

Executive Summary

The world is improving better than most pessimists know, but future dangers are worse than most optimists indicate. After 16 years of The Millennium Project's global futures research, it is clear that there is more agreement about how to build a better future than is evident in the media. When you consider the many wrong decisions and good decisions not taken—day after day and year after year around the world—it is amazing that we are still making as much progress as we are.

This year's report verifies that the world is getting richer, healthier, better educated, more peaceful, and better connected and that people are living longer, yet half the world is potentially unstable. Protesters around the world show a growing unwillingness to tolerate unethical decisionmaking by power elites. An increasingly educated and Internet-connected generation is rising up against the abuse of power. Food prices are rising, water tables are falling, corruption and organized crime are increasing, environmental viability for our life support is diminishing, debt and economic insecurity are increasing, climate change continues, and the gap between the rich and poor continues to widen dangerously. However, extreme poverty has fallen from 52% in 1981 to about 20% in 2010.

It is increasingly clear that the world has the resources to address its challenges. It is also increasingly clear that the current decisionmaking structures are not making good decisions fast enough and on the scale necessary to really address the global challenges. The Rio+20 UN Conference on Sustainable Development energized many of the leaders from NGOs, corporations, universities, and municipalities to synergize their efforts without waiting for national government action. New forms of collaborative action are beginning to emerge from self-organizing Arab Spring/Awakenings to websites like makerbot.com and adafruit.com, which share open-source 3D printer programs for individuals to be local manufacturers, and other websites for political people power websites like avaaz.org. Public-private partnerships and coalitions of the willing have formed to fight disease and poverty and to create a smarter planet. Information and communications systems from simple mobile phones to supercomputers are augmenting human decisionmaking around the world. It is reasonable to assume that the accelerating rates of these changes will eventually connect humanity and technology into new kinds of decisionmaking with global real-time feedback.

But history has taught us that good ideas and technologies can have unintended and negative consequences. These capabilities will eventually make it possible for a single individual acting alone to make and deploy a bioweapon of mass destruction and for organized crime to become far more powerful than today—when its combined income is already twice that of all the military budgets combined. These and other dangerous future possibilities discussed in Chapter 1 are not inevitable; there are many excellent solutions being pursued and making great progress, unbeknownst to the general public. Every year, The Millennium Project updates data about the global situation and prospects for the future, with most of the data updates going slowly but surely in a positive direction. Nevertheless, the world is in a race between implementing ever-increasing ways to improve the human condition and the seemingly ever-increasing complexity and scale of global problems.

So, how is the world doing in this race? What's the score so far? A review of the trends of the 28 variables used in The Millennium Project's global State of the Future Index provides a score card on humanity's performance in addressing the most important challenges. (See Box 1.)

An international Delphi panel selected over a hundred indicators of progress or regress for the 15 Global Challenges in Chapter 1. Variables were then chosen that had at least 20 years of reliable historical data. The resulting 28 variables were submitted to an international panel selected by The Millennium Project Nodes to forecast the best and worst value for each variable in 10 years. The results were integrated into the State of the Future Index's 10-year projection. Chapter 2 presents a summary of this research. SOFIs can also be created for countries or sectors.

Box 1

Where are we winning?

- Access to water
- Literacy rate
- Life expectancy at birth
- Poverty \$1.25 a day
- Infant mortality
- Wars
- HIV prevalence
- Internet users
- GDP/capita
- Women in parliaments
- School enrollment, secondary
- Energy efficiency
- Population growth
- Undernourishment prevalence
- Nuclear proliferation

Where are we losing?

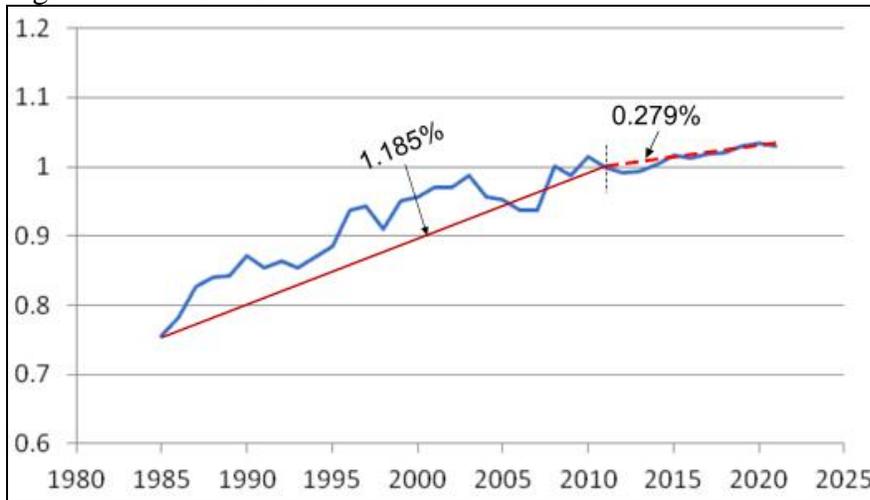
- Total debt
- Unemployment
- Income inequality
- Ecological footprint / biocapacity ratio
- GHG emissions
- Terrorist attacks
- Voter turnout

Where there is no significant change or change is not clear?

