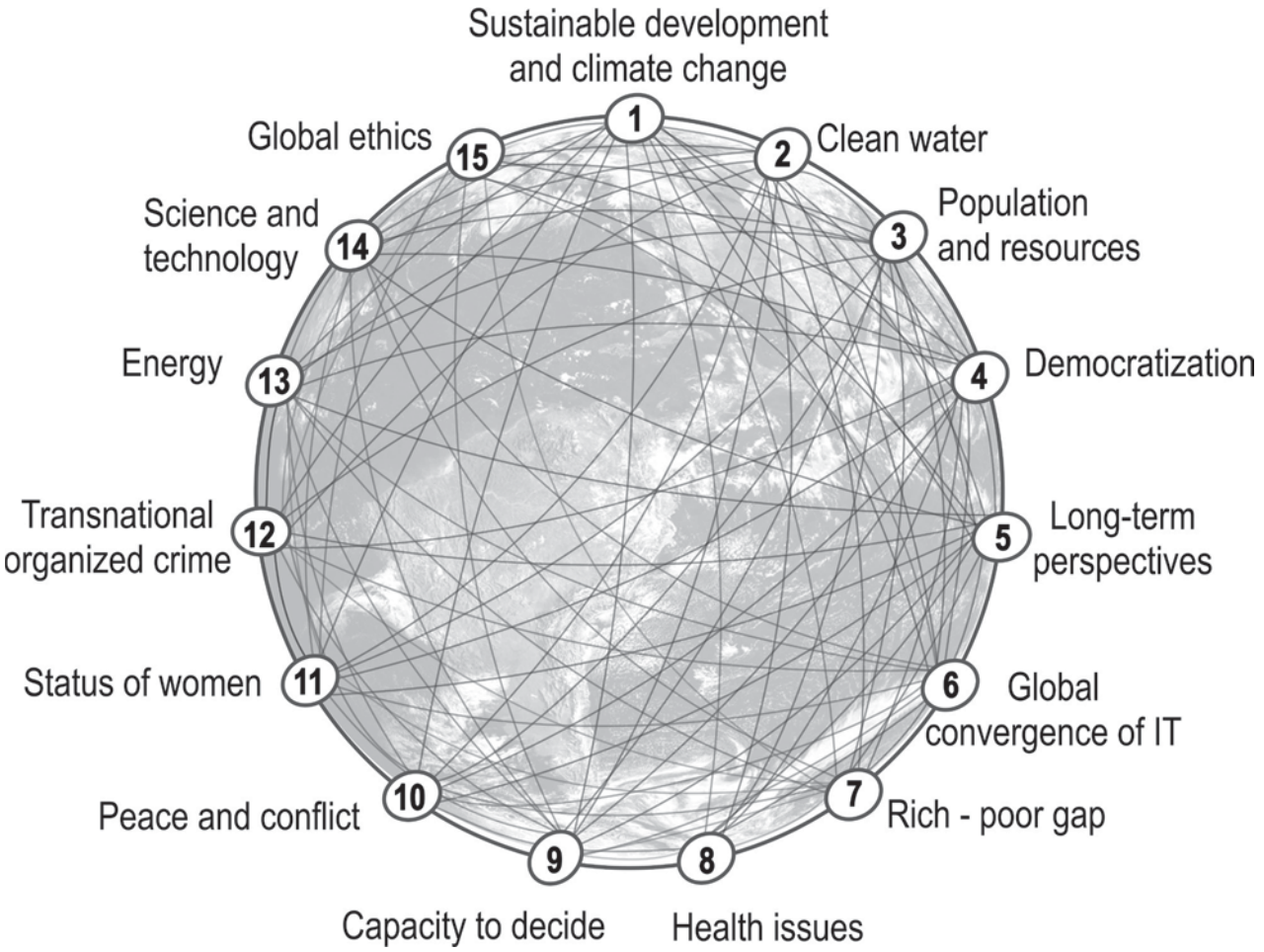
15 Global Challenges

The 15 Global Challenges provide a framework to assess the global and local prospects for humanity. The Challenges are interdependent: an improvement in one makes it easier to address others; deterioration in one makes it harder to address others. Arguing whether one is more important than another is like arguing that the human nervous system is more important than the respiratory system.



Readers are invited to contribute their insights to improve the overview of these 15 global challenges for next year's edition. Please use the online forms at www.StateoftheFuture.org (select "15 Global Challenges").

1
Global Challenges

This chapter presents short descriptions of 15 Global Challenges that have been identified and updated through an ongoing Delphi process and environmental scanning since 1996. The scanning process includes feedback from Millennium Project global assessments on the future of specific topics like media, energy, education, etc.; staff and interns scanning the Internet; expert reviews from the previous year's text; on-line feedback; regional input from The Millennium Project Node Chairs; feedback from The Millennium Project's email lists; monitoring conferences, seminars, and publications; and discussions around the world as staff and Node Chairs give talks on these challenges. All of this is distilled for patterns, and data are updated and cross-referenced.

These Challenges are transnational in nature and transinstitutional in solution. They cannot be addressed by any government or institution acting alone. They require collaborative action among governments, international organizations, corporations, universities, NGOs, and creative individuals. Although listed in sequence, Challenge 1 on sustainable development and climate change is no more or less important than Challenge 15 on global ethics. There is greater consensus about the global situation as expressed in these Challenges and the actions to address them than is evident in the news media.

More detailed treatments of the Global Challenges are available in the full version of Chapter 1, totaling about 1,900 pages. For each Challenge, there is a more comprehensive overview, alternative views or additional comments from participants on the overview, regional perspectives and relevant information from recent literature, a set of actions with a range of views from interviews with decisionmakers to address the challenge, additional actions and views on those actions, and suggested indicators to measure progress or lack thereof.

The descriptions represent a cumulative and distilled range of views from over 4,000 participants. See the Appendix for the demographics of the participants over the past year, and Appendix G for the full list of participants. Details of the questionnaires and interview protocols that have been used from 1996 to 2012 to generate both the short and more detailed treatments of these Challenges are available at www.millennium-project.org.

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The graphs at the end of this chapter illustrate trends for several variables and developments that assess changes relevant to the Global Challenges presented. They were created using the State of the Future Index methodology with trend impact analysis outlined in Chapter 2 here and detailed in the full version Chapter 2.

1. How can sustainable development be achieved for all while addressing global climate change?

The Rio+20 UN Conference on Sustainable Development energized many of the 2,700 leaders from NGOs, corporations, universities, and municipalities to synergize their efforts without waiting for national government action. Similar synergies without national governments emerged from UN Climate Change Conference in Durban (COP17). It merely reinforced commitments made by all major GHG emitters at the 2010 Cancun UN conference for the period beyond 2012 to 2020, but it did agree for the first time to negotiate a legally binding agreement to control emissions from all countries including China and the U.S. (the Durban Platform). Meanwhile, the pace of climate change continues, as the world warms faster than the latest IPCC projections. Atmospheric CO_2 as measured in Hawaii was 395.77 ppm in June 2012, which it was 393.68 ppm in June 2011 and 392.03 ppm in June 2010. It reached 400 ppm in Arctic monitoring stations in spring 2012. According to NOAA, the first six months of 2012 were the hottest in the U.S. since record-keeping began in 1895.

The total human-induced GHG emission is about 49.5 gigatons of CO_2 equivalent per year. Nature absorbs about half of this annually, but that ability is diminishing. To achieve carbon cycle equilibrium, assuming nature's absorption capacities remained the same, we would have to cut back to about 25 $GtCO_2e$ per year, which is deemed politically and economically unacceptable. The politically accepted target is a 2°C increase by 2100, requiring a reduction to around 44 $GtCO_2e$ by 2020. The business-as-usual scenario is an increase to about 56 $GtCO_2e$ by 2020. Oceans absorb atmospheric CO_2 (about 25% of it today) and will continue absorbing human-generated CO_2 for decades if not centuries, which increases acidity, affecting coral reefs and other sea life. Over the long term, increased CO_2 in the atmosphere leads to a proliferation of microbes that emit hydrogen sulfide—a very poisonous gas.

If all Annex I pledges were fully implemented, Annex I emissions would reach a level by 2020 that is 12–18% below the level of 1990; however, if only their unconditional pledges were implemented, the decrease would only be 5% below the 1990 level. There is also a growing fear that the target of not acceding 450 ppm of atmospheric CO_2 is inadequate and should be lowered to 350 ppm, or else the momentum of climate change could grow beyond humanity's ability to reverse it. Emissions from increased production of internationally traded products have more than offset the emissions reductions achieved under the Kyoto Protocol. The volume of the carbon market grew 11% in 2011, reaching $176 billion. The voluntary carbon market grew 33% in value in 2011, to $576 million, but volumes decreased by 28%.

Global ecosystem services that provide life support and economic foundations are valued at $16–64 trillion. These are being depleted faster than nature can resupply. Human activity dominates 43% of Earth's ice-free land surface and affects twice that area. In just 18 years (by 2030) demographers expect an additional 3 billion middle-class consumers drawing even more on these ecosystem services. Unless we improve our economic, environmental, and social behaviors, the next 100 years could be disastrous. The Wealth Accounting and Valuation of Ecosystem Services, a global partnership, is developing guidelines for ecosystem accounting and their integration into national policy analysis.

Poorer countries that contribute the least to GHGs are the most vulnerable to climate change's impacts because they depend on agriculture and fisheries, and they lack financial and technological resources to cope. G8 leaders in L'Aquila pledged $20 billion in 2009 to boost food security, yet only 22% of these funds have been committed. According to UNEP's *Towards a Green Economy* report, investing 2% of global GDP ($1.3 trillion per year) into 10 key sectors can kick-start a transition toward a low-carbon, resource-efficient green economy that would increase income per capita and reduce the ecological footprint by nearly 50% by 2050 compared with business as usual. Meanwhile, the world spends 1–2% of global GDP on subsidies that often lead to unsustainable resource use.

The amount of global wealth exposed to natural disasters risk has nearly tripled from $525.7 billion 40 years ago to $1.58 trillion. The world's economic losses due to natural disasters in 2011 reached $270 billion. Large reinsurance companies estimate the annual economic loss due to climate change could reach $300 billion per year within a decade. Meanwhile, 3,000 corporations cause $2.15 trillion in environmental damage every year; only six countries have a GDP greater than $2.15 trillion.

Climate change could be accelerated by dangerous feedbacks: melting ice/snow on tundras reflect less light and absorb more heat, releasing more methane, which in turn increases global warming and melts more tundra; warming ocean water releases methane hydrates from the seabed to the air, warming the

atmosphere and melting more ice, which further warms the water to release more methane hydrates; the use of methane hydrates or otherwise disturbing deeper seabeds releases more methane to the atmosphere and accelerates global warming; Antarctic melting reflects less light, absorbs more heat, and increases melting; and the Greenland ice sheet (with 20% of the world's ice) could eventually slide into the ocean.

Glaciers are melting, polar ice caps are thinning, and coral reefs are dying. Some 30% of fish stocks have already collapsed, and 21% of mammal species and 70% of plants are under threat. Oceans absorb 30 million tons of CO_2 each day, increasing their acidity. The number of dead zones—areas with too little oxygen to support life—has doubled every decade since the 1960s.

It is time for a U.S.–China Apollo-like 10-year goal and global R&D strategy to address climate change, focusing on new technologies like electric cars, saltwater agriculture, carbon capture and reuse, solar power satellites, maglev trains, urban systems ecology, pure meat without growing animals, and a global climate change collective intelligence to support better decisions and keep track of it all. It is estimated that growing pure meat without growing animals would generate 96% lower GHG emissions, use 45% less energy, reduce land use by 99%, and cut water use by 96% compared with growing animals for meat. These technologies have to be supplemented by policies that support carbon taxes, cap and trade schemes, reduced deforestation, industrial efficiencies, cogeneration, conservation, recycling, and a switch of government subsidies from fossil fuels to renewable energy.

Scientists are studying how to create sunshades in space, build towers to suck CO_2 from the air, sequester CO_2 underground, spread iron powder in oceans to increase phytoplankton, and reuse carbon at power plants to produce cement and grow algae for biofuels. Large-scale geoengineering, such as spraying aerosols into the atmosphere to reduce sunlight, could have unintended and irreversible side effects, such as making the daytime sky significantly brighter and whiter. Other suggestions include retrofitting coal plants to burn leaner and to capture and reuse carbon emissions, raising fuel efficiency standards, and increasing vegetarianism (the livestock sector emits more GHGs than transportation does). Others have suggested new taxes, such as on carbon, international financial transactions, urban congestion, international travel, and environmental footprints. Such taxes could support international public/private funding mechanisms for high-impact technologies. Massive public educational efforts via popular film, television, music, games, and contests should stress what we can do.

