Executive Summary

The global situation for humanity continues to improve in general, but at the expense of the environment. People around the world are becoming healthier, wealthier, better educated, more peaceful, and increasingly connected, and they are living longer. The child mortality rate has dropped 47% since 1990, extreme poverty in the developing world fell from 50% in 1981 to 21% in 2010, primary school completion rates grew from 81% in 1990 to 91% in 2011, only one transborder war occurred in 2013, nearly 40% of humanity is connected via the Internet, and life expectancy has increased ten years over the past twenty years to reach 70.5 years today.

However, water tables are falling on all continents, intrastate conflicts and refugee numbers are increasing, glaciers are melting, income gaps are increasingly obscene, coral reefs are dying, ocean acidity is increasing, ocean dead zones have doubled every decade since the 1960s, half the world's topsoil is destroyed, youth unemployment has reached dangerous proportions, traffic jams and air pollution are strangling cities, $1–1.6 billion is paid in bribes, organized crime takes in twice the money per year as all military budgets combined, civil liberties are increasingly threatened, and half of the world is potentially unstable.

Massive transitions from isolated subsistence agriculture and industrial economies to an emerging global Internet–connected pluralistic civilization is occurring at unprecedented speed and uncertainties. Monitoring major indicators of progress from health and education to water and energy shows we are winning more than we are losing—but where we are losing is very serious. After seventeen years of continuous monitoring of global change as documented in the annual

State of the Future reports, it is clear that humanity has the ideas and resources to address its global challenges, but it has not yet shown the leadership, policies, and management on the scale necessary to guarantee a better future. It is also clear from The Millennium Project's global futures research over all these years that there is greater agreement about how to build a better future than is evident in the one-way media that holds audiences by the drama of disagreement, which is reinforcing polarization. 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.

The IMF expects the global economy to grow from 3% in 2013 to 3.7% during 2014 and possibly 3.9% in 2015. With world population of 7.2 billion growing at 1.1% in 2013, the global per capita income is increasing at 2.6% per year. The world is reducing poverty faster than many thought was possible, but the divide between the rich and poor is growing faster than many want to admit. According to Oxfam, the total wealth of the richest 85 people equals that of 3.6 billion people in the bottom half of the world's economy, and half of the world's wealth is owned by just 1% of the population. We need to continue the successful efforts that are reducing poverty, but we also need to focus far more seriously on reducing income inequality if long-term instability is to be avoided.

Because the world is better educated and increasingly connected, people are becoming less tolerant of the abuse of elite power than in the past. Because youth unemployment is growing, more people have more time to do something about this abuse. Unless these elites open the conversation about the future with the rest of their populations, unrest and revolutions are likely to continue and increase. The executive summary of the *2008 State of the Future* stated:

> *Half the world is vulnerable to social instability and violence due to rising food and energy prices, failing states, falling water tables, climate change, decreasing water-food-energy supply per person, desertification, and increasing migrations due to political, environmental, and economic conditions.*

Unfortunately, these factors contributing to social instability have continued to worsen over the past five years, leading to the social unrest we see today in many parts of the world. The number of wars and battle-related deaths has been decreasing, however. Yet worrisome territorial

tensions among Asian countries continue to slowly escalate, cyber attacks and espionage are rapidly increasing, and overlapping jurisdictions for energy access to the melting Arctic will be tests of humanity's maturity to see if these can be peacefully resolved. The US and Russia argue about how to stop the bloodshed in Syria while a third of Syria's 21 million people are displaced in their country or refugees in neighboring countries. The number of nuclear weapons is falling and nation-state transborder wars are rare, yet conflicts within countries are increasing, and the world ignores 6 million war-related deaths in the Congo.

At the same time, the world is increasingly engaged in many diverse conversations about the right way to relate to the environment and our fellow humans and about what technologies, economics, and laws are right for our common future. These great conversations are emerging from countless international negotiations, the evolution of standards established by the ISO, the preparations for the post-2015 UN Development Goals and other UN gatherings, and thousands of Internet discussion groups and big data analyses. Humanity is slowly but surely becoming aware of itself as an integrated system of cultures, economies, technologies, natural and built environments, and governance systems.