- Corruption
- Freedom rights
- Electricity from renewables
- Forest lands
- R&D expenditures
- Physicians per capita

The 2012 SOFI in Figure 1 shows that the 10-year future for the world is getting better—but at a slower rate of improvement than over the past 20 years. However, in many of the areas where we are winning we are not winning fast enough, such as reductions in HIV, malnutrition, debt, and nuclear proliferation. And areas of uncertainty represent serious problems: corruption, political freedom, fossil fuel consumption, and forest cover. Some of the areas where we are losing could have quite serious impacts, such as unemployment, greenhouse gas emissions, debt, income gaps, and terrorism. Nevertheless, this selection of data indicated that 10 years from now, on balance, will be better than today. We are winning more than we are losing.

Figure 1 The 2012 State of the Future Index



Some Factors to Consider

The world is warming faster than the latest IPCC projections. According to NOAA, the first six months of 2012 were the hottest in the U.S. since record-keeping began in 1895. The U.S. is also experiencing the worst drought in 56 years, cutting its corn and soybean production, which is expected to increase world food prices. Total human-induced GHG emissions are about 49.5 gigatons of CO₂ equivalent per year. Nature absorbs about half of this annually, but its ability to do that is diminishing. Global ecosystem services are being depleted faster than nature can resupply. Glaciers are melting, polar ice caps are thinning, and coral reefs are dying. Rapid population and economic growth over the past hundred years has reduced environmental viability for life support; the impact over the next hundred years could be far greater. It is time for a U.S.–China Apollo-like 10-year goal and global R&D program to address climate change. These two countries are the greatest emitters of GHGs and have the largest economies.

Over 2 billion people gained access to improved drinking water since 1990, but 783 million people still do not have such access. However, water tables are falling around the world, 40% of humanity gets water from sources controlled by two or more countries, and global water demand could be 40% more than the current supply. The slow but steady Himalayan meltdown is one of the greatest environmental security threats in Asia. Its mountains contain 40% of the world's freshwater, which feeds 40% of humanity via seven great Asian rivers. Breakthroughs in desalination—such as pressurization of seawater to produce vapor jets, filtration via carbon nanotubes, and reverse osmosis—are needed along with less costly pollution treatment and better water catchments. Future demand for freshwater could be reduced by saltwater agriculture on coastlines, hydroponics, aquaponics, vertical urban agriculture installations in buildings, production of pure meat without growing animals, increased vegetarianism, fixes for leaking pipes, and the reuse of treated water.

World population is expected to grow another 2 billion in just 38 years, creating unprecedented demand for resources. Most of that growth will be in low-income urban Asia. Today Asia has 4.2 billion people and is expected to grow to 5.9 billion by 2050. By 2030, the global middle class is

expected to grow by 66%—about 3 billion more consumers with increased purchasing power and expectations. Population dynamics are changing from high mortality and high fertility to low mortality and low fertility. The world's fertility rate has fallen from 6 children in 1900 to 2.5 today. If fertility rates continue to fall, world population could actually shrink to 6.2 billion by 2100, creating an elderly world difficult to support. Today life expectancy at birth is 68 years, which is projected to grow to 81 by 2100. By 2050 there could be as many people over 65 as there are under 15, requiring new concepts of retirement. Scientific and medical breakthroughs are likely over the next 20–30 years that could give many people longer and more productive lives than most would believe possible today. People will work longer and create many forms of self-employed tele-work, part-time work, and job rotation to reduce the economic burden on younger generations and to maintain living standards. If new concepts of employment are not invented, increased political instability seems inevitable.

Current demographic shifts and improved education, compounded by economic volatility, increase demands for more transparent democratic systems. Although democracy has been growing for over 20 years, Freedom House reports that political and civil liberties declined in 2011 for the sixth consecutive year. New democracies must address previous abuses of power to earn citizens' loyalties without increasing social discord, slowing the reconciliation process, and reducing human rights. An educated and correctly informed public is critical to democracy; hence, it is important to learn how to counter and prevent various ideological disinformation campaigns, information warfare, politically motivated government censorship, reporters' self-censorship, and interest-group control over the Internet and other media, while reinforcing the pursuit of truth.