Without a global strategy to address climate change, the environmental movement may turn on the fossil fuel industries. The legal foundations are being laid to sue for damages caused by GHGs. Climate change adaptation and mitigation policies should be integrated into an overall sustainable development strategy. Without sustainable growth, billions more people will be condemned to poverty, and much of civilization could collapse, which is unnecessary since we know enough already to tackle climate change while increasing economic growth. Challenge 1 will be addressed seriously when green GDP increases while poverty and global GHG emissions decrease for five years in a row.

REGIONAL CONSIDERATIONS

Africa: Africa needs about $675 billion by 2030 to achieve low-carbon sustainable growth; the current carbon market for mitigation is not sufficient to address this. The Carbon Development Mechanism, the Reducing Emissions from Deforestation and Forest Degradation program, and the voluntary offset program are not fully utilized. Africa's total ecological footprint is set to double by 2040. Ten African nations have pledged to include the economic value of natural resources in their national accounts. The regional focus will be on adaptation to climate change rather than mitigation. Price and weather-indexed insurance schemes will help Africa stabilize prices in domestic markets and help farmers adapt to climate change. Southern Africa could lose more than 30% of its maize crop by 2030 due to climate change. Re-afforestation, saltwater agriculture along the coasts, and solar energy in the Sahara could be massive sources of sustainable growth. Mayors in Mali are now required to have couples plant trees as part of their marriage registration process.

Asia and Oceania: The Asia-Pacific region has half of the world's megacities; half the people will live in urban areas by 2026; the majority of the world's poverty, densely populated areas with slums are more vulnerable to climate change; rapid applications of urban systems ecology will be vital for sustainable development of the region. Asia accounted for 90% of the world's $270 billion in economic losses due to natural disasters in 2011. China has set caps on CO_2 emissions in seven provinces and cities and will launch local carbon markets. And 100 Chinese municipalities are trying to establish their own emissions trading platforms. China will invest nearly $10 billion to treat 27 million hectares of polluted and less productive farmland by 2015. Pesticide dosages reached about 1.3

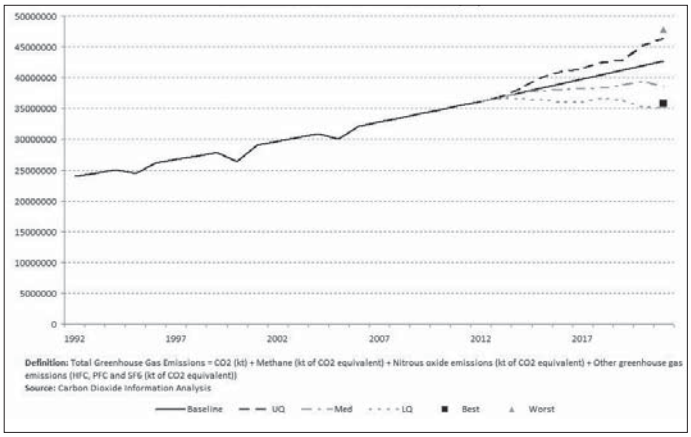
million tons annually in China, 2.5 times of the world's average; 70% of the applications are wasted and pollute the soil. China and Saudi Arabia invest heavily in farmland in Africa. Japan is unlikely to meet its goal by 2020 of reducing GHG emissions by 25% from 1990 levels; its emissions were well above the 1990 levels before the Fukushima disaster led to closing nuclear plants and increased use of fossil fuels. Japan plans to build a vertical farm fully controlled by robots near the Fukushima nuclear disaster area. Malaysia has pledged to cut 40% of the emissions intensity of its GDP from 2005 levels by 2020. Australia is to establish the world's largest marine reserve, covering one-third of Australia's territorial waters.

Europe: EU is on track to achieve its 2020 climate target to cut emissions 20 percent below 1990 levels, but the Euro debt crisis could increase a climate funding gap to $45 billion by 2015. Carbon emissions in the EU ETS fell 2.4% in 2012; a progressive move toward auctioning of allowances, a key change in the third phase of EU ETS from 2013, will further enhance its effectiveness. The EU is discussing a new gas emission reduction objective toward 2030 to take into account the delays in achieving Europe 2020 climate/energy objectives (GHG emissions 20% lower than 1990; 20% of energy from renewables; 20% increase in energy efficiency). Russia aims to reduce GHG emissions by 22–25% by 2020 compared with 1990 (which is still an increase in absolute terms, since Russia's emissions plunged sharply after the collapse of the Soviet Union). Nitrogen pollution from farms, vehicles, industry, and waste treatment costs the EU up to €320 billion per year. Bad air quality in Europe causes nearly 500,000 premature deaths a year across all countries, and costs up to €790 billion a year to address. The UK plans to have its own "GDP-plus" national accounts by 2020.

Latin America: The region faces a $100 billion annual loss by 2050 if the global temperature rises 2°C over pre-industrial levels. About half of the carbon stored in tropical forests worldwide is in Latin America; the deforestation rate is going down in Brazil, but the demand for hydropower and biofuels may reduce Latin America's forests as a carbon sink in the future. Deforestation in the Brazilian Amazon has fallen by 75% since last peaking in 2004, while it has become the world's second producer and exporter of soybeans. South America has 40% of the planet's biodiversity. Recycling in Brazil generates $2 billion a year while avoiding 10 million tons of GHG emissions. According to IICA, Latin America holds 43% of the world's potential for agricultural growth. It is rapidly expanding this potential while trying not to damage vital ecosystem services. Mexico's new climate change law sets legally binding goals: 30% reduction of CO_2 emissions by 2020 from 2000 levels; 35% of electricity from renewable sources by 2034. And Mexico established the National System for Climate Change with reporting and oversight responsibilities. Concentration of land tenure, breakup of farms into smaller parcels, and conversion of rural areas into new urban settlements are generating irreversible ecological damage in most countries. Bolivia announced it may nationalize all natural resource–related industries; the country is estimated to have more than 50% of the world's lithium reserves, key material to make batteries for electric cars and laptops. Aruba plans to be 100% fossil-fuel-free by 2020.

North America: Although President Obama created the Office of Energy and Climate Change Policy, municipalities initiate and implement more policies for sustainable development and reducing GHGs than the federal government. Without a successful green tech transition, U.S. GHG emissions may increase 6% between 2005 and 2035. Air pollution and exposure to toxic chemicals cost U.S. children $76.6 billion in health expenses. The U.S. will invest $880 million to clean up Florida Everglades. Permafrost temperature in northern Alaska increased about 4–7°C during the last century, almost half of it during the last 20 years. On average, every American wastes 253 pounds of food every year. U.S. Congress refused to end oil subsidies. Bank of America announced its 10-year, $50-billion green investment program.

Figure 2. Total Greenhouse Gas Emission (kt)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

2. How can everyone have sufficient clean water without conflict?

Because water is vital to all functions of civilization and because its availability is increasingly threatened, the UN's fourth World Water Development Report recommends much broader collaborative and integrative water management approaches. Many innovations will be needed to avoid future conflicts over water among nations and, within nations, among farmers, urbanites, energy producers, environmentalists, and industries.

Great progress has been made: over 2 billion people gained access to improved drinking water since 1990, and the Millennium Development Goal of halving the number of people without access to improved drinking water was achieved in March 2012, ahead of schedule. However, 783 million people still do not have access to safe drinking water (down from 884 million last year and 900 million the year before). Water tables are falling around the world, and additional water will be needed for another 2 billion people in just 38 years. Global water withdrawals have tripled over the last 50 years. By 2030 global water demand could be 40% more than the current supply. Nature also needs sufficient water to be viable to support all life. Hence, business as usual could lead to several billion people living in water-stressed areas by 2050. This could change with new agricultural practices, policy changes, and intelligently applied new technologies. Although water-related conflicts are already taking place, water-sharing agreements have been reached even among people in conflict and have led to cooperation in other areas.

Meanwhile, the world is likely to miss the MDG sanitation target by almost 1 billion people. About 80% of diseases in the developing world are water-related; most are due to poor management of human excreta. At least 1.8 million children under five die every year due to unsafe water, inadequate sanitation, and a lack of hygiene. Diarrheal disease in children under 15 has a greater impact than HIV, malaria, and tuberculosis combined. Fourth and fifth grade girls approaching puberty drop out of school when there are not separate toilets for girls in their school, but they return when those are built.

Aquaculture produces about half of human-consumed fish, which could be dramatically increased in many locations around the world. Agriculture accounts for 70% of human usage of freshwater; the majority of that is used for livestock production. Such water demands will increase to feed growing populations with increasing incomes. Global demand for meat may increase by 50% by 2025 and double by 2050, further accelerating the demand for water per capita. The UN estimates that $50–60 billion annually between now and 2030 is needed to avoid future water shortages. Some 30% of global cereal production could be lost in current production regions due to water scarcity, yet new areas in Russia and Canada could open due to climate change. Exploitation of shale gas through fracking could contaminate groundwater, and some suspect it could even trigger earthquakes. Cooling systems for energy production require large amounts of water; production and distribution of water takes a lot of energy too. A U.S. study in 2008 showed that nuclear power plants withdrew nearly eight times more freshwater than natural gas plants per unit of electricity generated. Energy demand may increase 40% in 20 years; coupled with increased food demands, dramatic changes in water management will be required. Power plants could reduce water use with once-through or recirculating water through on-site reservoirs, but electric utilities that switch to wind use no water, and photovoltaics use relatively little water for cleaning compared with thermal plants.

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, producing pure meat without growing animals, increasing vegetarianism, fixing leaking pipes, and the reuse of treated water.

Water should be central to development and climate change strategies. If climate change results in significant sea level rise, we may see 20% of the world's coastal freshwater become saline. In a desperate attempt to cope, people could use massive amounts of diesel to produce desalinated water, contributing further to CO_2 emissions. Though large-scale solar desalination is problematic, nanotechnology has the potential to make solar efficient enough to be a real solution.

Development planning should integrate the lessons learned from producing more food with less water via drip irrigation, seawater greenhouse and precision agriculture, rainwater collection and irrigation, watershed management, selective introduction of water pricing, and successful community-scale projects around the world. Plans should also help convert degraded or abandoned farmlands to forest or grasslands; invest in household sanitation, reforestation, water storage, and treatment of industrial effluents in multipurpose water schemes; and construct eco-friendly dams, pipelines, and aqueducts to move water from areas of abundance

to those of scarcity. And why not develop decentralized methods for final purification of water at the point of tap water for drinking, instead of total and expensive purification at the central water plant, since most water is not used for drinking? Just as it has become popular to calculate someone's carbon footprint, people are beginning to calculate their "water footprint."

The UN General Assembly declared access to clean water and sanitation to be a human right.

The Marseille Ministerial Declaration, adopted at the 6th World Water Forum, called for accelerating the implementation of human rights obligations relating to access to safe drinking water and sanitation. UN Water is committed to creating a global water data system to improve integrated water management decisionmaking. Challenge 2 will have been addressed seriously when the number of people without clean water and those suffering from water-borne diseases diminishes by half from their peaks and when the percentage of water used in agriculture drops for five years in a row. Providing universal access would imply a potential economic gain of $220 billion per year.

REGIONAL CONSIDERATIONS

Africa: Up to 2.5% of GDP of African countries and $5.5 billion are lost annually due to inadequate sanitation. About 30% of sub-Saharan Africa uses improved sanitation facilities. A global rush for farmland is actually a "great water grab," with a number of African governments signing away water rights for decades—with major implications for local communities. A study by the British Geological Society found there are huge amounts of groundwater available in Africa—100 times the amount found on the surface. Yet 40% of people still without access to improved drinking water live in sub-Saharan Africa, and a study in Nigeria and Ethiopia found that only about 70% of the "improved" sources are safe to drink. Foreign aid covers up to 90% of some sub-Saharan African countries' water and sanitation expenditures. Despite progress, the actual number of people without access in sub-Saharan Africa was greater in 2008 than in 1990. Without policy changes, this region will not meet the MDG target on water until 2040 and the one on sanitation until 2076.

The number of Africans living in water-stressed areas is projected to be about 350–403 million by 2055 in the absence of climate change; with climate change, it could be 350–600 million people. Since the majority of Africa depends on rain-fed agriculture, upgrading rain-fed systems and improving agricultural productivity will immediately improve millions of lives. Putting sanitation facilities in some village schools could bring girls back to school. The Strategic Framework for Water Security and Climate Resilient Development was launched to address twin challenges of water security and climate change. The Gibe III Dam under construction will lower water levels at Lake Turkana, possibly affecting more than 500,000 people in Ethiopia. An agreement among the Nile basin countries will be necessary to prevent future conflicts as water demands increase south of Egypt.