These great conversations will be better informed if we realize that the world is improving better than most pessimists know and that future dangers are worse than most optimists indicate. Better ideas, new tech, and creative management approaches are popping up all over the world, but the lack of imagination and courage to make serious change is drowning the innovations needed to make the world work for all.

Meanwhile, the world is beginning to automate jobs more broadly and quickly than during the industrial revolution and initial stages of the information age. How many truck and taxicab drivers will future self-driving cars replace? How many will lose their jobs to robotic manufacturing? Or telephone support people to AI telephone systems? The number of employees per business revenue is falling, giving rise to employment-less economic growth. New possibilities have to be invented, such as one-person Internet-based self-employment, for finding markets worldwide rather than looking for local jobs. Successfully leapfrogging slower linear development processes in lower-income countries is likely to require implementing futuristic possibilities—from 3D printing to seawater agriculture—and making increasing individual and collective intelligence a national objective of each country.

The explosive, accelerating growth of knowledge in a rapidly changing

and increasingly interdependent world gives us so much to know about so many things that it seems impossible to keep up. At the same time, we are flooded with so much trivial news that serious attention to serious issues gets little interest, and too much time is wasted going through useless information.

The Millennium Project has gathered the insights from creative and knowledgeable people around the world to identify and update prospects for 15 Global Challenges to provide a framework for understanding what is important to know about global change. Chapter 1 presents distilled overviews of each of these challenges so that readers can save time and more easily improve their understanding of our common future compared with more narrowly focused sources scattered around the Internet. Chapter 1 is continually updated online in the Global Futures Intelligence System. GFIS can be thought of as a global information utility from which different readers can draw different value for improving understanding and decisions. In addition to succinct but relatively detailed descriptions of the current situation and forecasts, recommendations to address each challenge are also included. Some examples suggested in Chapter 1 include:

- Establish a U.S.-China 10-year environmental security goal to reduce climate change and improve trust.
- Grow meat without growing animals, to reduce water demand and GHG emissions.
- Develop seawater agriculture for biofuels, carbon sink, and food without rain.
- Build global collective intelligence systems for input to long-range strategic plans.
- Create tele-nations connecting brains overseas to the development process back home.
- Establish trans-institutions for more effective implementation of strategies.
- Detail and implement a global counter-organized crime strategy.
- Use the State of the Future Index as an alternative to GDP as a measure of progress for the world and nations.

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 30 variables used in The Millennium Project's global State of the Future Index (see Box 1) provides a score card on humanity's performance in addressing the most important challenges.

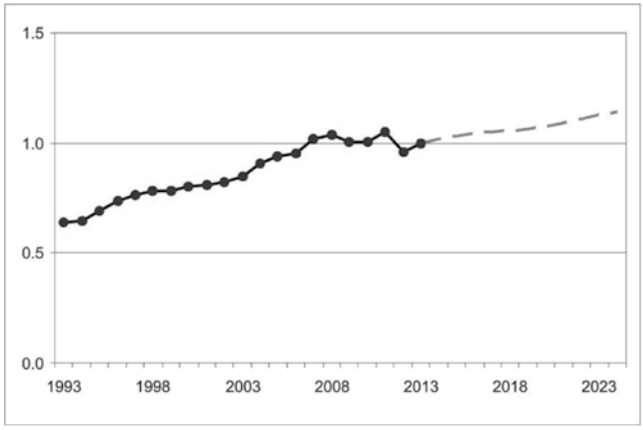
The State of the Future Index is a measure of the 10-year outlook for the future based on historical data for the last 20 years. It is constructed with key variables and forecasts that, in the aggregate, depict whether the future promises to be better or worse. The SOFI is intended to show the directions and intensity of change and to identify the factors responsible. It provides a mechanism for studying the relationships among the items in a system. It has been produced by The Millennium Project since 2000.