Humanity needs a global, multifaceted, general long-term view of the future with long-range goals to help it make better decisions today to build a brighter future. Attaining such long-range goals as landing on the moon or eradicating smallpox that were considered impossible inspired many people to go beyond selfish, short-term economic interests to great achievements. Short-term, selfish economic decisionmaking has led to many problems, ranging from the Euro crisis to the political stalemate in Washington and insufficient actions from Rio+20. The options to create and update national, global, and corporate strategic foresight are so complex and are changing so rapidly that it is almost impossible for decisionmakers to gather and understand the information required to make and implement coherent policy. At the same time, the consequences of incoherent policies are so serious that new systems for collective intelligence are needed to improve resilience.

Over 2 billion Internet users, 6+ billion mobile phone subscriptions, and uncountable billions of hardware devices are intercommunicating in a vast real-time multi-network, supporting every facet of human activity. The race is on to complete the global nervous system of civilization. Ericsson forecasts that 85% of the world's population will be covered by high-speed mobile Internet in 2017. Humanity, the built environment, and ubiquitous computing are becoming a continuum of consciousness and technology reflecting the full range of human behavior, from individual philanthropy to organized crime. New forms of civilization will emerge from this convergence of minds, information, and technology worldwide.

Assuming no new European crisis and that Europe's recession will only shrink their economy - 0.3%, IMF estimates that the world economy will grow at 3.5% in 2012. With world population growth at 1%, humanity will get about 2.5% wealthier by traditional standards. According to the World Bank, extreme poverty (\$1.25/day) has fallen from 1.94 billion people (52% of the world) in 1981 to 1.29 billion (about 20%) in 2010, while world population increased from 4.5 billion to nearly 7 billion during the same time. At this rate, however, about 1 billion people might still be living in extreme poverty in 2015. World unemployment grew to 9% in 2011 from 8.3% in 2010. The landscape of geo-economic power is changing rapidly as the influence of BRIC and other emerging economies as well as of multinational enterprises is rising. Lower- and middle-income countries with surplus labor will be needed in higher-income countries with labor shortages. This could continue the brain drain problem, yet online computer matching systems can connect those overseas to the development process back home. The world needs a long-term strategic plan for a global partnership between rich and poor. Such a plan should use the strength of free markets and rules based on global ethics.

The health of humanity continues to improve. The incidence of infectious diseases is falling, as is mortality from such diseases as malaria, measles, and even HIV/AIDS. New HIV infections declined 21% over the past 12 years, and AIDS-related deaths dropped by 19% between 2004 and 2010. The U.S. Food and Drug Administration approved Truvada, the first drug approved to reduce the risk of HIV infection in uninfected individuals. However, a new infectious disease has been discovered each year over the past 40 years, 20 diseases are now drug-resistant, and old diseases have reappeared, such as cholera, yellow fever, plague, diphtheria, and several others. In the last six years, more than 1,100 epidemics have been verified. International collaboration to reduce HIV, SARS, and H1N1 (swine flu) has built better global health systems. The dramatic improvements in health and medical services over the past 20 years could be reduced by the ongoing economic problems that are cutting health budgets around the world. The global public debt is about \$40 trillion, while the world's GDP in 2012 is about \$80 trillion (PPP). Bill Gates and others supporting health programs are pleading with G20 governments to keep their pledges of \$80 billion annually from 2015 onward to create a healthier world. Because the world is aging and increasingly sedentary, cardiovascular disease is now the leading cause of death in the developing as well as the industrial world. However, infectious diseases are the second largest killer and cause about 67% of all preventable deaths of children under five (pneumonia, diarrhea, malaria, and measles). Nevertheless, over the last 20 years 30% fewer children under five are dying. Mortality from infectious disease fell from 25% in 1998 to less than 16% in 2010.

The acceleration of change and interdependence, plus the proliferation of choices and the growing number of people and cultures involved in decisions, increase uncertainty, unpredictability, ambiguity, and surprise. This increasing complexity is forcing humans to rely more and more on expert advice and computers. Just as the autonomic nervous system runs most biological decisionmaking, so too are computer systems increasingly making the day-to-day decisions of civilization. The acceleration of change reduces the time from recognition of the need to make a decision to completion of all the steps to make the right decision. As a result, many of the world's institutions and decisionmaking processes are inefficient, slow, and ill informed. Institutional structures are not anticipating and responding quickly enough to the acceleration of change; hence, social unrest is likely to continue until new structures provide better management. This may also trigger a return to the city and subregional cooperation as the

locus of policy leadership and management. Today's challenges cannot be addressed by governments, corporations, NGOs, universities, and intergovernmental bodies acting alone; hence, transinstitutional decisionmaking has to be developed, and common platforms have to be created for transinstitutional strategic decisionmaking and implementation.

