



Executive Summary

Although the future has been getting better for most of the world over the past 20 years, the global recession has lowered the State of the Future Index for the next 10 years. Half the world appears vulnerable to social instability and violence due to increasing and potentially prolonged unemployment from the recession as well as several longer-term issues: decreasing water, food, and energy supplies per person; the cumulative effects of climate change; and increasing migrations due to political, environmental, and economic conditions.

The good news is that the global financial crisis and climate change planning may be helping humanity to move from its often selfish, self-centered adolescence to a more globally responsible adulthood. The G-20 is improving international financial regulations, market supervision, and accounting rules, and has brokered massive stimulus packages to prevent the world from falling into even deeper global financial crises. The December 2009 climate change conference in Copenhagen has focused attention around the world on the practical details of how to address climate change. World leaders in politics, business, academia, NGOs, and international organizations are increasingly cooperating. Many perceive the current economic disaster as an opportunity to invest in the next generation of greener technologies, to rethink economic and development assumptions, and to put the world on course for a better future.

After 13 years of the Millennium Project's global futures research, it is increasingly clear that the world has the resources to address its challenges. Coherence and direction has been lacking. But recent meetings of the U.S. and China, as well as of NATO and Russia, and the birth of the G-20 plus the continued work of the G-8 promise to improve global strategic collaboration. It remains to be seen if this spirit of cooperation can continue and if decisions will be made on the scale necessary to really address the global challenges discussed in this report.

According to the IMF, the World Bank, and OECD, the world economy should begin to grow again toward the beginning of 2010, but at a slower pace than during the past several years. If it is true that more complex systems tend to be more resilient than less complex ones, and that the world has increased in complexity since the Great Depression, the ability for the global economy to recover should be better today than in the past.

Meanwhile, the vast majority of the world is living in peace, conflicts actually decreased over the past decade, cross-cultural dialogues are flourishing, and intra-state conflicts are increasingly being settled by international interventions. By mid-2009 there were 15 conflicts with 1,000 or more deaths per year—one more than in 2008. These occurred in Africa (4), Asia (4), the Americas (2), and the Middle East (4), with 1 conflict classified as worldwide anti-extremism. A

pending unknown is whether Iran and North Korea will trigger a nuclear arms race. Another more distant specter, but possibly even a greater threat, is that of single individuals acting alone to create and deploy weapons of mass destruction, such as new diseases for biological weapons or super viruses to bring down the Internet. These present unprecedented difficulties in deterrence. It used to be a religious ideal that the welfare of anyone is the welfare of all, but with such potential massive threats from single individuals, this ideal may be the most practical attitude to take to help prevent individuals from growing up to be such threats. Networks of nanotech sensors for chemical, biological, and radiological traces can help, but they cannot eliminate these threats.

In the meantime, the world is beginning to wake up to the enormity of the threat of transnational organized crime. The UN Office on Drugs and Crime has called on all states to develop coherent national strategies to counter international organized crime as a whole. Interpol held its 38th European Regional Conference developing a European strategy. The 2009 G-8 meeting of justice and home affairs ministers explored global strategies, noting the increasing linkage between terrorism and organized crime. The U.S. opened the International Organized Crime Intelligence and Operations Center in June 2009. Meanwhile, transnational organized crime continues to expand in the absence of a comprehensive, integrated global counter-strategy. Its global income is estimated to be about \$3 trillion, which is twice all the military budgets of the world combined.

Freedom House's 2009 survey found that democracy and freedom have declined for the third year in a row, and press freedoms declined for the seventh year in a row. It estimates that only 17% of the world's population lives in 70 countries with a free press, while 42% lives in 64 countries that have no free press. The number of countries rated "free" declined by one from the previous year's survey. Nevertheless, over the past three decades democracy grew rapidly: countries rated "free" increased from 47 to 89 (representing 46% of the world's population); those "partly free" increased from 56 to 62; and those "not free" decreased from 55 to 42 (representing 34% of world's population). Democratic forces will have to work harder to make sure that the short-term reversals do not stop the longer-term trend of democratization.