Box 1. Variables used in the 2013–14 State of the Future Index

1. GNI per capita, PPP (constant 2005 international $)
2. Economic income inequality (share of top 10%)
3. Unemployment, total (% of world labor force)
4. Poverty headcount ratio at $1.25 a day (PPP) (% of population)
5. Levels of corruption (0=highly corrupt; 6=very clean)
6. Foreign direct investment, net inflows (BoP, current $, billions)
7. R&D Expenditures (% of GDP)
8. Population growth (annual %)
9. Life expectancy at birth (years)
10. Mortality rate, infant (per 1,000 live births)
11. Prevalence of undernourishment
12. Health expenditure per capita (current $)
13. Physicians (per 1,000 people)
14. Improved water source (% of population with access)
15. Renewable internal freshwater resources per capita (thousand cubic meters)
16. Ecological Footprint / Biocapacity ratio
17. Forest area (% of land area)
18. CO_2 emissions from fossil fuel and cement production (billion tones($GtCO_2$)
19. Energy efficiency (GDP per unit of energy use (constant 2005 PPP $ per kg of oil equivalent))
20. Electricity production from renewable sources, excluding hydroelectric (% of total)
21. Literacy rate, adult total (% of people ages 15 and above)
22. School enrollment, secondary (% gross)
23. Number of wars (conflicts with more than 1,000 fatalities)
24. Terrorism incidents
25. Number of countries and groups that had or still have intentions to build nuclear weapons
26. Freedom rights (number of countries rated free)
27. Voter turnout (% voting population)
28. Proportion of seats held by women in national parliaments (% of members)
29. Internet users (per 100 people)
30. Prevalence of HIV (% of population age 15 and 49)

The variables included in SOFI were selected from a set of indicators rated by an international Delphi panel for their capacity for showing progress or regress on the 15 Global Challenges and the availability of at least 20 years of reliable historical data. The variables were submitted several times to an international panel selected by The Millennium Project's Nodes to forecast the best and worst values for each variable in 10 years. These were used for the normalization and integration of all the variables into a single index[1] and for computation of the State of the Future Index. The index shown in Figure 1 indicates a slower progress since 2007, although the overall outlook is promising.

Figure 1. 2013 State of the Future Index



The World Report Card

Each of the 30 variables can be examined to show where we are winning, where we are losing, and where there is unclear or little progress, producing a report card for the world. Figures 2, 3, and 4 show the indicators with their historical data and projections grouped by progress criterion.

1 See "State of the Future Index" in GFIS's Research section for details of the construction of SOFI, annual global SOFIs since 2001, and several national applications.

Figure 2. Where Are We Winning?

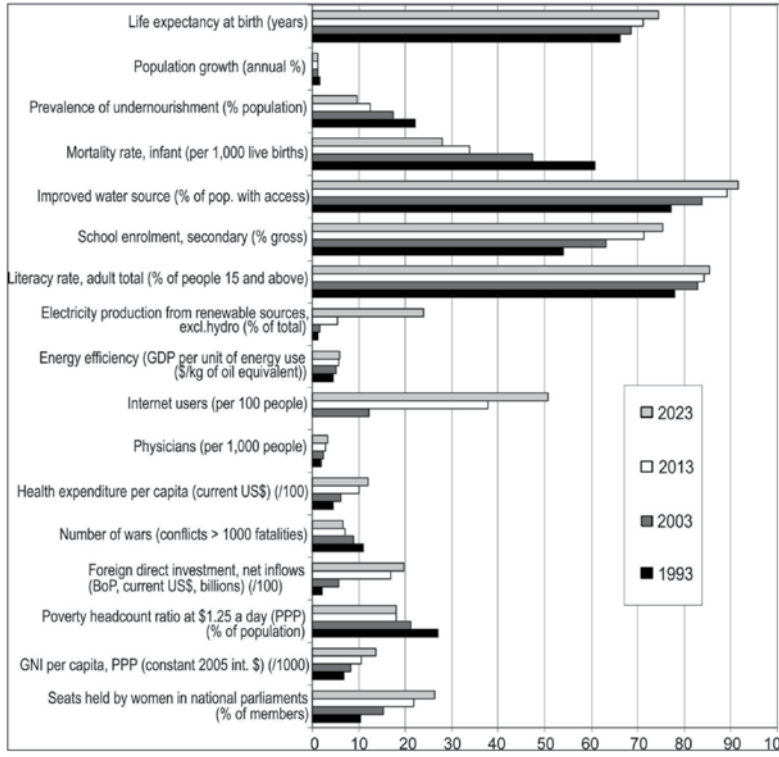


Figure 3. Where Are We Losing?