Asia and Oceania: Asia has 60% of the world's population but only 28–30% of its freshwater. Cotton growers in India draw 737 billion gallons of water from Indus River per year, enough to meet domestic water needs in Delhi for more than two years. India feeds 17% of the world's people on less than 5% of the world's water and 3% of its farmland. Some 3,000 million liters of waste from Delhi are dumped into the Yamuna River each day. UN-Habitat has declared the river "dead"—without enough oxygen to support river life. In India, 626 million people do not have access to a toilet. Inadequate sanitation costs the economies of four Southeast Asian countries the equivalent of about 2% of their GDP. China will invest $5.5 billion over 10 years to prevent and treat groundwater contamination. Its water consumption per unit of GDP more than halved between 2000 and 2010, but the water situation in China is expected to continue to get worse for the next five to eight years under the best-case scenario. With only 8% of the world's freshwater, China has to meet the needs of 22% of the world's population. It aims to quadruple production of desalinated water by 2020, from the current 680,000 m^3 (180 million gallons) a day to as many as 3 million m^3 (800 million gallons). Forced migration due to water shortages has begun in China, and India should be next. The number of landslides and other disasters around Three Gorges Dam increased 70% since its water level reached its maximum level in 2010, possibly leading to the resettlement of additional 100,000 people. The Yangtze, Mekong, Salween, Ganges, and Indus are among the 10 most polluted rivers in the world. The government of Victoria in Australia has opened private competition to bid for water supply contracts. China is buying increasing amounts of agricultural land in Australia to offset carbon. By 2050, an additional 1.5 billion m^3 of water will be needed in the Middle East, of which about a third will be allocated to the Palestinian Authority and Jordan. The Middle East Geneva Accords offers a way to resolve Israeli-Palestinian water issues. Some 2.6 million Afghans are at risk of hunger from drought. Yemen may have the first capital city to run out of water; it has the world's second-fastest growing population; its water tables are falling by 6.5 feet per year; and Yemen's freshwater availability is 135m^3 per person each year. Increasing water prices could spark social unrest. Fear of a political

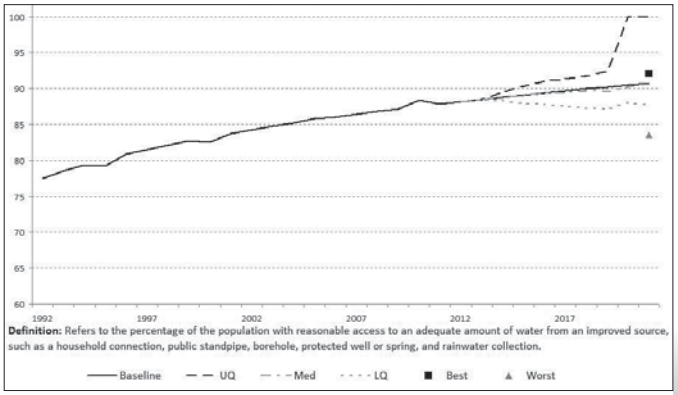
and environmental crisis may lead to the collapse of the state and an influx of refugees, Saudi Arabia has donated fuel to Yemen and offered to fund water projects. The economic costs of poor-quality water in countries in the Middle East and North Africa range from 0.5% to 2.5% of GDP.

Europe: Some 120 million people do not have access to safe drinking water and even more lack access to sanitation in Europe. Russia plans to improve water efficiency 2.5 times by 2030. Water utilities in Germany pay farmers to switch to organic operations because it costs less than removing farm chemicals from water supplies. Water losses due to bad infrastructure are less than 5% in Germany but can be as high as 50% in Bulgaria. The EU is conducting a Policy Review for water scarcity and droughts, and the Common Agricultural Policy is exploring how to achieve a more balanced management of water resources. The EU took Portugal to court for failing to submit river basin plans, an obligation under the EU Water Framework Directive. Spain is the first country to use the water footprint analysis in policymaking. The European Commission launched a €40-million fund to improve access to water in Africa, the Caribbean, and the Pacific. The world's largest reserves of freshwater are in Russia, which could export water to China and Middle Asia. The worst drought in the UK since 1976 affected more than 35 million.

Latin America: Latin America has 26% of the world's freshwater and 6% of its population, yet two-thirds of the region is arid or semiarid, including large areas of central and northern Mexico, northeastern Brazil, northwestern Argentina, northern Chile, and parts of Bolivia and Peru. About 25% of the population (over 100 million) lives in water-stressed areas, mainly in Mexico, Argentina, and the countries along the west coast. Some 125 million lack sanitation services. Mexico performs 85% below the OECD average for water quality but has increased investments in water systems and the "2030 Water Agenda" for universal water access and wastewater treatment. Suffering from the worst drought in 70 years, Mexican farmers have lost 2.2 million acres of crops. Costa Rica needs to invest $2.4 billion to improve water and sanitation conditions by 2030. El Salvador will be hit hardest by water shortages in the region. Ice is melting in the Andes, affecting hydroelectric dams, agriculture, and urban water supplies; 68% of the region's electricity is from hydroelectric sources. Water crises might occur in megacities within a generation unless new water supplies are generated, lessons from both successful and unsuccessful approaches to privatization are applied, and legislation is updated for more reliable, transparent, and consistent integrated water resources management. The region's water demand could increase 300% by 2050.

North America: North Americans use water 2.5 times the European rate. The price of water in 30 major U.S. cities increased 18% since 2010. U.S. thermoelectric power plants withdrew as much water as farms did, and more than four times as much as all U.S. residents. Competition for water among agriculture, cities, and power plants is heightened due to droughts in 2011 and 2012. Each kilowatt-hour of electricity in the U.S. requires about 25 gallons of water for cooling, which makes power plants the second largest water consumer in the country (39% of all water withdrawals) after agriculture. There is no central coordination for data and improvements for the U.S. water situation. A total of 36 states in U.S. are expected to have water deficiencies in 2013. The U.S. may have passed its "peak water" level in the 1970s. More than 30 states are in litigation with their neighbors over water. Some 13% of Native American households have no access to safe water and/or wastewater disposal, compared with 0.6% in non-native households. Tapping Western Canada's tar sands consumes an estimated 20–45 cubic meters of water per megawatt-hour, nearly 10 times that for conventional oil extraction. Canada is mapping its underground water supplies to help policymakers prevent water shortages. Government agricultural water subsidies should be changed to encourage conservation. Tap water is regulated in the U.S., but bottled water is not; 40% of bottled water tested came from tap water.

Figure 3. Population with Access to Improved Water Sources (% of world population)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

3. How can population growth and resources be brought into balance?

World population is expected to grow another 2 billion in just 38 years, creating unprecedented demand for food, water, energy, and employment. 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. There were only1 billion humans in 1804; 2 billion in 1927; 6 billion in 1999; and 7.02 billion by mid-2012. UN forecasts a range from 8.1 billion to 10.6 billion people by 2050, with 9.3 billion as the mid-projection.

Population dynamics are changing from high mortality and high fertility to low mortality and low fertility, with an increasingly elderly population worldwide. The world's fertility rate has fallen from 6 children in 1900 and 5 in 1950 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; with advances in longevity research, this projection will increase. About 20% of the world will be over 60 by 2050, and 20% of the older population will be aged 80 or more. Some 20% of Europeans are 60 or older, compared with 10% in Asia and Latin America and 5% in Africa.

More than 20 countries have falling populations, which could increase to 44 by 2050, with the vast majority of them in Europe. By 2050 there could be as many people over 65 as under 15, requiring new concepts of retirement. Countering this "retirement problem" is the potential for future scientific and medical breakthroughs that could give people longer and more productive lives than most would believe possible today. People will work longer and create many forms of tele-work, part-time work, and job rotation to reduce the economic burden on younger generations and to maintain living standards.

To keep up with population and economic growth, food production should increase by 70% by 2050. Meat consumption is predicted to increase from 37 kg/ person/year in 2000 to over 52 kg/ person/year by 2050; if so, then 50% of cereal production would go to animal feed. FAO estimates a record 3.2% increase in world cereal production in 2012. In May 2012, FAO's Food Price Index marked the lowest level since September 2011, about 14% below its peak in February 2011. However, food prices may rise again due to increasing affluence (especially in India and China), soil erosion and the loss of cropland, increasing fertilizer costs (high oil prices), market speculation, aquifer depletion, falling water tables and water pollution, diversion of crops to biofuels, increasing meat consumption, falling food reserves, diversion of water from rural to urban, and a variety of climate change impacts.

Although the percent of hungry people in the world has fallen from over 30% in 1970 to 15% today, FAO lists 35 countries that are in need of external food assistance and WFP provides food assistance to more than 90 million people in 73 countries. Yet in some of these countries, agricultural lands (mostly in sub-Saharan Africa) are being sold or leased to foreign investors to feed people in their own countries. Since 2006, more than 400 large-scale land-grabs covering nearly 35 million hectares of land in 66 countries have been reported. European- and Asian-based investors account for about two-thirds of the deals listed by GRAIN. Grain imports to the Arab countries in the Middle East and North Africa increased to 70 million tons in 2011, more than doubling since 1990. OECD estimates that the private sector's investment in farmland and agricultural infrastructure is as much as $25 billion and could double or triple over the next three to five years. Responsible Agricultural Investment, backed by the World Bank and UN agencies, aims to promote investment that respects local rights and livelihoods, but it is heavily criticized by NGOs as a move to legitimize land grabbing.

Massive wheat damage by the Ug99 fungus in 2009 was less in 2010; its genome is now sequenced and Ug99-resistant wheat is now available; nevertheless, creating alternatives would be wise to avoid future pandemics like the Ug99 fungus. Conventional farming relying on expensive inputs is not resilient to climatic change. Agricultural productivity could decline 9–21% in developing countries by 2050 as a result of global warming. Small-scale farmers can double food production within 10 years by using ecological methods. Agroecological farming projects have shown an average crop yield increase of 80% in 57 countries, with an average increase of 116% for all African projects. GM cotton crops in China have cut pesticide use in half since the introduction of insect-resistant BT cotton in 2007, but monocultures undermine biodiversity, which is critical for agricultural viability.

New agricultural approaches are needed, such as producing pure meat without growing

animals, better rain-fed agriculture and irrigation management, genetic engineering for higher-yielding and drought-tolerant crops, reducing losses from farm to mouth, precision agriculture and aquaculture, planting sea grass to bring back wild fish populations, and saltwater agriculture (halophytes) on coastlines to produce food for human and animals, biofuels, and pulp for the paper industry as well as to absorb CO_2, reduce the drain on freshwater agriculture and land, and increase employment. The global market for organic food and beverages increased threefold in the past decade, with organic agriculture found on 37 million hectares in 160 countries.

Examples of other ways to help balance future populations and resources include: encourage vegetarianism, anticipate potential impacts of synthetic biology and other longevity technologies that could make aging healthier and more productive, accelerate safe nanotech R&D (to help reduce material use per unit of output while increasing quality), encourage telemedicine (including online self-diagnosis expert software) and mobile phone tele-education (although the vast majority of the world is literate, there are still 1.4 billion who are not, and illiterates are the majority in 21 countries), integrate urban sensors to create smarter cities, and teach urban systems ecology. Some 52% of the world's population currently lives in urban areas; by 2025 it will increase to 58%. In 2025, 4.3 billion urban residents will generate 2.2 billion tons of solid waste per year, an increase from 1.3 billion tons per year today.

Without more intelligent human-nature symbioses, increased migrations, conflicts, and disease seem inevitable. ICT continues to improve the match between needs and resources worldwide in real time, and nanotech will help reduce material use per unit of output while increasing quality.

Challenge 3 will be addressed seriously when the annual growth in world population drops to fewer than 30 million, the number of hungry people decreases by half, the infant mortality rate decreases by two-thirds between 2000 and 2015, and new approaches to aging become economically viable.

REGIONAL CONSIDERATIONS

Africa: Africa's population doubled in the past 27 years to reach 1 billion. It is projected to reach 2.7 billion in 2060, overtaking that of China and India, and possibly growing to 3.6 billion by 2100. Half of Africa's population is age 17 or less, and the active population age 15–64 will triple between 2005 and 2060. UNICEF estimated 60% of urban dwellers live in slum conditions today; children in these conditions are less likely to go to school and have poor nutrition, increasing future unemployment and probabilities of prolonged social conflicts. Very rapid growth of the young population and low prospects for employment in most nations in sub-Saharan Africa and some nations in the North Africa could lead to prolonged instability until at least the 2030s. Historically, however, growing populations have often led to the economic growth. Yet increasing population density, coupled with degrading soil fertility and climate change, will put immense pressure on natural resources. Hence, increasing investments into rural nutritionally rich agriculture and women, who lead African agriculture, will reduce malnutrition—Africa's greatest public health problem. Much of the urban management class is being seriously reduced by AIDS, which is also lowering life expectancy. Only 28% of married women of childbearing age are using contraceptives, compared with the global average of 62%. Conflicts continue to prevent development investments, ruin fertile farmland, create refugees, compound food emergencies, and prevent better management of natural resources.

