Dollars,” to strengthen local resources.

—Douglas Rushkoff, “Life Dollars: Finding Currency in Community,” *Sep-Oct 2010*, pp. 21-23

● **The millennial generation’s attitudes toward privacy and security will alter law enforcement’s strategies.**

In the United States, the millennial generation (those born approximately 1983–2002) are receptive to new technologies and have relatively few concerns about privacy issues. Law enforcement and security strategies using social networking or other techniques that others consider invasions of privacy may be more commonly accepted among this cohort. —Eric Meade, “Scanning the Future of Law Enforcement: A Trend Analysis,” *July-Aug 2010*, p. 23

● **Expect growing resentment toward a new class of genetic elites, or “genobles.”**

The use of genetic technologies could destabilize human civilization as the wealthy use enhancements to increase their advantages over have-nots, says medicine law researcher Maxwell J. Mehlman. The rise of genobility—i.e., genetic nobility—will require societies to set boundaries for emerging society-altering technologies. —*Tomorrow in Brief*, *Jan-Feb 2010*, p. 2

● **Breakthroughs in data storage could give music lovers 24/7 access to every song ever recorded.**

Whether the music is stored in a personal device like an iPod or in the “clouds” of third-party servers like Pandora will be complicated by an assortment of tricky economic and copyright issues. —*World Trends & Forecasts*, *Sep-Oct 2010*, p. 6



ABDULSATARID / DREAMSTIME.COM

## SCIENCE AND TECHNOLOGY

● **Quantum computing could make networks impervious to cyberattacks—or render them defenseless.**

The race to be the first to build a large quantum computer, or quantum network, is a matter of national security, according to computer scientist Dave Bacon of the University of Washington. The goal is to harness the behavior of particles at the quantum level to enable faster computation. This could allow governments (or other users) to break otherwise impervious encryption codes, as well as to reverse the process and create essentially unbreakable codes. —*World Trends & Forecasts*, *July-Aug 2010*, p. 6

● **The science of tipping points will show strange similarities between the functioning of the stock market, the Arctic, and the brain.** Many complex systems—including market exchanges, animal populations, and ecosystems—exhibit identifiable “early warning” behaviors prior to big disruptive shifts like crashes, according to a 2009 paper published in the journal *Nature*. The authors contend that the study of corollary warning signals across systems would benefit from more reliable statistical tools. —*World Trends & Forecasts*, *Jan-Feb 2010*, p. 7

● **Auto parts that store and release electricity could keep cars running continuously.**

The prototypes are made of a lightweight composite material that could make hybrid gasoline / electric vehicles lighter and more energy efficient, allowing motorists to travel longer distances between recharges. —*Future Scope*, *May-June 2010*, p. 4

● **New transportation systems are emerging that will lessen traffic congestion and accident risks.**

Interstate highways will feature lanes for cars and trucks controlled by computers. Robo-cars (small vehicles completely controlled by built-in artificial intelligence) will pick up elderly and disabled people in residential areas and take them to nearby supermarkets, doctor’s appointments, and wherever else they might like to go. —*McKinley Conway*, “Coming: The Biggest Boom Ever!” *May-June 2010*, pp. 20-23

## WORK AND CAREERS

● **Future leaders will be asked to manage super-performing, technologically enhanced employees.**

Leaders will bear much of the burden of social evolution when the “Enhanced Singular Individuals” (ESIs) of the Singularity Era enter the general population of “Norms” (those without technological enhancements). —*Barton Kunstler*, “The Singularity’s Impact on Business Leaders: A Scenario,” *Mar-Apr 2010*, p. 17

● **Super-automation may soon bring super-unemployment.**

The growing use of artificial intelligence to increase productivity in offices all across the developed world could result in dramatically increased unemployment, falling consumer demand, and a financial crisis surpassing the Great Depression, warns Silicon Valley entrepreneur Martin Ford. —*Martin Ford*, author of *The Lights in the Tunnel*, reviewed by *Patrick Tucker*, *Sep-Oct 2010*, p. 51

● **Middle skills will rise in importance.** Middle-skill workers ranging from carpenters to radiology technicians will be needed in the key industries benefiting from U.S. federal funding, such as construction, health

care, manufacturing, and transportation. In Rhode Island, more than 42% of job openings between 2006 and 2016 are projected to be middle-skill jobs, compared with 26% for low-skill and 32% for high-skill jobs.