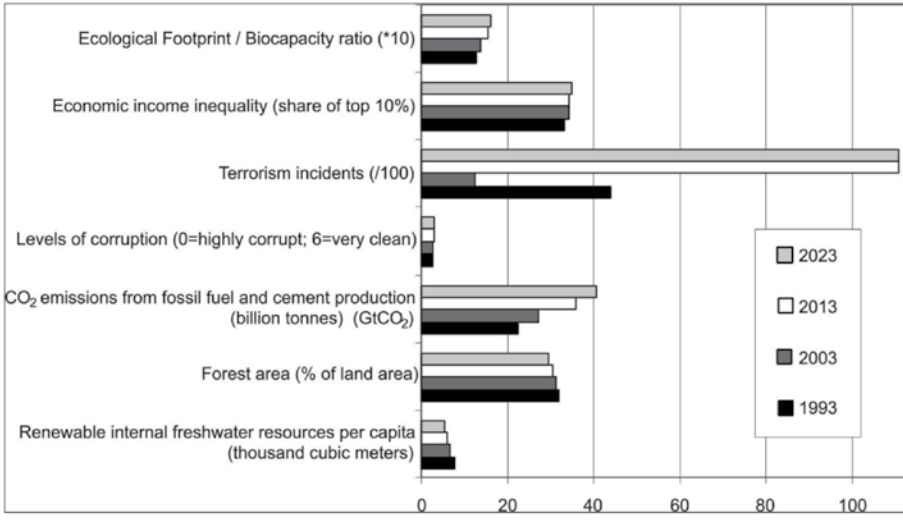
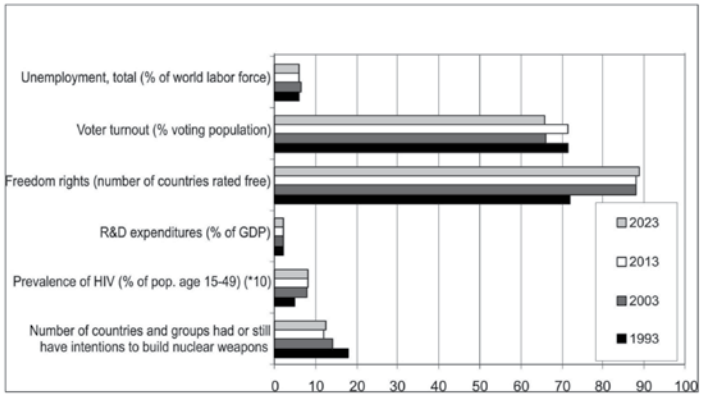


Figure 4. Where Is There Unclear or Little Change?



Some Factors to Consider

A great brain race has begun! The EU, U.S., Japan, and China have announced programs to understand how the brain works and apply that knowledge for better computers and to improve our relation to them. Google also is working to create artificial brains to be your personal artificial intelligence assistant. Another great race is on to make supercomputer power available to the masses with advances in IBM's Watson and with cloud computing by Amazon and others. About 85% of the world's population is expected to be covered by high–speed mobile Internet in 2017. China already has nearly twice as many Internet users as the entire population of the U.S., and 81% of its Internet users gain access via mobile phones. Over 8 billion devices are connected to the "Internet of Things," which is expected to grow to 40–80 billion devices by 2020. According to the ITU, nearly 40% of humanity uses the Internet now. The global nervous system of humanity is nearing completion, making a de facto global brain(s) of humanity—partly by design and partly spontaneously. So what happens when the entire world has access to nearly all the world's knowledge and instantaneous access to artificial brains able to solve problems and create new conditions like geniuses, while blurring previous distinctions between virtual realities and physical reality?

We have already seen brilliant financial experts augmented with data and software making short–term, selfish, economic decisions that led to the 2008 global financial crisis, continued environmental degradation, and widening income disparities. It is not yet clear that humanity will

grow from adolescent short–term, me–first thinking to more adult longer–term, we–first planet–oriented decisionmaking. Humanity seems to be evolving from ideologically driven central decisionmaking to more decentralized pragmatic evidence–based decisionmaking. Yet multi–way interactive media that is one of the greatest forces for good also attracts individuals with common interests into isolated ideological groups, reinforcing social polarization and conflict and forcing some political systems into gridlock.