Although government and business leaders are beginning to respond more seriously to the global environmental situation, it continues to get worse. Each day, the oceans absorb 30 million tons of CO₂, increasing their acidity. The number of dead zones—areas with too little oxygen to support life—has doubled every decade since the 1960s. The oceans are warming about 50% faster than the IPCC reported in 2007. The amount of ice flowing out of Greenland during the summer of 2008 was nearly three times more than that lost during the previous year. Arctic summer ice could be gone by 2030, as could many of the major Himalayan, European, and Andean glaciers. Over 36 million hectares of primary forest are lost every year. Human consumption is 30% larger than nature's capacity to regenerate, and demand on the planet has more than doubled over the past 45 years. This growth continues as, for example, more cars are expected to be produced in China in 2009 than in the U.S. or Japan.

Some environmental forces have been pushing for a U.S.–China 10-year Apollo-like goal with a global energy/environment R&D program. This is not only important for the environment; it is also a strategy to increase the likelihood of international peace. Without some G-2 agreement, it

will be difficult to get the kind of global coherence necessary to address climate change seriously. Politicians are arguing that a ceiling of 450 ppm CO₂ is the best agreement possible, but our atmosphere has 390 ppm of CO₂ now, and glaciers are already melting, polar caps are thinning, insects are migrating, disease patterns have been altering, and temperatures have been rising. A leading NASA climatologist argues that we should reduce atmospheric CO₂ to 350 ppm to avoid hitting a point of no return for global warming. We know more about how to move the peak year for GHG emissions closer to the present than rocket pioneer Werner von Braun knew how to land a man on the moon when President Kennedy announced that famous 10-year goal.

Scientific and technological progress continues to accelerate. IBM has promised a computer at 20,000 trillion calculations per second by 2011, which is estimated to be the speed of the human brain. Genetic code is being written to create new life forms such as plants that emit hydrogen instead of oxygen. Synthetic chromosomes have been created from laboratory chemicals. Nanomedicine may one day rebuild damaged cells atom-by-atom, and nanotech robots moving through arteries may destroy plaque, pathogens, and cancer. Just as the world was surprised by the impact of the Internet, so too the world may well be surprised by the coming impacts of nano-synthetic biology in prolonging life. Even though the global economy is slowing, global R&D for 2009 is expected to be 3.2% higher than last year. The acceleration of S&T innovations from improved instrumentation, communications among scientists, and synergies among nanotechnology, biotechnology, information technology, cognitive science, and quantum technology continues to fundamentally change the prospects for civilization. Yet the risks from acceleration and globalization of S&T are enormous. We need a global collective intelligence system to track S&T advances, forecast consequences, and document a range of views so that politicians and the public can understand the potential consequences of new S&T and have antidotes prepared in advance for highly negative impacts despite their low probability.

World energy demand could nearly double by 2030, with China and India accounting for over half of the increase. China uses more coal than the U.S., EU, and Japan combined, but it now has a policy to close an old coal plant for each new cleaner burning plant that turns coal into a gas before burning it. Without major policy and technological changes, fossil fuels will meet 80% of primary energy demand by 2030. If so, then large-scale carbon capture, storage, and/or reuse should become a top priority to reduce global climate change. For the first time, during 2008 the majority of the increase in U.S. and EU electrical production came from renewable sources instead of fossil or nuclear sources. New investment in renewable energy reached \$120 billion in 2008, up 16% over the previous year despite the credit crunch. Japan claimed it will have a solar power satellite system wirelessly transmitting energy to its electric grids on Earth by 2030. Electricity was wirelessly transmitted 148 kilometers between two Hawaiian islands by a U.S. firm in 2008.