Asia and Oceania: By 2025, the number of people over 65 will be about the same as those under 15. China has more than 170 cities with populations over 1 million, and the number could increase to 221 by 2025. More than 240 million people will migrate from rural areas to urban cities in the same period. China has to feed 22% of the world's population with less than 7% of the world's arable land. There were six Chinese children for every one elder in 1975; by 2035 there will be two elders for every one child. China is growing old before it has grown rich. The median age of Japan is almost 45 years; by 2040 it will be 55 and its population decreases from 127 million to 106 million. Suicide and depression cost Japan $32 billion. Suicides have exceeded 30,000 annually since 1998. Approximately a third of the population in the Middle East is below 15; another third is 15–29; youth unemployment there is over 25%. New concepts of employment may be needed to prevent political instability. Farmers in Asia are getting older; the average age of Thai farmers was 42 in 2010, a jump from 31 in 1985. About 5 million people are estimated to be severely food-insecure. Mandatory labeling of GM food will be introduced in India from January 2013. Indonesia has banned exports of 14 un-processed raw minerals. China is reducing its export of scarce strategic rare earth metals. By 2030, Australia will be the second largest

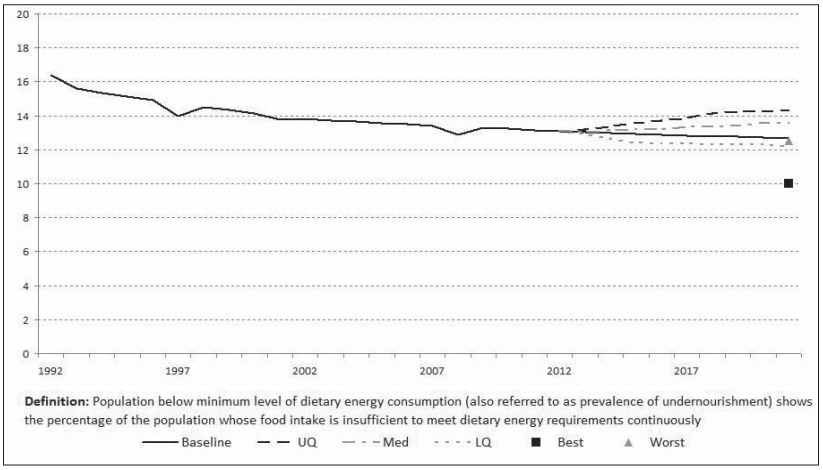
LNG producer after Qatar if planned projects go ahead.

Europe: By 2030 Europe's population is expected to peak and then decline, losing as much as 100 million people in the next 50 years. Women's life expectancy at birth in EU by 2060 could reach 89.1 years, up from 82.5 in 2010; men's could be 84.6 years, up from 76.7 in 2010. About 30% of the population will be 60 or older in 2060, and the number of workers supporting pensioners will decrease from four to two. The Center for Strategic and International Studies forecasts that people of Muslim origin will grow to 25% of France and 33% of Germany by 2050. Europe's low fertility rate and its aging and shrinking population will force changes in pension and social security systems, incentives for more children, and increases in immigrant labor, affecting international relations, culture, and the social fabric. East to West European migrations are expected to continue and rural populations are expected to shrink, freeing additional land for agriculture. Russia's population peaked at 149 million in 1991 and then began a decade-long decline, falling at a rate of about 0.5% per year due to declining birth rates, rising death rates, and emigration; the last few years, however, have seen some population growth, increases in life expectancy, and immigration. About 2.5% of Russia's economically active population in 2011 was legal migrants.

Latin America: About 85% of the region will be urban by 2030, requiring massive urban and agricultural infrastructural investments. Over 53 million people are malnourished. Brazil, Ecuador, Venezuela, Guatemala, Honduras, and Nicaragua have approved food security laws to ensure local agricultural products are primarily used to feed their own populations and not for export; nine more countries are planning the same. Latin America's elderly population is likely to reach 188 million in 2050 or 18.5% of the total population. By 2050, half of Mexico's population will be older than 43, with an 18-year increase in median age. As fertility rates fall in Brazil and longevity increases by 50% over the next 20 years, the ability to meet financial needs for the elderly will diminish; hence, the concept of retirement will have to change, and social inclusion will have to improve to avoid future intergenerational conflicts. Peru imposed a 10-year moratorium on imports of GMO products; Peru is one of the world's leading exporters of organic food, with $3 billion in annual revenue.

North America: Minorities in the United States are now the majority of those under one year old. The number of elderly prisoners jumped 1,300% since the 1980s. The number of those 65 or older in the U.S. is expected to grow from about 40 million in 2009 to 72 million in 2030. Less than 2% of the U.S. population provides the largest share of world food exports, while more than 10% of households are food-insecure and two-thirds of people in the U.S. are overweight or obese. The prevalence of type 1 diabetes among American youth increased 23% from 2002 to 2009. Reducing "throw-away" consumption could change the population-resource balance. Biotech and nanotech are just beginning to have an impact on medicine; hence dramatic breakthroughs in longevity seem inevitable in 25–50 years. Vancouver, Toronto, and Calgary are among the five most livable cities of the world. Global warming should increase Canadian grain exports.

Figure 4. Prevalence of Undernourishment (% of population with insufficient food intake)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

4. How can genuine democracy emerge from authoritarian regimes?

Synergistically self-organized human rights movements for a sustainable global democratic system are taking place virtually all over the world. Regardless of the trigger—autocracy, political repression, economic system, or the price of bread—increasing numbers of more globally conscious, media-savvy advocates of self-determination are taking to the streets—exhibiting unprecedented power. Their commitment and courage is contagious via the news media and the Internet, inspiring others worldwide. Obsolete ruling structures are having difficulty limiting new forms of freedom and ideological shifts. Historically, such movements do not evolve smoothly. Some 65 years after the American Revolution, the Civil War was terribly savage. The acceleration of change is much different today, but if these movements do not mature into new more-effective systems to implement new strategies to address some of the Global Challenges in this chapter (water, organized crime, energy, financial inequities, food), then eventually they could atrophy, lose their democratic gains, and even turn to anarchy in many regions of the world.

Although the perception and implementation of democracy differ globally, it is generally accepted that democracy is a relationship between a responsible citizenry and a responsive government that encourages participation in the political process and guarantees basic rights. Laws and institutions benefiting the majority, while ensuring individual rights, and a strong civil society to enforce accountability are critical to counter organized crime, corruption, the concentration of media ownership, corporate monopolies, increased lobbying, and impunity, which all threaten democracy.

According to Freedom House, world political and civil liberties declined in 2011 for the sixth consecutive year, the longest regress since 1972, when the yearly analysis began. Some authoritarian regimes may have tightened control in response to the Arab Spring/Awakening and its contagion. Declines were noted in 26 countries, while improvements occurred in only 12 countries. The share of people enjoying democratic values stood at 43%, living in 87 "free" countries, while 22% lives in 60 "partly free" countries and 35% (about 2.5 billion people) lives in 48 countries with "not free" stratus.

The number of electoral democracies increased to 117, with three countries (Niger, Thailand, and Tunisia) gaining status and one (Nicaragua) losing it. After eight consecutive years of decline, the average global situation of press freedom showed a slight improvement, due to an increase of the "partly free" category, which now includes 72 countries—45% of the world's population—but 40.5% of the world lives in 59 countries with a "not free" press, while 14.5% living in 66 countries enjoys "free" media—its lowest level in over a decade.

Demographic shifts and improved education, compounded with economic volatility, increase demands for a more global democratic system. The relative instability between quasi-authoritarian and quasi-democratic regimes may be generating the beginnings of a new global regime. Yet too many people become refugees with little or no protection or have to risk their lives for democratic principles. Old ideological, political, ethnic, and nationalistic legacies have to be addressed and international statutes adjusted to protect their rights and the long-range trend toward democracy. New democracies must address previous abuses of power to earn citizens' loyalties without increasing social discord and slowing the reconciliation process.

Some factors helping to evolve more global democratic systems are legitimate tamper-proof election systems with internationally accepted standards for election observers, a better educated world public, free press, a more efficient International Criminal Court, international regulations that are globally binding and enforced, democratic institutions, knowledge diplomacy, data sharing, and the growing number and influence of international NGOs. New political parties are forming, such as the Pirate Parties in 50 countries, including post-Arab-Spring Tunisia, that want to reform copyright and patent law and promote free sharing of knowledge, transparency, an open state, and better communication with the citizens. More participatory democracy may grow from e-government to we-government. Petitions circulating around the world are beginning to influence decisions and hold governments and large organizations accountable through public participation rather than just relying on national judiciary systems. News is independently reported or validated. The e-generation is more borderless that in the past and wants to design new worlds. Some argue that access to the Internet should become a human right as a tool for freedom of expression and association.

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. Old ideological, political, ethnic, and nationalistic legacies also have to be addressed to maintain the long-range trend toward democracy. Since democracies tend not to fight each other and since humanitarian crises are far more likely under authoritarian than democratic regimes, expanding democracy is sine qua non for building a peaceful and just future for all. Meanwhile, international procedures are needed to assist failed states or regions within states, and intervention strategies need to be designed for when a state constitutes a significant threat to its citizens or others.

Challenge 4 will be addressed seriously when strategies to address threats to democracy are in place, when less than 10% of the world lives in nondemocratic countries, when Internet and media freedom protection is internationally enforced, when the critical enforcement institutions function without political or other interference, and when voter participation exceeds 60% in most democratic elections.

REGIONAL CONSIDERATIONS

Africa: Freedom House notes that 51% of sub-Saharan Africa's population live in the 21 countries rated "partially free," 39% live in 19 countries "not free," while only 12% live in the 9 countries with "free" status. The Charter on Democracy, Elections and Governance adopted by the African Union in 2007 entered into force in March 2012, following the 15th ratification. The South Africa chapter of Human Rights Watch's 2012 World Report states that the country "continues to grapple with corruption, growing social and economic inequalities, and the weakening of state institutions by partisan appointments and one-party dominance," with Zimbabwe, Angola, Chad, and others still mired in authoritarian regimes but masking as democracies. Afrobarometer's survey found 80% of Ghanaians being fairly or very satisfied with the way democracy works in Ghana, while 42% held that view in Nigeria. While democratic norms have opened up the civil society, Africa is yet to experience "strong and vibrant civil society," especially in organizing to demand better government, issues, policies, and programs. Increasing numbers of educated, unemployed youth with Mobile phones and Internet access may change this.

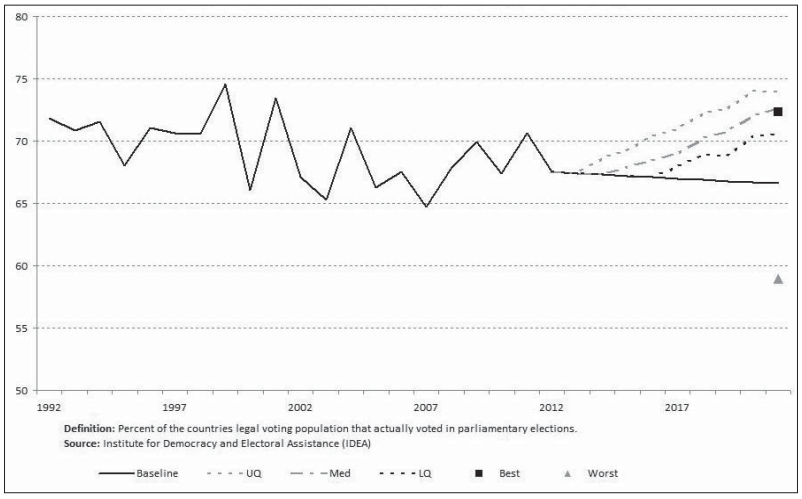
Asia and Oceania: The Asia-Pacific region continues to make progress according to the indicators of democracy monitored by Freedom House. Nevertheless, only 16 countries of the region are rated as "free" and 15 as "partially free," while 41% of the population lives in the 8 "not free" countries. Notable gains were made in Myanmar (Burma), Singapore, and Thailand. Since China is home to over half of the world population presently living in countries rated "not free," a modification of its status would change the worldmap of democracy. The former Google Chairman believes that will happen after the "Great Firewall of China" is opened. In South Asia, repression of political and civil liberties is aggravated by increasing ethnic and sectarian conflicts, mainly in Afghanistan, Pakistan, and Bangladesh. Meanwhile, India—the world's largest democracy—shows further improvement with the growth of the anticorruption movement. In the MENA region, Israel remains the only country ranked "free," 4 countries are "partly free," and 85% of the region's population lives in the 13 "not free" countries. Some of the countries rated the lowest are in the Persian Arab Gulf region: Saudi Arabia, the United Arab Emirates, Bahrain, and Yemen. However, the Arab Spring/Awakening opens new perspectives, despite the violent response of some countries' authoritarian regimes.