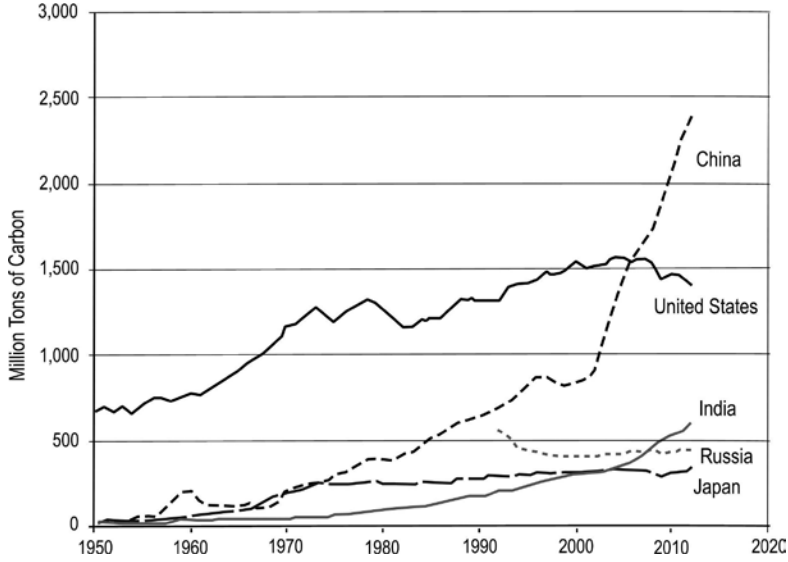
Humanity may become more responsible and compassionate as the Internet of people and things grows across the planet, making us more aware of humanity as a whole and of our natural and built environments. It also makes it increasingly difficult for conventional crimes to go undetected. Unfortunately, cyberspace has become the new media for new kinds of crimes. According to Akamai, there were 628 cyber–attacks over 24 hours on July 24, 2013, with majority targeting the U.S. Cyber–attacks can be thought of as a new kind of guerrilla warfare. Prevention may just be an endless intellectual arms race of hacking and counter–hacking software, setting cyber traps, exposing sources, and initiating trade sanctions.

Although the long–range trend toward democracy is strong, Freedom House reports that world political and civil liberties deteriorated for the eighth consecutive year in 2013, with declines noted in 54 countries and improvements in just 40 countries. At the same time, increasing numbers of educated and mobile phone Internet–savvy people are no longer tolerating the abuse of power and may be setting the stage for a long and difficult transition to more global democracy.

Meanwhile, the Fifth Assessment Report of the Intergovernmental Panel on Climate Change found that greenhouse gases grew from an average of 1.3% per year between 1970 and 2000 to an average of 2.2% between 2000 and 2010. Each decade of the past three was warmer than the previous decade. The past 30 years was likely the warmest period in the northern hemisphere in the last 1,400 years.

Even if all CO_2 emissions are stopped today, the IPCC report notes that "most aspects of climate change will persist for many centuries." Hence, the world has to take adaptation far more seriously, in addition to reducing GHG emissions by better conservation, higher efficiencies, changes in food and energy production, and new methods to reduce the GHGs that are already in the atmosphere.

Figure 5. Carbon Emission Trends Among Major Emitters



Source: Earth Policy Institute with data from CDIAC, BP

Without dramatic changes, UNEP projects a 2° C (3.6° F) rise above pre–industrial levels in 20–30 years, accelerating changing climate, ocean acidity, changes in disease patters, and saltwater intrusions into freshwater areas worldwide. FAO reports that 87% of global fish stocks are either fully exploited or overexploited. Typhoon Haiyan that devastated the Philippines in November 2013 had gusts reaching 235 miles per hour and a storm surge of water swelling as high as 20 feet, making it the most powerful tropical storm on record to make landfall. Oceans absorb about 33% of human–generated CO_2, but their ability to continue doing this is being reduced, with changing acidity and dying coral reefs and other living systems.