Although the vast majority of the world is living in peace, half the world continues to be vulnerable to social instability and violence due to growing global and local inequalities, falling water tables, increasing energy demands, outdated institutional structures, inadequate legal systems, and increasing costs of food, water, and energy. In local areas of worsening political, environmental, and economic conditions, increasing migrations can be expected, which in turn can create new conflict. Add in the future effects of climate change, and there could be up to 400 million migrants by 2050, further increasing conditions for conflict. Yet the probability of a more peaceful world is increasing due to the growth of democracy, international trade, global news media, the Internet, NGOs, satellite surveillance, better access to resources, and the evolution of the UN and other international and regional organizations.

The number of nuclear weapons has fallen from 65,000 in 1985 to 11,540 in 2011. Wars—as defined by 1,000 or more battle-related deaths—have been steadily decreasing over the past two decades, although the past two years have seen an increase, mainly due to the Arab Spring/Awakening. Terrorism is changing from transnationally organized attacks to attacks by small groups and single individuals. Mail-order DNA and future desktop molecular and pharmaceutical manufacturing could one day give single individuals the ability to make and use weapons of mass destruction from biological weapons. Ubiquitous sensor systems in public spaces plus better mental health and education systems will be needed to reduce such future threats. Governments and industrial complexes find themselves under multiple daily cyberattacks (espionage or sabotage) from other governments, competitors, hackers, and organized crime. It seems intellectual software arms races will be inevitable. Back-casted peace scenarios should be created through participatory processes to show plausible alternatives to the full range of conflict possibilities.

Empowerment of women has been one of the strongest drivers of social evolution over the past century and is acknowledged as essential for addressing the global challenges facing humanity. Women are increasingly engaged in decisionmaking, promoting their own views and demanding accountability. Women account for 19.8% of the membership of national legislative bodies worldwide, and in 32 countries the figure is over 30%. Women represent 14.3% of the total 273 presiding officers in parliaments. There are 20 women heads of state or government. Patriarchal structures are increasingly challenged around the world. Women are 41% of the world paid employment, but hold 20% of senior manager positions. The process toward gender political-economic equality seems irreversible. Meanwhile, violence against women is the largest war today, as measured by death and casualties per year. In some areas, violence against women at one point in their lives can be as high as 70%. About 70% of people living in poverty are women, who also account for about 64% of the 775 million adult illiterates.

The world is slowly waking up to the enormity of the threat of transnational organized crime, but it has not adopted a global strategy to counter it. In the absence of such a strategy, TOC income has grown to more than \$3 trillion a year.. Its potential ability to buy and sell government

decisions could make democracy an illusion. The UN Office on Drugs and Crime has called on all states to develop national strategies to counter TOC as a whole. This could provide input to the development and implementation of global strategy and coordination.

In just 38 years, the world should create enough electrical production capacity for an additional 3.3 billion people. There are 1.3 billion people (20% of the world) without electricity today, and an additional 2 billion people will be added to the world's population between now and 2050. Compounding this is the requirement to decommission aging nuclear power plants and to replace or retrofit fossil fuel plants. About 3 billion people still rely on traditional biomass for cooking and heating. If the long-term trends toward a wealthier and more sophisticated world continue, our energy demands by 2050 could be more than expected. However, the convergences of technologies are accelerating to make energy efficiencies far greater by 2050 than most would believe possible today. So the world is in a race between making a fundamental transition fast enough to safer energy and the growing needs of an expanding and wealthier population.

Over half of the new energy generation capacity comes from renewable sources today. IPCC's best-case scenario estimates that renewable sources could meet 77% of global energy demand by 2050, while the World Wildlife Fund claims 100% is possible. The costs of geothermal, wind, solar, and biomass are falling. Setting a price for carbon emissions could increase investments. If the full financial and environmental costs for fossil fuels were considered—mining, transportation, protecting supply lines, water for cooling, cleanups, waste storage, and so on—then renewables will be seen as far more cost-effective than they are today. Without major breakthroughs in technologies and behavioral changes, however, the majority of the world's energy in 2050 will still come from fossil fuels. In 2010, the world spent \$409 billion on fossil fuel subsidies, about \$110 billion more than in 2009, encouraging inefficient and unsustainable use.