—*World Trends & Forecasts, Jan-Feb 2010, p. 15*

● **The U.S. Hispanic population faces a retirement crisis.** Hispanic and Latino Americans have saved less for their future and are less likely to be covered by employer-sponsored retirement plans than their white counterparts, according to the Hispanic Institute. Hispanics are largely employed in the service-related fields that do not provide retirement plans or enough income for workers to save on their own. —*World Trends & Forecasts, Jan-Feb 2010, p. 17*

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● **The rise of workshop desks and “active work environments” will keep office workers healthier.** The Information Age has created an epidemic of slothful office workers. The Active Desk (a workspace incorporating a treadmill) and similar inventions aim to create a more physically demanding work environment that doesn't detract from knowledge workers' productivity. —*Tomorrow in Brief, Mar-Apr 2010, p. 2*

## WORLD AFFAIRS

● **Fighting the global threat of climate change could unite countries—or inflame rivalries.** Nations with more sophisticated environmental monitoring systems could use data to their advantage, perhaps weakening an enemy by failing to warn it of an oncoming storm or other catastrophe. —*Roger Howard, “The Politics of Climate Change,” Nov-Dec 2009, p. 25*

● **Future international diplomacy may increasingly focus on how to control the climate.** Some advocates believe geoengineering may become imperative by 2015. However, the deliberate manipulation of the Earth's natural systems in order to mitigate the effects of climate change is very difficult, and could carry dangerous unintended side effects. One result may be protests that lead to violence, especially if different regions have divergent results or demand incompat-

ible outcomes. —*Jamais Cascio, “The Potential and Risks of Geoengineering,” May-June 2010, pp. 27-28*

● **Will there be garbage wars in the future?** Increasing consumption in the developing world is leading to increasing waste, leaving less room for trash producers in the developed world to send their debris. After about 2025, developing countries will likely close their doors to foreign waste, forcing the developed world to refine waste-to-energy and recycling technologies. —*Marvin J. Cetron and Owen Davies, “Trends Shaping Tomorrow's World: Forces in the Natural and Institutional Environments,” July-Aug 2010, p. 43*

● **Equipment donations may unintentionally increase pollution in the developing world.** Recycling old equipment by sending it to the developing world can be bad for the environment in the receiving countries. These older technologies tend to be more polluting than newer, more-efficient manufacturing equipment. —*Future Scope, May-June 2010, p. 4*

● **Untangling the legal issues related to the environment will fall to specialized lawyers, judges, and courts.** Air and water pollution and other environmental issues cross international borders, complicating the regulatory and enforcement landscape. Environmental courts could help countries ensure healthier social and environmental futures, according to University of Denver law professor George Pring. —*World Trends & Forecasts, Sep-Oct 2010, p. 10*

● **Global youth population will grow from 3 billion now to 3.5 billion by 2020.** Half a billion of the world's population under age 25 live on less than \$2 a day, according to the United Nations. As growing numbers of youth are “at risk” in some way—whether joining gangs, becoming addicted to drugs, or falling prey to the sex trade—new approaches will be needed to ensure better futures. Leading law enforcement experts recommend programs such as parent education, mentoring, nonviolent conflict resolution, character education, and community-school partnerships, as well as supporting the UNICEF-sponsored International Convention on the Rights of the Child. —*Gene Stephens, “Youth at Risk: A New Plan for Saving the World's Most Precious Resource,” July-Aug 2010, pp. 16-21*

● **The balance of economic power is shifting from West to East.** If Asian economic growth leads to more people pursuing the West's consumerist lifestyles, strains on global resources and the environment will accelerate, a diplomat and scholar warns. A more-sustainable future may be found in a return to traditional Asian values that eschew materialism. —*Joergen Oerstroem Moeller, “Asia Redraws the Map of Progress,” Sep-Oct 2010, pp. 14-19*



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