In just 36 years (by 2050) the world needs to create enough electrical production capacity for an additional 3.7 billion people. There are 1.2 billion people without electricity today (17% of the world), and an additional 2.4 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. The cost of nuclear power is increasing, while the cost of renewables is falling. Wind power passed nuclear as Spain's leading source of electricity. However, fossil fuels (coal, oil, and natural gas) will continue to supply the vast majority of baseload electricity past 2050

unless there are major social and technological changes. 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 rapidly to make energy efficiencies far greater by 2050 than forecast today.

Because of falling water tables around the world, climate change, various forms of water pollution, and an additional 2.4 billion people in just 36 years (the majority in Asia), some of the people with safe water today may not have it in the future unless significant changes are made. Major progress was made over the past 25 years that provided enough clean water for an additional 2 billion people, but then water tables were higher, climate change was slower, and pollution was less. According to the OECD, half the world could be living in areas with severe water stress by 2030.

The UN's mid–range forecast is that the current 7.2 billion people will grow to 9.6 billion by 2050 and there will be as many people over 65 as under 15, requiring new concepts of retirement or work. Average life expectancy at birth has increased from 48 years in 1955 to 70.5 years today. Future scientific and medical breakthroughs could give people longer and more productive lives than most would believe possible today. For example, uses of genetic data, software, and nanotechnology will help detect and treat disease at the genetic or molecular level. As a result, people will work longer and create many forms of tele–work, reducing the economic burden on younger generations and maintaining a better quality of life. In the meantime, because people are living longer, health care costs are increasing, and the shortage of health workers is growing, telemedicine and self–diagnosis via biochip sensors and online expert systems will be increasingly necessary.

The continued acceleration of S&T is fundamentally changing what is possible, and access to this knowledge is becoming universally available. But little news coverage, educational curricula, or the general public who elect political leaders seem aware of the extraordinary changes and consequences that need to be discussed. For example, China's Tianhe–2 supercomputer is the world's fastest computer at 33.86 petaflops (quadrillion floating point operations per second)—passing the computational speed of a human brain (though not its cognitive abilities). Individual gene sequencing is available for $1,000 that will lead to individual genetic medicine, while human pancreatic cells have been

change into liver cells and skin cells into heart cells. Synthetic biology is creating new life forms from computer designs. Nano–scale robots are being developed that should be able to manage nano–scale building processes for novel materials. A Higgs–like particle has been discover that could explain the fundamental ability of particles to acquire mass. Quantum entanglement of billions of particle pairs could revolutionize communications and possibly transportation, and quantum building blocks (qubits) have been embedded into nanowires to lead to quantum computers. Although seemingly remote from improving the human condition, such basic science is necessary to increase the knowledge that applied science and technology draws on to improve the human condition.

Yet the acceleration of scientific and technological change seems to grow beyond conventional means of ethical evaluation. Is it ethical to clone ourselves, to bring dinosaurs back to life, or to invent thousands of new life forms through synthetic biology? Is it ethical to implement new S&T developments without proper safety testing or to develop new forms of weapons without human control over their use and safe disposal? Should basic scientific research be pursued without direct regard for social issues and the society that funds it? Might social considerations impair progress toward a truthful understanding of reality? Since journalists have to "hype" to be read in such an information noisy world, truth can be distorted, resulting in a cynical public. 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 and possible future S&T.

Although the empowerment of women has been one of the strongest drivers of social evolution over the past century, violence against women is the largest war today, as measured by death and casualties per year. Globally, 35% of women have experienced physical and/or sexual violence, and 38% of all murders of women are committed by intimate partners. While the gender gaps for health and educational attainment were closed by 96% and 93% respectively, according to the 2013 Global Gender Gap by the World Economic Forum, the gap in economic participation has been closed by only 60% and the gap in political outcomes by only 21% globally. Women account for 21.3% of the membership of national legislative bodies worldwide, up from 11.3% in 1997.

It is not reasonable to expect the world to cooperatively create and

implement strategies to build a better future without some general agreement about what that desirable future is. Such a future should not be built on unrealistic fantasies unaware of the global situation. It should also be aware of the extraordinary possibilities. The overviews of the 15 Global Challenges in Chapter 1 gives a framework for understanding the current situation and prospects that have been systematically updated over the past seventeen years and with the accumulative participation of over 4,500 creative and knowledgeable people. The Global Challenges can be used as input to strategic development processes and university courses and can help the general public to understand what is important about future possibilities. This work is continuously updated with much greater detail in the Global Futures Intelligence System at www.themp.org.