Europe: All 27 EU countries are rated "free." The EU Parliament is the largest transnational democratic electorate in the world. As of 2012, the European Citizens' Initiative allows citizens to initiate legislative proposals if backed by 1 million citizens. Governments across the continent are increasingly involving citizens in local and legislative development. Some expect increased political and fiscal EU integration due to the Eurozone crises. A new code of conduct passed in December 2011 requires Members of the European Parliament to disclosure their financial statements and meetings with lobbyists. Transparency International's Corruption Perceptions Index ranked Russia 143 out of 181 countries (though improving from 154th place in 2010). The average bribe that Russian businessmen offer to civil servants is $9,000, although some estimates are higher. Russia adopted a new law to prevent aggressive behavior of demonstrators. Russia has proposed a Eurasian Union and Commission (modeled on the EC) be established by 2015. Controversy over Serbian politic crimes continues. Corruption, autocracy, and lack of progressive institutions also hinder the democratization process in most Central and East European (non-EU) countries.

Latin America: Freedom House rated 22 countries in the region "free," 10 "partly free," and only Cuba as "not free." The "Mexican Spring" YoSoy132 movement led to open televised presidential debates and students monitoring the polling booths for the Presidential election. The big challenges for the region are an institutional weakness for addressing social and political demands of people, as well as the interlinkages of organized crime, businesses, and government corruption. The "war" against the drug cartels and their internal wars, mainly in Mexico, caused thousands of victims and internally displaced persons and reduced civil liberty, while only 2% of the crimes and human rights violations reported to the authorities end up in a conviction. However, a sense of solidarity of the people and increased influence of civil society organizations, constitutional reforms supported by the majority of the population in Bolivia and Ecuador for strengthening the rights of indigenous peoples, as well as examples of democratic governance set by Chile and Brazil are helping to strengthen democratic processes. The Community of Latin American and Caribbean States was initiated by Venezuelan President Hugo Chavez in 2010 to foster Latin American integration as an alternative to the OAS.

North America: The OPEN Act bill in the U.S. is inviting improvements through online inputs--a first in the U.S. for "e-citizenry." The proposed Global Online Freedom Act of 2012 aims to improve corporate responsibility concerning human rights and the freedom of Internet. The U.S. State Department gave $5 million to the UN Democracy Fund, and USAID spent over $70 million, to support democracy and the rule of law programs around the world, but the legitimacy of U.S. military intervention to counter autocracy is questioned. Canada is the most successful democratic multiethnic model; however, recent changes to regulations for charity organizations and fraud investigations concerning the last federal election raise concerns over a healthy future of Canadian democracy. Concerns also persist in Canada and the U.S. about electoral processes, the concentration of media ownership, powerful lobbying, and political corruption. The Occupy Wall Street movement, which began as a protest to the increasing social injustice due to "greed and corruption of the 1%" expanded to most major U.S. cities and many others around the world, causing many to explore new concepts of political economy and democracy.

Figure 5. People exercising their democratic rights



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

5. How can policymaking be made more sensitive to global long-term perspectives?

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. (An international assessment of such future goals is found in Chapter 4.2.)

The options to create and update national, global, and corporate strategic foresight are so complex and 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 are urgently needed. One approach is to create collective intelligence systems that create synergies among brains, software, and information (see Chapter 7), securing agreement to make necessary changes. A CIS can be created for issues, countries, companies, universities, and the world. Such systems will be increasingly required to cope with accelerating knowledge explosions, complexities, and interdependencies while securing public agreement about necessary changes.

Related to CIS is the establishment of resilience systems—the capacities to anticipate, respond, and recover from disasters while identifying future technological and social innovations and opportunities. Better global, national, and local training and information systems are need to improve resilience from massive floods, blizzards, pandemics, nuclear disasters, droughts, Internet failures, and electricity outages. Implementing and integrating resilience and collective intelligence systems is one way to make policymaking more sensitive to global long-term perspectives.

Heads of government should have a foresight office connected by a CIS to related units in government agencies. The CIS could help provide continuity from one administration to the next. Advisory councils of futurists can augment the foresight office and be connected to resilience systems and CIS that scan for change around the world and identify and assess expert judgments in real-time (the Real-Time Delphi is an example). The staff for such systems should synthesize futures research from others, calculate State of the Future Indexes for relevant subjects or countries (see Chapter 2), and produce state of the future reports. Existent government future strategy units (see Chapter 4.1) are being networked by Singapore's Future Strategy Unit to share best practices, just as the UN Strategic Planning Network connects 12 UN agency strategy units. These two networks could also be connected with the Office of the UN Secretary-General to help coordinate strategies and goals. Leaders should make these new systems as transparent and participatory as possible to include and increase the public's intelligence and resilience. As a result, more future-oriented and global-minded voters might elect leaders who are sensitive to global long-term perspectives.

National legislatures could establish standing "Committees for the Future," as Finland has done. National foresight studies should be continually updated, improved, and conducted interactively with issue networks of policymakers and futurists and with other national long-range efforts. Futurists should create more useful communications with policymakers. Alternative scenarios should be shared with parliamentarians and the public for feedback. They should show cause-and-effect relations and expose decision points leading to different consequences from different strategies and policies. Decisionmakers and their advisors should be trained in futures research for optimal use of these systems (see www.millennium-project.org/millennium/FRM-V3.html). Governments could add foresight as a performance evaluation criterion, add foresight to their training institutions, and require a "future considerations" section be added to policy reporting requirements. Government budgets should consider 5–10 year allocations attached to rolling 5–10 year SOFIs, scenarios, and strategies. Governments with short-term election cycles should consider longer, more-stable terms and funds for the staff of parliamentarians. A 26 item checklist of ways to better connect futures research to decisionmaking is available in Chapter 14. A successful Global Future Collective Intelligence System should help policymaking become more sensitive to global long-term perspectives.

Increasing numbers of arts, media, and entertainment professionals are bringing global long-term perspectives to their audiences. Communications and advertising companies could create memes (e.g., from reaction to anticipation or think ahead) to help the public become sensitive to long-term perspectives so that more future-oriented educated publics could support more future-oriented, global-minded politicians. Prizes could be given to recognize the best examples of global long-term decisionmaking. Participatory policymaking processes augmented by e-government services can be created that are informed by futures research. Universities should fund the convergence of disciplines, teach futures research and synthesis as well as analysis, and produce generalists in addition to specialists. Efforts to increase the number and quality of courses on futures concepts and methods should be supported, as well as augmenting standard curricula with futures methodologies converted to teaching techniques that help future-orient instruction.

Each of the 15 Global Challenges in this chapter and the eight UN Millennium Development Goals could be the basis for transinstitutional coalitions composed of self-selected governments, corporations, NGOs, universities, and international organizations that are willing to commit the resources and talent to address a specific challenge or goal. Challenge 5 will be addressed seriously when foresight functions are a routine part of most organizations (as accounting is today), when the consequences of high-risk projects are routinely considered before they are initiated, and when 50 countries have national SOFIs and standing Committees for the Future in national legislatures.

REGIONAL CONSIDERATIONS

Africa: Africa's dependence on advanced country markets will lessen dramatically. China has become a force in African long-range planning; it will be the second largest export destination for Africa. The South African National Planning Commission presented the long-range National Development Plan to President Zuma November 2011, which is open for public feedback. Foresightfordevelopment.org makes research documents, projects, scenarios, people, and blogs available to support African futures research. Daily management of many African countries makes future global perspectives difficult; hence, more-regional bodies like the African Union and the African Development Bank are more likely to further futures work in Africa and should build on 10 years of work of UNDP/African Futures. Civil society is also becoming a bigger stakeholder and lobby in foresight.

Asia and Oceania: Long-term global perspectives will be needed to avoid future energy resource conflicts in the South China Seas. China's Five Year Plan promotes long-term thinking, and since it tends to make decisions in a longer time frame than others, its increasing power and eventually that of India should lead to more global, long-term decisionmaking as these nations interact with the rest of the world. Japan includes private-sector companies in its long-term strategic planning unit. The Prime Minister's Office of Singapore has begun an international network of government future strategy units.

Europe: Factors making Europe take global long-term perspective increasingly into account include the Euro crisis, forecasts of Asian and African migrations, the emergence of China, and public finances for social and health services for an aging population. The EU2020 strategy for a sustainable social market economy builds on the Lisbon strategy for growth and jobs. The EU Committee of the Regions and the European Observation Network for Territorial Development and Cohesion supports foresight studies. The European Parliamentary Technology Assessment is a network and database of 18 European parliaments integrating futures into decisionmaking. The 7th Framework Programme of the EU expands foresight support; the Institute for Prospective Technological Studies provides futures studies for EU decisionmaking; the European Foresight Platform connects futurists; iKnow Project scans for weak signals and wild cards; and the European Regional Foresight College improves futures instruction. The Netherlands constitution requires a 50-year horizon for land use planning. Russian Ministries use Delphi and scenarios for foresight, while corporations tend to use technology roadmaps. Poland 2050 encourages more qualitative than quantitative approaches for long-term analyses.

Latin America: The new President of Mexico is interested in futures research. The Chilean legislative bodies held a public televised forum on the future in December 2011. Research from ECLAC and UNIDO's technological foresight training could be improved to stimulate long-range decisionmaking; participation in such international organizations will improve the region's long-range global dialogues. Mexico, Peru, Chile, and Colombia have signed a free-trade agreement to create the Pacific Latin American Alliance for economic development cooperation. Alternative long-term development strategies are being created by the Bolivian Alliance for the Americas, the Union of South American Nations, and the Community of Latin America and Caribbean States. The shift toward more socialist politics in some countries is motivating alternative futures thinking. Futures approaches are mostly ignored by the academia and mass media, which focus on urgent and confrontational issues over ideologies, unmet basic needs, inequality, and large economic groups that monopolize services. Venezuela has the Sembrar el Futuro prize for students' futures thinking, and Mexico initiated the Global Millennium Prize for students' ideas for addressing global challenges. Since the average age in Latin America is only 24, it is fundamental to incorporate the visions of the next generation via social networks and apps.

North America: Create a map of individuals and organizations with foresight and use it to create a virtual organization at the White House (USA) and Langevin Block (Canada) for regular input to the policy process. "Future considerations" should be added to standard reporting requirements. Examples of successful global long-range activates should be promoted (see Chapter 14) along with cases where the lack of futures thinking proved costly. Global perspectives in decisionmaking are emerging due to perpetual collaboration among different institutions and nations that has become the norm to address the increasing complexity and speed of global change. Global long-term perspectives continue to be evident in the climate change policies of many local governments.

6. How can the global convergence of information and communications technologies work for everyone?

Over 2 billion Internet users, 6+ billion mobile phone subscriptions, and uncountable billions of hardware devices are intercommunicating in a vast real-time multinetwork, supporting every facet of human activity. It is reasonable to assume that the majority of the world will experience ubiquitous computing and eventually spend most of its time in some form of technologically augmented reality. New forms of civilization are beginning to emerge from this convergence of minds, information, and technology worldwide. Mobile phones have already become personal electronic companions, combining computer, GPS, telephone, camera, alarm clock, research assistance, projector, music player, flashlight, newspaper, movie theater, translator, TV, thousands of apps, even on-call armed protectors at the touch of an icon. Ericsson forecasts that 85% of the world's population will be covered by high-speed mobile Internet in 2017.

As Moore's Law continues, as costs fall, and as ease of use increases, even remote and less developed areas will participate in this emerging globalization. The race is on to complete the global nervous system of civilization. Collaborative systems, social networks, and collective intelligences are self-organizing into new forms of transnational democracies that address issues and opportunities. This is giving birth to unprecedented international conscience and action, augmenting conventional management. Such open systems seem natural responses to increasing complexity that has grown beyond hierarchical control. Open source software's non-ownership model may become a significant element in the next economic system. Businesses are building offices and holding meetings in cyberworlds that compete with conventional reality.