In March 2009 an asteroid missed Earth by 77,000 kilometers, 80% closer to the planet than our moon is. If it had hit Earth, it would have wiped out all life on 800 square kilometers. No one knew it was coming. The time between its discovery and close approach was very short. Few people knew the global financial crisis was coming; fewer still forecast its breadth and depth. We need global, national, and local systems for resilience—the capacities to anticipate, respond, and recover from disasters while identifying future technological and social innovations and

opportunities. The acceleration of change reduces the time from recognizing the need to make a decision to completing all the steps to make the right decision. The number and intricacy of choices seem to be growing beyond leaders' abilities to analyze and make decisions. For example, do we have the right to clone ourselves, or to rewrite genetic codes to create thousands of new life forms, or to genetically change ourselves and future generations into new species? Some experts speculate that the world is heading for a "singularity"—a time in which technological change is so fast and significant that we today are incapable of conceiving what life might be like beyond the year 2025.

Fortunately, we have the means for many people to know the world as a whole, identify global improvement systems, and seek to improve such systems—hence accelerating the improvements of our global situation. We are the first generation to act via Internet with like-minded individuals around the world. We have the ability to connect the right ideas to resources and people to help address global and local challenges. This is a unique time in human history. Mobile phones, the Internet, international trade, language translation, and jet planes are giving birth to an interdependent humanity that can create and implement global strategies to improve the prospects for humanity.

Nearly 25% of humanity is connected to the Internet. There are more people using the Internet in China than the total population of the U.S. Mobile phones are becoming handheld computers.

Humanity, the built environment, and ubiquitous computing seem destined to become so interconnected that collective intelligences with "just-in-time knowledge" will emerge for improving civilization. With an increasingly educated world and the majority of humanity connected to the Internet over the next 20 years, new forms of political power may emerge, growing beyond the control of traditional hierarchical structures.

The world's population is 6.8 billion. It is expected to grow to 9.2 billion by 2050, but it could shrink by 2100, creating a world with many elderly people. Nearly all the population increases will be in developing countries; hence, today's first world will be tomorrow's elderly world. Today, 18 countries have falling populations, which could increase to 44 countries by 2050. The vast majority of them will be in Europe. Scientific and medical breakthroughs over the next 50 years are likely to change these forecasts, giving people longer and more productive lives than most would believe possible today. Meanwhile, nearly a billion people are undernourished, lack safe water, and have the highest birth rates. Without substantial policy and technological changes, there could be 3 billion people by 2025 without adequate water due to climate change, population growth, and increasing demand for water per capita. The implications for migration and conflict are enormous.

Infectious diseases are the second leading cause of death worldwide. About half the people in the world are at risk of several endemic diseases. More than 42 million people are living with HIV/AIDS, and 74% of these infected people live in sub-Saharan Africa. For the first time in 40 years, WHO declared a pandemic: the H1N1 influenza (swine flu) rapidly infected 60,000 people in nearly half the countries of the world, resulting in 263 deaths between April and June 2009. Over the past 40 years, 39 new infectious diseases have been discovered. In the last five years, more than 1,100 epidemics have been verified, and we face 20 drug-resistant "superbugs,"

including deadly skin infections (MRSA). Old diseases have reappeared. Massive urbanization, increased encroachment on animal territory, and concentrated livestock production could trigger new pandemics. Climate change is altering insect and disease patterns. New kinds of diseases may accidentally come from future synthetic biology laboratories unless new international regulations for laboratories are created and enforced.

Major development assistance grew to \$119.8 billion in 2008 and a projected \$145.1 billion in 2010 even in the face of the global recession. The financial crisis and recession has stimulated the G-8, G-20, and others to rethink the basic assumptions of economics, finance, and trade-led development strategies. The worldwide trend of poverty reduction continues, but at a slower rate due to the global recession and higher food, fuel, and commodity prices. Although remittance flows to poorer countries have more than doubled since 2002, they are likely to fall substantially this year. About 1 billion people live on just \$1.25 a day. As humanity and its technology become a continuum, simultaneous knowing or just-in-time knowledge seems inevitable, making more people in the knowledge-oriented world more successful.