Chapter 2, Hidden Hunger: Unhealthy Food Markets in the Developing World, shares an international assessment of the causes of and solutions to the increasing problem of hidden hunger: the intake of sufficient calories but with little nutritious value, vitamins, and minerals. Although the share of people in the world who are hungry has fallen from over 30% in 1970 (when world population was 3.7 billion) to 15% today (with world population at over 7 billion)—the vast majority of whom are in Africa and Asia—concerns are increasing over the variety and nutritional quality of food. FAO estimates that some 30% of the population (2 billion people) suffers from hidden hunger. Some researchers argue that industrial agriculture reduces the nutrient content of crops, thus escalating the risk of hidden hunger. The International Food Policy Research Institute's Global Hunger Index report notes that many of the unhealthy food conditions in the developing world are related to poor government social policies, income inequalities, inefficient farming, post–traumatic stress following civil wars, and the low status and educational level of women.

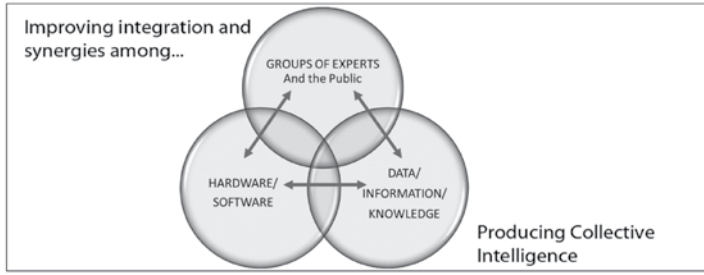
Chapter 3, Vulnerable Natural Infrastructure in Urban Coastal Zones, shares an international assessment of the causes of and solutions to the increasing deterioration of the natural infrastructure along the urban coastal zones around the world. This deterioration diminishes

nature's ability to reduce the impacts of hurricanes, tsunamis, and pollution, as it also negatively affects ecosystem services essential to livelihood. Over half the people in the world live within 120 miles of a coastline. Hence, without appropriate mitigation, prevention, and management of the natural infrastructure within urban coastal zones, billions of people will be increasingly vulnerable to a range of disasters.

Chapter 4, SIMAD and Lone Wolf Terrorism Prospects and Potential Strategies to Address the Threat, shares an international assessment of the increasingly destructive power of individuals acting alone. The number of terrorism incidents increased over the past 20 years, reaching 8,441 in 2012 and more than 5,000 in the first half of 2013. Of all terrorism, the lone wolf type is the most insidious, because it is exceedingly difficult to anticipate, given the actions and intent of individuals acting alone. The average opinion of the international panel participating in this study is that nearly a quarter of terrorist attacks carried out in 2015 might be by a lone wolf and that the situation might escalate: about half of the participants in the study thought that lone wolf terrorists might attempt to use weapons of mass destruction around 2030.

Chapter 5, Global Futures Intelligence System, explains an approach to bringing important information about the future together with expert judgments and decision support software in new structures for continuous updating and improvements to create collective intelligence and wisdom about the future. Throughout Chapter 1, references are made to GFIS as the online location at www.themp.org for more detailed information on a subject that is continually updated. Each of the 15 Global Challenges features a menu that includes the following: both a short and a detailed report; a situation chart of the present and desired situation, as well as potential policies for progress; news aggregated from selected RSS feeds; a scanning system with annotated information; and key related web resources, books, papers, models, discussions, questionnaires, and lists of edits to these items. The collective intelligence emerges in GFIS from synergies among data/information/knowledge, software/hardware, and experts and others with insight that continually learn from feedback to produce just–in–time knowledge for better decisions than any of these elements acting alone. Figure 6 is a graphic illustration of these interactive elements.

Figure 6. Graphic Illustration of a Collective Intelligence System



The accelerating rates of changes discussed in the *State of the Future* will eventually connect humanity and technology into new kinds of decisionmaking with global real–time feedback. GFIS is an early expression of that future direction, as is the *2013–14 State of the Future*.