The continued acceleration of S&T is fundamentally changing what is possible, and access to the S&T knowledge that is changing prospects for the future is becoming universal. Computational chemistry, computational biology, and computational physics are changing the nature of science, and its acceleration is attached to Moore's law. R&D on 3D printers is merging the industrial, information, and biological revolutions. Synthetic biology is assembling DNA from different species in new combinations to create lower-cost biofuels, more precise medicine, healthier food, new ways to clean up pollution, and future capabilities beyond current belief. Swarms of nano robots are being developed that should be able to manage nano-scale building blocks for novel material synthesis and structures, component assembly, and self-replication and repair. Although synthetic biology and nanotech promise to make extraordinary gains in efficiencies needed for sustainable development, their environmental health impacts are in question. CERN, the European Organization for Nuclear Research, announced that it discovered a Higgs-like boson particle that might explain the fundamental ability of particles to acquire mass, giving rise to future applications of energy and matter unimaginable today. We need a global collective intelligence system to track S&T advances, forecast consequences, and document a range of views so that all can understand the potential consequences of new S&T.

The acceleration of S&T change seems to grow beyond conventional means of ethical evaluation. Is it ethical to clone ourselves or bring dinosaurs back to life or to invent thousands

of new life forms from synthetic biology? Public morality based on religious metaphysics is challenged daily by growing secularism, leaving many unsure about the moral basis for decisionmaking. Many turn back to old traditions for guidance, giving rise to the fundamentalist movements in many religions today. Unfortunately, religions and ideologies that claim moral superiority give rise to “we-they” splits that are being played out in conflicts around the world. The moral will to act in collaboration across national, institutional, religious, and ideological boundaries that is necessary to address today’s global challenges requires global ethics.

Collective responsibility for global ethics in decisionmaking is embryonic but growing. Corporate social responsibility programs, ethical marketing, and social investing are increasing. New technologies make it easier for more people to do more good at a faster pace than ever before. Single individuals initiate groups on the Internet, organizing actions worldwide around specific ethical issues. News media, blogs, mobile phone cameras, ethics commissions, and NGOs are increasingly exposing unethical decisions and corrupt practices. Advance software experts in the self-organizing international group called Anonymous have become a new force increasing world attention to help the Arab Spring, Wikileaks, the Occupy movement, and police brutality.

Global ethics also are emerging around the world through the evolution of ISO standards and international treaties that are defining the norms of civilization. It may also be evolving from protests around the world that show a growing unwillingness to tolerate unethical decisionmaking by power elites. The proliferation and scope of unethical decisions that led to the 2008 financial crisis seem not to have been addressed sufficiently to prevent future crises. We need to create better incentives for ethics in global decisions, promote parental guidance to establish a sense of values, encourage respect for legitimate authority, support the identification and success of the influence of role models, implement cost-effective strategies for global education for a more enlightened world, and make behavior match the values people say they believe in. Entertainment media could promote memes like “make decisions that are good for me, you, and the world.”

Without a serious focus on green growth, falling water tables, raising food/water/energy prices, population growth, resource depletion, climate change, terrorism, and changing disease patters, catastrophic results around the world are likely and will force migrations over the next few decades to make much of the world increasingly unstable. To prevent this, fortunes will be made in areas such as green nanotech manufacturing, synthetic biology for medicine and energy, methods to increase human intelligence, retrofitting energy plants to produce construction material and buildings to produce energy, transferring agriculture from freshwater to saltwater on coastal regions of the word, electric vehicles, growing pure meat without growing animals, and using the principles of urban systems ecology to make cities become conscious-technologies.

We have to learn how to cut through all the information noise to get to the essential intelligence that is important about the future for us and our civilizations. Consider the volume of information you allow in your brain that is irrelevant, and how you might be different in 10 years if you only allowed truly relevant and useful information that really mattered to you and your civilization.

The Millennium Project is integrating all its information, software, and participants into a Global Futures Intelligence System that would be updated on a continuous basis rather than in annual reports. The chapters in the Executive Edition of the *2012 State of the Future* are:

1. Global Challenges (short overviews)
 2. State of the Future Index: Global Progress and National Applications
 3. Changes to Gender Stereotypes
 4. Cooperatives 2030
 5. Hopes and Fears, a Kuwait Perspective
 6. Future of Ontologists
- Appendix: Millennium Project Participants in the 2011–12 Program

The full *2012 State of the Future* is about 8,000 pages available in electronic version on CD or USB flash drive, and also accessible as a download from www.millennium-project.org, as part of the upcoming Global Futures Collective Intelligence System.

The world needs hardheaded idealists who can look into the worst and best of humanity to create and implement strategies of success. We hope our work will help you to do so. Feedback is welcome to Jerome.Glenn@millennium-project.org.