One of the next "big things" could be the emergence of collective intelligences for issues, businesses, and countries, forming new kinds of organizations able to address problems and opportunities without conventional management. Collective intelligence can be thought of as a continually emerging property that we create (hands on) from synergies among people, software, and information that continually learns from feedback to produce just-in-time knowledge for better decisions than any one of these elements acting alone. Real-time streamed communications shorten the time it takes from situational awareness to decisions. Search engines and Wikipedia give instant access to "all" the world's stored knowledge. Google Goggles searches the Web by images taken by smart phones instead of typing or speaking key works. The Web is evolving from the present user-generated and participatory system (Web 2.0) into Web 3.0, a more intelligent partner that has knowledge about the meaning of the information it stores and has the ability to reason with that knowledge, using conceptual descendants of today's *Jeopardy*-beating Watson from IBM and Apple's affectionate Siri.

However, this explosive growth of Internet traffic, mainly from video streaming, has created a stress on the Net's capacities, requiring new approaches to keep up with bandwidth demand, while the ubiquity of the Internet in society makes its reliability critically vital. People and businesses are trusting their data and software to "cloud computing" on distant Net-connected servers rather than their own computers, raising privacy and reliability questions. The Amazon cloud data center's outage and Sony PlayStation's release of personal data for millions of users are examples. Even though Wikipedia has become the world's encyclopedia, it struggles to counter disinformation campaigns fought through its pages. Governments are wrestling with how to control harmful content. A vigorous debate continues on net neutrality, the doctrine that technical and economic factors for Net users should not be affected by considerations of equipment, type of user, or communications content.

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. Low-cost computers are replacing high-cost weapons as an instrument of power in asymmetrical warfare. Cyberspace is also a new medium for disinformation among competing commercial interests, ideological adversaries, governments, and extremists, and it is a battleground between cybercriminals and law enforcement. The full range of cybercrimes worldwide is estimated at $1 trillion annually. Fundamental rethinking will be required to ensure that people will be able to have reasonable faith in information. We have to learn how to counter future forms of information warfare that otherwise could lead to the distrust of all forms of information in cyberspace. Nevertheless, the value of ICT for reducing the divisions among people outweighs its divisiveness.

It is hard to imagine how the world can work for all without reliable tele-education, tele-medicine, and tele-everything. Internet bases with wireless transmission are being constructed in remote villages; cell phones with Internet access are being designed for educational and business access by the lowest-income groups; and innovative programs are being created to connect the poorest 2 billion people to the evolving nervous system of civilization. Over 2.4 million children and teachers have OLPC (One Laptop Per Child), Kindle e-book readers are bringing global libraries to schools in Africa, the Inter-American Development Bank found that children in Peru in 2012 using the OLPC gained about five months of cognitive development over a 15-month period compared with those who did not use it.

Social networks link hundreds of millions of members into new kinds of "personal" relationships and spur the growth of political consciousness and popular power, as in the "Arab Spring." E-government systems allow citizens to receive valuable information from their leaders, provide feedback to them, and carry out needed transactions without time-consuming and possibly corrupt human intermediaries. Telemedicine capabilities are uniting doctors and patients across continents. E-government systems exist to some degree for the majority of the world; the UN conducts comparative assessments of the e-government status of its member states.

Universal broadband access should become a national priority for developing countries to make it easier to use the Internet to connect developing-country professionals overseas with the development processes back home, improve educational and business usage, and make e-government and other forms of development more available. Challenge 6 will have been addressed seriously when Internet access and basic tele-education are free and available universally and when basic tele-medicine is commonplace everywhere.

REGIONAL CONSIDERATIONS

Africa: According to worldinternetstats.com, Internet penetration in Africa is 13.5%, up 24% since the preceding year. There are nearly 700 million mobiles, for 70% penetration; Standard Bank expects this to grow to 800 million by 2015. Madagascar offers a mobile cloud phone service based on a login like e-mail so that users do not have to have their own phones but can borrow someone else's mobile phone to access their number. The new Main One and West Africa fiber-optic cables are cutting cost and increasing speed. QuizMax is a free mobile phone app for math and science education used by 100,000 children in South Africa. Kenya's Digital Villages Project integrates Internet access, business training, and microcredit. FAO's Africa Crop Calendar Web site provides information for 130 crops. Tele-education, tele-medicine, and e-government will become more important as African professionals die of AIDS in increasing numbers. Teachers and students in Ghana, Kenya, and Uganda have received over 1,000 Kindles and 180,000 e-books, bringing massive e-libraries to schools.

Asia and Oceania: Asia has the largest share of the world's Internet users (45%) but only 26% penetration. China has about 513 million Internet users (up from 420 million in 2011) with about 350 million Internet-connected mobile phones (up from 280 million). Controversies continue over control of Internet access in China. Vietnam, India, Turkey, and Iran have tightened controls on Internet access and content. Phones are being smuggled into North Korea to post reports on conditions. The UN continues to rate South Korea the top e-ready country, but that nation is struggling with video game addiction. The BBC offers educational courses via the newspapers, TV, and mobile phones for learner-paced options in Bangladesh, with plans to improve the English language skills of 25 million Bangladeshis by 2017. India is establishing e government stations in rural villages.

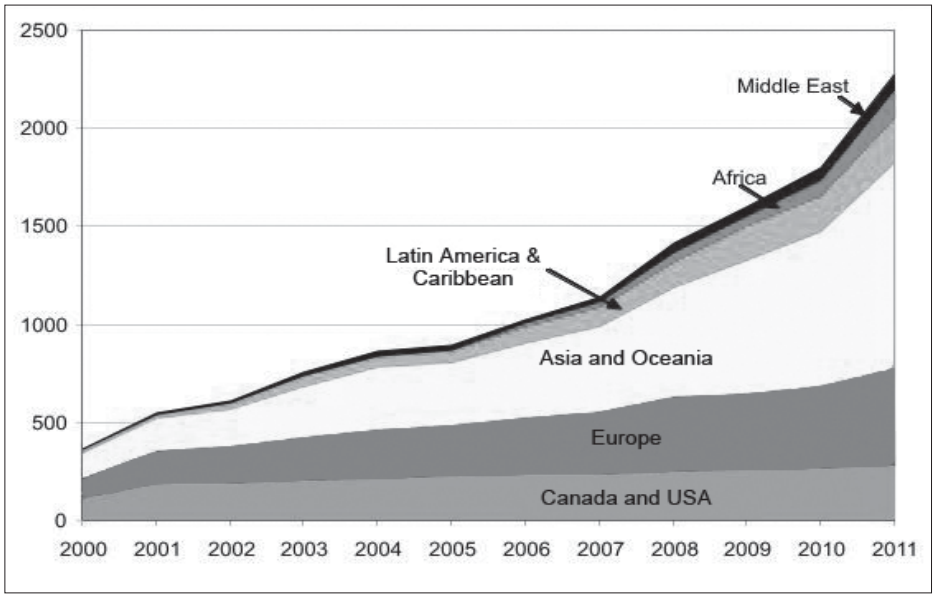
Europe: About 73% of EU-27 households had access to the Internet in 2011, unevenly distributed in the region. Russia with 50.8 million Intent users passed Germany (50.1 million) and France (42.3 million) in 2012 to become Europe's leader. Finland has made 1Mbps broadband a legal right for all Finns and plans to increase that to 100Mbps by 2015. The EU's Safer Internet Programme is working in 26 European countries to counter child pornography, pedophilia, and digital bullying. The EU policy is that Internet access is a right but that it can be cut off for misuse. Estonians (inside and outside their country) cast their votes for the Estonian parliament by mobile phones in March 2011. Macedonia is providing computers to all in grades 1–3. Montenegro mobile penetration is one of the highest in Europe—and it plans to connect its citizens overseas with its development process back home via the Tele-Montenegro website.

Latin America: About 40% of the region has

Internet access (up from 34% in 2011). The region's children with Internet access will rise from 1.5 million today to 30 million by 2015. Uruguay is the first country to provide all primary students with their own Internet-connected laptop, followed by Costa Rica. Fulfilling the promise of these tools will require more serious attention to training. The Internet was of great assistance in dealing with the Haiti earthquake. Although fiber optic cable has been laid between Cuba and Venezuela, connecting their governments, Cubans still have the slowest access in Latin America. Mexican Internet users average four hours online per day.

North America: Free to all on the Internet, Google and Wikipedia are making the phrase "I don't know" obsolete. Wikipedia is educating the world with 3.9 million articles in English and smaller amounts in 284 other languages. Silicon Valley continues as a world leader in innovative software due to company policies like Google's that gives its employees 20% free time to create anything they want. This "20-percent Time" is credited with half of Google's new products. The United States is in ninth place in the world in access to high broadband connections. Broadband development in rural and underserved areas was undermined by the financial crisis, but it is still a national priority in the U.S. There were 43,889 reported cyber-*attacks on U.S. government agencies* in *2011*, up 5% from the previous year.

Figure 6. Internet Users in the World by Geographic Regions (December 31, 2011)



Source: Internet World Stats www.internetworldstats.com

7. How can ethical market economies be encouraged to help reduce the gap between rich and poor?

According to the World Bank, extreme poverty ($1.25/day) has fallen from 52% in 1981 to about 20% in 2010, while the world population increased from to 4.5 billion to nearly 7 billion. The world has achieved the Millennium Development Goal of halving the rate of extreme poverty of 1990 before 2015. At this rate, however, about 1 billion people might be still living in extreme poverty in 2015. There were 1.94 billion people in extreme poverty in 1981. This fell to 1.29 billion in 2008. Those living at or below $2/day declined from 2.59 billion in 1981 to 2.47 billion in 2008. According to UNDP's 2011 Multidimensional Poverty Index, about 1.65 billion people are living in poverty.

World GDP grew 3.6% in 2011 (slower than the 4.6% IMF average forecast for 2011-2015), to $78.9 trillion (PPP), and is expected to pass $80 trillion in 2012. Per capita income grew from $11,500 in 2010 to $11,800 in 2011. The growth average was 4.1% for lower-income countries (less than $30,000 per capita per year) and 2.2% for the higher-income ones. The number of low-income countries has fallen from 63 in 2000 to 35 at the end of 2011.

The G20 represented 87% of the world's economy in 2011. The World Bank notes that the international capital flows to developing countries in 2010 rose to $1.1 trillion, out of which 73% went to 10 middle-income countries that represent 73% of developing countries' gross national income. Meanwhile, by 2011 the total external debt owed by developing countries increased to $4 trillion, of which 40% belonged to the BRIC group.

Over 50% of global GDP is generated in 600 urban centers, 400 of which are in emerging markets (200 in China alone). By 2030, the global middle class is expected to grow by 66%--about 3 billion more consumers with increased purchase power and expectations. Yet, the economic slowdown rose global unemployment to 9% of the 3.27 billion global workforce. The ILO estimates that some 75 million of the unemployed are young people aged 15-24, and 400 million new jobs would need to be created over the next 10 years to avoid a further rise in unemployment, while some 1.52 billion people are in vulnerable employment. Agriculture still employs 36% of the world workforce, while its contribution to global GDP is only 6%, compared with 31% for industry and 63% for the service sector. The gap between rich and poor within countries continues to widen around the world as the ratio between wages and profit become dangerously imbalanced. The 1% versus 99% movement along with protests and strikes around the world question the integrity of financial leaders and the fairness of the current economic system, and they call for changes toward more sustainable prosperity. New indicators are being developed for measuring progress and prosperity and to redress financial stability by enhancing welfare.

Exports in 2011 increased to $18 trillion, led by China with $1.9 trillion. The developing economies' share reached 47% for exports and 42% for imports, the highest ever on record. Major donors' foreign aid to developing countries fell in 2011 by 2.7% from its peak in 2010, for a total of $133.5 billion. This was 0.31% of DAC's combined GNP (less than half of the suggested 0.7%). Meanwhile, the South-South cooperation increased to 10-15% of total official aid, although in real terms it is estimated to be much higher, as the valuation of their services tends to be lower than that of western contractors. Global remittance flows, including those to high-income countries, were $483 billion in 2011, and the World Bank expects this will exceed $593 billion by 2014, of which $441 billion will go to developing countries.

The 2012 *State of the Microcredit* reports that the number of very poor families receiving a microloan rose from 7.6 million in 1997 to 137.5 million in 2010, affecting more than 687 million people. This progress contributes to the goal of helping more than 175 million of the world's poorest families get financial and business services and ensuring that 100 million families rise out of extreme poverty between 1990 and 2015. The UN estimates that a tax on international financial transactions might generate up to $250 billion per year, which could help offset the costs of the continuing economic, financial, fuel, climate, and food crises.