Women have been making slow but steady increases in political and economic decision making around the world. The ratio of women in national parliaments has increased from 13.8% in 2000 to 18.4% in 2009. Women account for over 40% of the world's workforce but earn less than 25% of the wages and own only 1% of the assets. WHO reports that after diseases and hunger, violence against women is the greatest cause of death among women.

Progress in more ethical decisionmaking may also have been making slow but steady progress. Over 5,000 businesses in 130 countries have joined the UN's Global Compact to use global ethics in decisionmaking. The International Criminal Court has successfully tried political leaders. News media, blogs, mobile phone cameras, ethics commissions, and NGOs are increasingly exposing unethical decisions and corrupt practices. Collective responsibility for global ethics in decisionmaking is embryonic but growing. Corporate social responsibility programs, ethical marketing, and social investing are increasing. Global ethics also are emerging around the world through the evolution of ISO standards and international treaties that are defining the norms of civilization.

Yet each year over \$1 trillion is paid in bribes, most of the annual 50 million tons of e-waste is dumped in developing countries, and 12–27 million people are slaves today. Refugees, internally displaced people, and asylum seekers dropped by 700,000 in 2008 to 42 million, but will increase in 2009 due to 2 million displaced people in northwestern Pakistan and others in Sri Lanka and Somalia. Too many greedy and deceitful decisions led to a world recession and demonstrated the international interdependence of economics and ethics. Improved systems to increase integrity, financial transparency, and accountability are being developed by governments and international organizations. All these and other global challenges are presented in Chapter 1 of this print edition, while more detailed information is available in Chapter 1 of the attached CD.

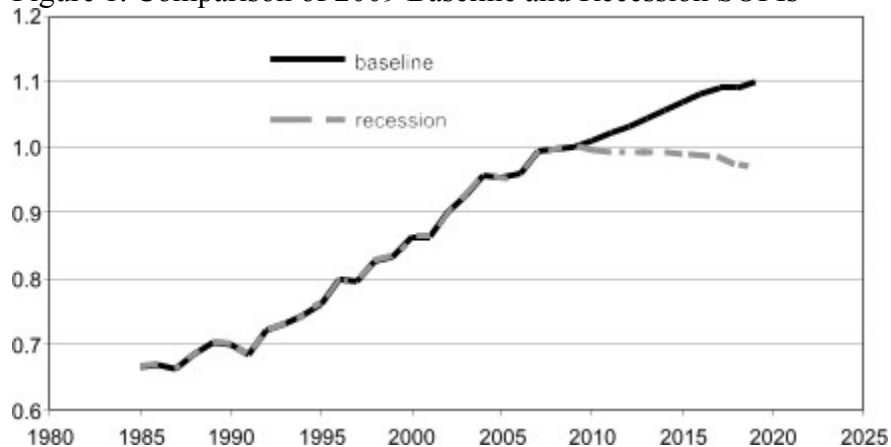
State of the Future Index

How will the world recession change the future over the next 10 years compared with what it would have been like? Chapter 2 addresses that question. Two State of the Future Indexes are presented; one without the recession and one based on an extended recession. As revealed by Figure 1, the difference is quite striking.