The rapid increase of entrepreneurship, self-employment, SMEs, and global communications and an international division of labor that develop new forms of business governance and relationships all have the potential to raise living standards and reduce income disparities among nations. Goldman Sachs estimates that e-commerce might reach $963 billion by 2013. Approximately 1 billion people in 96 countries now belong to a co-operative, according to the International Co-operative Alliance. Since half of the world major economies are multinationals, these businesses play a crucial role in poverty alleviation and building a sustainable economic system.

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. Conventional approaches to poverty reduction (technical assistance and credit) that work in low- and middle-income stable countries do not work in fragile countries, which need stability first.

Ethical market economies require improved fair trade, increased economic freedom, a "level playing field" guaranteed by an honest judicial system with adherence to the rule of law and by governments that provide political stability, a chance to participate in local development decisions, reduced corruption, insured property rights, business incentives to comply with social and environmental goals, a healthy investment climate, and access to land, capital, and information. Direction from central government with relatively free markets is competing with the decentralized, individualized private enterprise for lifting people out of poverty.

The landscape of the geoeconomical power is changing rapidly as the influence of the BRICS and other emerging economies, as well as of multinational enterprises is rising. New geopolitical economic alliances are growing: the G20 is already G35+, while the Group of 77 now includes more than 130 countries encompassing over 60% of the world's population. India launched the South-South Bank initiative in an attempt for the BRICS to create a new world financial system.

Challenge 7 will be addressed seriously when market economy abuses and corruption by companies and governments are intensively prosecuted and when the inequality gap—by all definitions—declines in 8 out of 10 consecutive years.

REGIONAL CONSIDERATIONS

Africa: The African Development Bank notes that 313 million people (34% of the region's population) are now middle-class, potentially rising to 1.1 billion by 2060. For the first time since 1981, less than half of sub-Saharan Africa's population is living below $1.25/day. The rate decreased from 59.4% in 1993 to 47% in 2008. Sub-Saharan Africa has the highest Multidimensional Poverty Index and has about one-third of the world's poor (473 million). Since the late 1990s, much of Africa experienced 4-6% economic growth, yet per capita income levels remain low due to population growth and high income disparities--100,000 people hold 80% of the wealth, according to AfDB. Increasing commodity prices worldwide helped African oil exporters while having adverse effects on oil-importing countries. Foreign direct investment in Africa rose sixfold over the past 10 years and is forecast to reach $150 billion by 2015. China is Africa's biggest trading partner, with bilateral trade growing from $10.6 billion in 2000 to $160 billion in 2011 and expected to further expand. Intra-African trade continues to account for only 10% of exports on the continent and is too weak to be an incentive for changing trade patterns. This might change with the Continental Free Trade Area expected to be set in 2017. Remittances to sub-Saharan African were $23 billion in 2011. In recent years, there was an increase in the promotion of small and micro enterprises through policies and funds, but township and local innovation systems are also needed to help reduce the rich-poor gap. Approximately 56.2 million hectares (5% of Africa's agricultural land) is subject to land-grabbing, further threatening the livelihoods of the already poor. Urban farming in the Democratic Republic of Congo is converting many unemployed people into small farmer entrepreneurs. The region's development continues to be impeded by high birth rates, increasing food prices, gender inequality, income and location biases, weak infrastructure, high indirect costs, corruption, armed conflicts, poor governance, environmental degradation and climate change, poor health conditions, and lack of education. There is a need to promote township innovation systems and local innovation systems to close the gap between the rich and the poor.

Asia and Oceania: China, Japan, and South Korea began negotiations for a Free Trade Agreement. This will be one of the biggest free trade areas, accounting for 20% of the world's GDP and 19% of exports. A larger Asian economic integration with ASEAN, an Asian Monetary Union, and an Asian Union are also in discussion. In 2011, China and India continued their spectacular growth at 9.2% and 7.8% respectively, and are now the world's second and third most powerful national economies. China reduced its poverty rate from 84% of population below $1.25/day in 1981 to 13% in 2008. In developing Asia outside China, although the rate dropped to 25% in 2008 from 41% in 1981, the number of people living in extreme poverty in 2008 remained around 1.1 billion. Chinese manufacturers are starting to outsource manufacturing to East Africa. South Asia has half of the world's Multidimensional Poverty Index poor (827 million). World Bank forecasts remittances to Asia to grow from $191 billion in 2011 to over $240 billion in 2014. In the aftermath of the Fukushima nuclear disaster, Japan's economy contracted 0.5%. Increasing pollution, water and energy problems, and the rich-poor gap threaten the future economic growth of developing Asia. Corruption, organized crime, and conflict continue to impede Central Asia's development. Natural disasters and the effects of climate change are

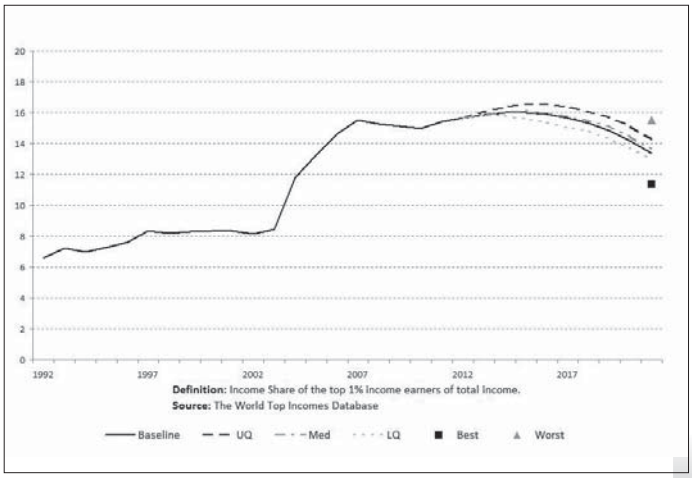
threatening the development and the very existence of entire Pacific communities. In the Middle East-North Africa region, youth unemployment is about 25% and nearly 5 million people are added to the workforce annually. The Arab Labor Organization estimates that a 1% increase of unemployment rate reduces GDP by 2.5%. The Arab Spring created momentum for building a more open economy and democratic society. Speculation is growing that the Asian economy might not realize the potential most have forecast and could stabilize at middle-income level, affecting the plans of many industrial nations to export products and services into the region.

Europe: The EU has the world's highest GDP—$15,821 billion (PPP)—but growth was less than 2% in 2011, and concerns increase about eurozone countries' debt and direction of fiscal policy. Discontent grows among the population as austerity measures increase inequality. Unemployed across the EU reached 10%, with 11% in the eurozone, where a total of 17.6 million people are out of work. In Spain and Greece, average unemployment rates are over 20% but over 50% for the young people. Some cite a lack of entrepreneurial attitudes combined with structural shortcomings of post-communist states that resulted in state-dependency attitudes among some social groups and young people in poorer areas. The eurozone leaders adopted a set of short- and long-term measures to save the euro and stimulate economic growth and are discussing several proposals, including a financial transaction tax across the eurozone, more centralized supervision of banks, and emission of eurobonds. The crisis also triggered negotiations over structural reforms, which might include a tighter political integration with more solidarity and concessions on fiscal sovereignty. Corruption is estimated at €120 billion a year (close to total EU annual budget), undermining the trust in the EU system as a whole. This is expected to be addressed by the new anticorruption resolution adopted in September 2011. The EU countries contributed 54% of DAC ODA, and six eastern EU member states increased their foreign aid in 2011. The Stabilization Fund and revenues from oil and gas exports helped Russia recover from the global financial crisis better than expected. Its relations with CIS and the EU are strengthening. Tele-Montenegro is being created to connect Montenegrins outside of the country with the development process back home.

Latin America: Latin America has the most unequal society in the world, and the income share of the bottom 10% of the population remained at 0.9-1% of total income for the past 15 years. Nevertheless, the share of people living below $1.25/day dropped from 14% in 1984 to 6.5% in 2008. According to OECD, less than 4% of state revenue is generated by personal income taxes, compared with 27% in industrialized countries, while VAT is placing an additional burden on poor customers. The "shadow economy" is estimated to about 40% relative to the formal one. Argentina's 8% was the highest economic growth in the region, while Brazil slowed down to 2.7%. Fiscal and economic reforms are improving stability, although country and regional policies increasingly focused on national interests and ethical behavior might affect future foreign investments.

North America: Despite its economic turmoil and slow GDP growth, the U.S. world economic domination will likely continue, thanks to its entrepreneurial spirit and innovative patent portfolio. However, its rich-poor gaps also continue; unemployment remains around 8%, while the ratio of labor compensation relative to business and national income reached a 50-year low. All growth in income during 2010 went to the wealthiest 10% of households, with 93% of it going to the wealthiest 1%. Increasing profits at the expense of lower wages is not sustainable and undermines markets at home. Canada's economy is focused on resources, with no clear sustainability strategy. The livelihood of the over 400 remote communities in the boreal and Arctic regions remains problematic and unaddressed.

Figure 7. Economic Income Inequality (% income share of the richest 1%)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

8. How can the threat of new and reemerging diseases and immune microorganisms be reduced?

The health of humanity continues to improve; the incidence of infectious diseases is falling, as is mortality from such diseases. And people are living longer, yet many old challenges remain and future threats are serious. The dramatic improvements in health and medical services over the past 20 years could be reduced by the ongoing economic problems cutting health budgets around the world. Bill Gates asked the G20 to keep their health commitments even though many face financial difficulties; if country health pledges are kept, they would add $80 billion annually from 2015 onward to create a healthier world.

Foreign aid for health increased 202% from 2000 to 2009. Previous health strategies, sustained growth in health budgets, and improving living standards over the last 20 years has resulted in at least 30% fewer children under five dying in 2010 than in 1990, total mortality from infectious disease fell from 25% in 1998 to less than 16% in 2010, and world maternal mortality fell from 4% in 1990 to 2% today. The number of malaria cases fell 23% in 105 countries between 2000 and 2009 and the number of deaths by 38%, even though antibiotic resistance emerged during this period. The number of measles deaths fell by 78% between 2000 and 2008. International collaboration to reduce HIV, SARS, and H1N1 (swine flu) had built better global health systems.

Non-communicable diseases and emerging and drug-resistant infectious diseases are also increasing. 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). Poverty, urbanization, travel, immigration, trade, increased encroachment on animal territories, and concentrated livestock production move infectious organisms to more people in less time than ever before and could trigger new pandemics. On average, 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, chikungunya, yellow fever, plague, dengue fever, meningitis, hemorrhagic fever, and diphtheria. In the last six years, more than 1,100 epidemics have been verified. About 75% of emerging pathogens are zoonotic (they jump species), which could increase as more humans convert nature to human habitat.

Although two new HIV infections occur for every one person starting treatment, the emergence and distribution of effective "test and treat" antiretroviral therapy (ART) has markedly changed the trajectory of the AIDS epidemic. According to the 2011 UNAIDS report, new HIV infections declined 21% over the past 12 years. HIV incidence has fallen in 33 countries, 22 of them in sub-Saharan Africa. AIDS-related deaths dropped by 19% between 2004 and 2010. Most of the success came in the last two years with rapidly increased antiretroviral medicine to treat and prevent HIV infection, fewer sexual partners per person, male circumcision, and increased condom use among African youth.

The median cost of antiretroviral medicine per person in low-income countries has dropped to $137 per year, although it is free in some areas; 47% of the estimated 9.7 million people in need of ART received it by the end of 2010. About 700,000 AIDS-related deaths were prevented by combination antiretroviral therapy. The new rapid "test and treat" strategy uses a variety of inexpensive tests (costing a few cents), from finger pricks to mouth swabs, and can now produce results in 1–20 minutes. Because ART reduces the viral load to the point where it cannot be detected, it also prevents transmission. Although there has been great progress in the last few years, during 2010 there were 2.7 million people newly infected with HIV and 1.8 million AIDS-related deaths. Today, 34 million people are living with HIV/AIDS, and an estimated 60% of people living with HIV are unaware of their HIV status. In Eastern Europe and Central Asia, the number of people living with HIV rose 250% from 2001 to 2010.

Highly visible epidemics were down in 2011–12 but current risks include NDM-1, an enzyme that can make a variety of bacteria resistant to most drugs (once found only in India and Pakistan, it has been detected in the United States, Canada, the Netherlands, the United Kingdom, and Australia); influenza in its many forms, especially avian flu (H5N1); food-borne epidemics, notably in China; cholera in Haiti, which due to the slow response could move to the Dominican Republic and Mexico; and the controversial laboratory-produced mutant avian flu as a potential intentional (terrorist) epidemic.