SOFI is a technique that combines 28 variables that indicate the overall outlook for the next 10 years. The variables that improved in the past two decades and are estimated to continue improving despite pressures of the recession (although many at a slower rate than in the past) are:

- Literacy rate, adult total (percent of people aged 15 and above)
- School enrollment, secondary (percent gross)
- Countries having or thought to have plans for nuclear weapons (number)
- GDP per unit of energy use (constant 2000 PPP \$ per kg of oil equivalent)
- Number of major armed conflicts (number of deaths >1,000)
- Population growth (annual percent)
- Physicians (per 1,000 people)
- Internet users (per 1,000 population)
- Infant mortality (deaths per 1,000 births)
- Life expectancy at birth (years) (but possibly leveling off)
- Women in parliaments (percent of all members)

Figure 1. Comparison of 2009 Baseline and Recession SOFIs



Future Economic Elements to Improve the Human Condition

With increasing global interdependence and the speed of change, even greater economic disasters may be possible than the one the world is experiencing today. If so, can such future disasters be prevented or reduced? Could this be the tipping point for new systems to be created? Capitalism and socialism are early industrial-age systems. Surely new systems are possible. Are there elements or attractors that might make it possible for the emergence of new economic systems to benefit humanity?

Chapter 3 shares the views of an international panel selected by The Millennium Project Nodes around the world to explore such potential economic elements via a Real-Time Delphi questionnaire. Literature searches, interviews, feedback from the Project's Planning Committee, and group discussions generated a list of 35 elements (not policies, events, developments, or goals) that might help shape changes in the economic system over the next 20 or so years.

The new elements do not have to replace previous elements, just as the industrial age did not replace agriculture. Each element could be the subject of a book, but for the purposes of this study, the descriptions were presented as very simple statements. The elements receiving the highest average ratings from the international panel for beneficial impacts for the future of humanity were:

- Ethics a key element in most work relations and economic exchanges
- New GNP/GDP definitions that include all forms of national wealth: e.g., energy, materials, ecosystems, social and human capital
- Global commons—air, climate, oceans, biodiversity (bees necessary for agriculture, etc.)—supported by international agreements among countries for very small (less than 1%) tax on selected categories, including currency trading and international travel; the funds collected would amount to several hundred billion per year for global public goods
- Collective intelligence—global commons for the knowledge economy
- On-line and in-classroom educational systems that continually update curriculum on the evolving economic system and its elements.

The study generated a broad range of views. The highest level of agreement among the participants was about the role of collective intelligence in the knowledge economy. The greatest amount of disagreement—getting nearly equal number of high and low ratings—was over the following five items:

- Global mechanisms for automatic financial stabilization; e.g., international convention for an automated system (expert software) to make financial policy changes as economic conditions change, conducted initially in larger economic countries
- Single global currency
- Artificial life—as computers were a key element in the information economy, so too artificial life might be a key to the next economy
- Internationalization of labor unions
- Labels on financial instruments, something like nutrition labels on food.

Real-Time Delphi Studies

The Millennium Project also helped several organizations over the past year collect judgments around the world using its Real-Time Delphi online software. The RTD is a relatively new and efficient method for collecting and synthesizing expert opinions. The original Delphi technique was developed by the RAND Corporation in the late 1950s. Although it has produced many valuable insights, it requires multiple rounds of questionnaires that can take months to complete. The big advantage of the RTD is that it is a “roundless” Delphi. There is no need for an explicit second round. The respondents participate by filling out an online questionnaire, and the results—both numerical and qualitative—are updated as responses are recorded in “real time.” Respondents can—and are encouraged to—revisit the questionnaire as many times as they want. Each time, they are shown their own responses as well as the updated answers of the others, and they can revise and change their own inputs.

Chapter 4 shares some results from RTD studies conducted for other organizations: the World Bank supported a review of the Resource Allocation Framework of the Global Environmental Facility; UNESCO used it for initial planning for the United Nations World Water Development Report; Peru’s Energy and Mining Supervisory Agency explored possibilities for the 10-year future of electricity; Millennia 2015 assessed developments and policies to improve the status of women; and the World Federation of UN Associations studied current relevance and issues of the Universal Declaration of Human Rights.

Futures Research Methodology Version 3.0

With funding from the Rockefeller Foundation, The Millennium Project produced *Futures Research Methodology Version 3.0*. It is the largest, most comprehensive, internationally peer-reviewed collection of methods to explore the future ever assembled. Chapter 5 introduces this resource to the public. The collection has 39 chapters totaling nearly 1,300 pages and is available on a CD. Each chapter follows a similar outline:

1. Short overview of the method’s history
2. Description of its primary and alternative usages
3. How to do it
4. Strengths and weaknesses
5. Use in combination with other methods
6. Speculations about the future evolution of the method

Some chapters also contain appendices with examples of applications of the method, software for applying the methods, and sources for further information. Over half of the chapters were written by the method’s inventor or by a significant contributor to its evolution.

The purpose of futures research methodology is to systematically explore, create, and test both possible and desirable futures to improve decisions. It includes analysis of how those conditions might change as a result of the implementation of policies and actions. Futures research can be

directed to large- or small-scale issues in the near or distant future; it can project possible or desired conditions. Its methods can be highly quantitative or qualitative.

The value of futures research is less in forecasting accuracy than in focusing attention, planning, and opening minds to consider new possibilities and in changing the policy agenda. The goal is not to know the future precisely but to understand a range of possibilities that lead to better decisions.



Emerging International Environmental Security Issues

The scope and scale of the effects of climate change—ranging from changes in weather patterns to loss of livelihoods and disappearing states—has unprecedented implications for political and social stability. Global strategies are needed to address anthropogenic causes of climate change and increasingly catastrophic environmental deterioration. International military and civilian collaboration is necessary to create adaptation policies and mechanisms to reduce potential environmentally induced conflicts.

Environmental diplomacy and environmental considerations are increasingly integrated into conflict prevention and peacekeeping efforts as well as international efforts for confidence building. Nontraditional security issues—including environment, migration, and social development—have become standard considerations in security planning. Since it is well understood that environmental security cannot be addressed by any nation alone, military strategies and geopolitics are being reshaped around complex issues and within multilateral frameworks. Increasingly powerful sensors around the world connected by satellites and advancing software improve the ability to identify environmental threats and crimes. Hence, the capacities of international institutions to implement current legal agreements and make new and more powerful legal instruments are being strengthened. As a result, environmental damages that people and organizations got away with in the past are less likely to escape detection and punishment in the future.

The Millennium Project defines environmental security as environmental viability for life support, with three sub-elements:

- preventing or repairing military damage to the environment
- preventing or responding to environmentally caused conflicts
- protecting the environment due to its inherent moral value

Chapter 6 presents a summary of recent events and emerging environmental security–related issues organized around this definition. Over the past several years, with support from the U.S. Army Environmental Policy Institute, The Millennium Project has been scanning a variety of sources to produce monthly reports on emerging environmental issues with potential security or treaty implications. More than 300 items have been identified during the past year and over 1,500 items since this work began in August 2002. The full text of the items and their sources can be found in the CD Chapter 9.1, “Emerging Environmental Security Issues.” and in the

monthly reports on the Millennium Project's Web site, www.millennium-project.org (under "What's New," select "International Environmental Security Issues"). Other Millennium Project studies related to environmental security are included in Chapter 9 on the CD and are available at www.millennium-project.org (under "Books and Reports," select "Special Studies").



This year's annual State of the Future is an extraordinarily rich distillation of information for those who care about the world and its future. There are many answers to many problems, but we are flooded with so much extraneous information every day that it is difficult to identify and concentrate on what is truly relevant. Since healthy democracies need relevant information, and since democracy is becoming more global, the public will need globally relevant information to sustain this trend. We hope the annual State of the Future reports can help provide such information.

The insights in this thirteenth year of The Millennium Project's work can help decisionmakers and educators who fight against hopeless despair, blind confidence, and ignorant indifference—attitudes that too often have blocked efforts to improve the prospects for humanity. Ridiculing idealism is shortsighted, but idealism without the rigors of pessimism is misleading. We need very hardheaded idealists who can look into the worse and best of humanity and can create and implement strategies of success.