To counter bioterrorism, R&D has increased for improved bio-sensors and general vaccines able to boost the immune system to contain any deadly infection. Such vaccines could be placed around the world like fire extinguishers. Some small viruses have been found to attack large viruses, offering the possibility of a new route to disease cures. New

problems may come from unregulated synthetic biology laboratories of the future. People are living longer, health care costs are increasing, and the shortage of health workers is growing, making telemedicine and self-diagnosis via biochip sensors and online expert systems increasingly necessary. Better trade security will be necessary to prevent increased food- or animal-borne disease. Viral incidence in animals is being mapped in Africa, China, and South Asia to divert epidemics before they reach humans. Future uses of genetic data, software, and nanotechnology will help detect and treat disease at the genetic or molecular level.

The 17 neglected tropical diseases are a group of parasitic and bacterial infections that are the most common afflictions of the world's poorest people. They blind, disable, disfigure, and stigmatize their victims, trapping them in a cycle of poverty and disease. Many of these are waterborne diseases. High-density population growth and slow progress in sanitation in poorer areas keep these diseases active. Many low-cost interventions are available, yet the majority of affected people do not have access to them. Some of the largest health impacts remain schistosomiasis (200 million cases), dengue fever (50 million new cases a year), measles (30 million cases a year), onchocerciasis (18 million cases in Africa), typhoid and leishmaniasis (approximately a million each globally), rotavirus (600,000 child deaths per year), and shigella childhood diarrhea (600,000 deaths per year).

About half of the world's population is at risk of several endemic diseases. Hepatitis B infects up to 2 billion people. There is more TB in the world now than ever before, even though TB treatment success with DOTS exceeded 85%. Between 1995 and 2008, over 43 million people have been treated and 36 million people cured. There is also progress with malaria: 38 countries (9 in Africa) documented reductions of more than 50% in the number of malaria cases between 2000 and 2008, and more than 100 million long-lasting insecticide-treated bed nets have been distributed in the fight against malaria.

The best ways to address epidemic disease remain early detection, accurate reporting, prompt isolation, and transparent information and communications infrastructure, with increased investment in clean drinking water, sanitation, and handwashing. WHO's eHealth systems, smartphone technology, international health regulations, immunization programs, and the Global Outbreak Alert and Response Network are other essentials of the needed infrastructure.

REGIONAL CONSIDERATIONS

Africa: With 12 % of the world's population, Africa has 25% of the world's disease burden, 3% of its health workers, and 1% of its health expenditures. HIV incidence has fallen by 26% overall in 22 countries in sub-Saharan Africa due to ART, although the area still accounted for the majority of all people living with HIV in 2012. It has one of the world's worst tuberculosis epidemics, compounded by rising drug resistance and HIV co-infection. Patients on ART increased to 48% by the end of 2010 with an additional 1.3 million people added in the last year and "universal access" (greater than 80%) in Botswana, Namibia, and Rwanda. PEPFAR (a U.S. government program) is funding 105 medical schools in the sub-Saharan region to encourage graduates to stay in Africa and is funding laboratories across the continent. Some 16% of children in Zimbabwe and 12% in Botswana are AIDS orphans. Clinics in northern Malawi provided free antiretroviral drugs, which reduces adult AIDS deaths by 57% in three years. AIDS deaths fell 40% in urban Addis Ababa in a similar two-year program of free antiretroviral drugs.

Asia and Oceania: A new strain of whooping cough in Australia has the potential to become a global epidemic. The emergent research on NDM-1 gene and drug resistance found in the New Delhi water system has alerted WHO investigators to a "potential nightmare" situation. While China is investing $127 billion in new health infrastructure, Asia remains an epicenter of emerging epidemics. If Asian poultry farmers received incentives to replace their live-market businesses—the source of many viruses—with frozen-products markets, the annual loss of life and economic impacts could be reduced. China had 780,000 people with HIV/AIDS at beginning of 2012, which is expected to increase to 1.2 million by 2015, causing a discussion about co-payment options for drugs offered at no cost since 2003.

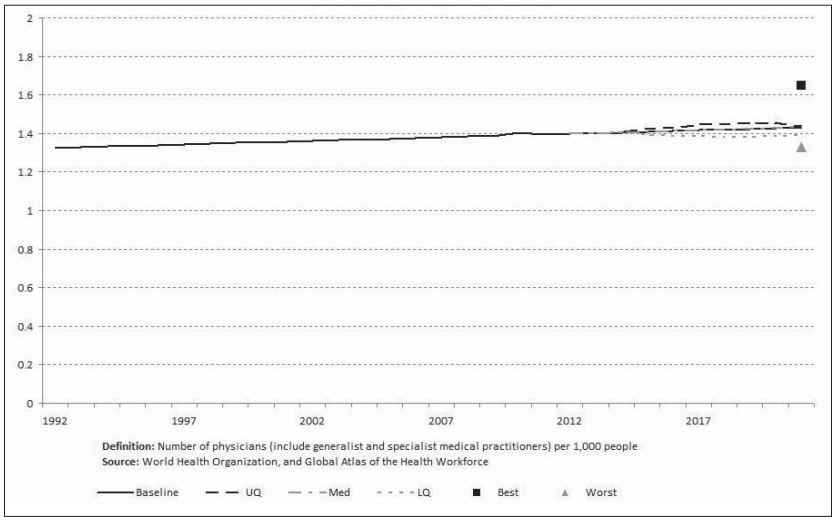
Europe: In Eastern Europe and Central Asia, there was a 250% increase in the number of people living with HIV from 2001 to 2010. The Russian Federation and Ukraine account for almost 90%. WHO Europe (*Health 2020*) is changing its focus toward prevention amid a funding crisis due to the global recession. The aging population of Europe continues to pressure government medical services, while infant mortality under five has been cut in half since 1990 and maternal mortality has dropped by one-fourth.

Latin America: The region has the highest life expectancy among developing regions. While Haiti's HIV rate has fallen from 6% to 2.2% over the last

10 years, the earthquake in 2010 devastated medical systems and brought on a cholera outbreak of a half-million cases and perhaps 250,000 more as the cholera strain is evolving and may become endemic. Some 100,000 Haitians are expected to be vaccinated this year. The HIV/ AIDS epidemic remains stable throughout Latin America. Brazil has shown that free ART since 1996 dramatically cut AIDS mortality, extended survival time, saved $2 billion in hospital costs, and keep prevalence to 0.6%. Neglected tropical diseases affect 200 million people in Latin America (intestinal worms, Chagas, schistosomiasis, trachoma, dengue fever, leishmaniasis, lymphatic filariasis, and onchocerciasis).

North America: The U.S. Food and Drug Administration approved Truvada, the first drug approved to reduce the risk of HIV infection in uninfected individuals. New U.S. health care legislation comes into full effect in 2014. In the meantime, with a slowed economy, hospitals are increasingly merging to form insurance-like systems; insurance companies are buying and/or making deals with health care providers. The U.S. is upgrading its electronic health records and other forms of health information technology with $29 billion from the HITECH Act. A California Biobank 20-year study will evaluate genetic markers for risk of disease in 250,000 patients by linking DNA samples to electronic medical records. The U.S. has 1.2 million people with HIV; Canada has 73,000. About 33% of children in the U.S. are overweight or obese, and one survey found that children aged 8–18 spent on average 7.5 hours a day with entertainment media.

Figure 8. Physicians (per 1,000 people)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

9. How can the capacity to decide be improved as the natureof work and institutions change?

The acceleration of change and interdependency, plus the proliferation of choices and the growing number of people and cultures involved in decisions, all increase uncertainty, unpredictability, ambiguity, and surprise. This increasing complexity of everything from world affairs to individual career choices 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. We have far more data, evidence, and computer models to make decisions today, but that also means we have far more information overload and excessive choice proliferation, leading many to seek external experts. The number and complexity of choices seem to be growing beyond our abilities to analyze, synthesize, and make decisions. 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.

Many of the world's institutions and decisionmaking processes are inefficient, slow, and ill informed. 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. Previous economic models continue to mistakenly assume that human beings are well-informed, rational decisionmakers in spite of research to the contrary.

Alternative approaches use diverse input and rules-based models to help anticipate outliers and surprise. Adaptive learning models such as cellular automata, genetic algorithms, and neural networks are growing in capability and accuracy, and databases describing individual behavior are becoming even more massive. Using leading indicators instead of lagging indicators can make analytics more useful to anticipate the need for decisions, rather than reacting to surprises. An organization's strategic consciousness could become more important than static strategic plans, allowing for management by understanding instead of just fixed objectives. This can help an organization act more like a complex anticipatory adaptive system.

In social sciences it has been difficult to develop "laws" to forecast social behavior and, hence, make good decisions based on forecasted consequences. With the advent of massive digital databases and new software, we can let the computer make more empirically based forecasts of the plausible range of how people will react to various decisions. At the same time, increasing democratization and interactive media are involving more people in decisionmaking, which further increases complexity and surprise. This can reinforce the principle of subsidiarity—decisions made by the smallest number of people possible at the level closest to the impact of a decision. Fortunately, the world is moving toward ubiquitous computing with institutional and individual collective intelligence (emergent properties from synergies among brains, software, and information) for "just-in-time" knowledge to inform decisions. Ubiquitous computing will increase the number of decisions per day, constantly changing schedules and priorities. Decisionmaking will be increasingly augmented by the integration of sensors imbedded in products, in buildings, and in living bodies with a more intelligent Web and with institutional and personal collective intelligence software that helps us select experts, information, and decision support software to receive and respond to feedback for improving decisions.

We like to think we make decisions based on values and consequences of the alternative choices. But sometimes the consequences are not clear and values can be in conflict. As a result, the judgment or intuition of experts can be sought. But how are we to identify experts for a given decision? An expert's intuition might be fine on one situation and terrible on the next. Addressing this is the use of diverse expert input and crowd sourcing to decisionmaking via collective intelligence systems.

The MIT Collective Intelligence Center sees its mission as answering "How can people and computers be connected so that collectively they act more intelligently than any individuals, groups, or computers have ever done before?" They are trying to develop measures of collective intelligence (like IQ tests for individuals). Rapid collection and assessment of many judgments via online software can support timelier decisionmaking. (See Chapter 14.2 for an explanation of the Real-Time Delphi.) Google invited "citizen cartographers" to refine the U.S. map. This sort of activity is fundamentally different than the "wisdom of crowds" in which the average judgment is taken to be an answer to unresolved issues. The "wisdom of crowds" approach is essentially a vote, while collective intelligence is a continually emergent property from synergies among data-information-knowledge, software-hardware, and individual and groups of brains that continually learn from

feedback. Self-organization of volunteers around the world via Web sites is increasing transparency and creating new forms of decisionmaking. Blogs are increasingly used to support decisions. Issues-based information software in e-government allows decisionmaking to be more transparent and accountable. Although cognitive neuroscience promises to improve decisionmaking, little has been applied for the public.

Political and business decisions include competitive intelligence and analysis to guide decisionmaking; as the world continues to globalize, increasing interdependencies, synergetic intelligence, and analysis should also be considered. What synergies are possible among competing businesses, groups, and nations? Synergetic analysis aims to increase "win-win" decisions that assist a larger number of enterprises while reducing the wasted efforts of "win-lose" decisions.

Cloud computing, knowledge visualization, and a variety of decision support software are increasingly available at falling prices. DSS improves decisions by filtering out bias and providing a more objective assessment of facts and potential options. Some software lets groups select criteria and rate options, some averages people's bets on future events, while others show how issues have alternative positions and how each is supported or refuted by research.

Often decisions are delayed because people don't know something—a condition Google is beginning to eliminate. Training programs for decisionmakers should bring together research on why irrational decisions are made, lessons of history, futures research methods, forecasting, cognitive science, data reliability, utilization of statistics, conventional decision support methods (e.g., PERT, cost/benefit, etc.), collective intelligence, ethical considerations, goal seeking, risk, the role of leadership, transparency, accountability, participatory decisionmaking with new decision support software, e-government, ways to identify and better an organization's improvement system, prioritization processes, and collaborative decisionmaking with different institutions.

Challenge 9 will be addressed seriously when the State of the Future Index or similar systems are used regularly in decisionmaking, when national corporate law is modified to recognize transinstitutional organizations, and when at least 50 countries require elected officials to be trained in decisionmaking.

REGIONAL CONSIDERATIONS

Africa: The first Global African Diaspora summit held in South Africa in May 2012 called for professionals in the African diaspora to return with their skills to help the continent. If the brain drain cannot be reversed, African diaspora should be connected to the development processes back home through Internet tele-nation systems. There are several ambitious strategic plans to close Africa's infrastructure gap, such as the AU-NEPAD African Infrastructure Action Plan 2010–2015, the Infrastructure Project Preparation Facility, and the Pan–African Infrastructure Development Fund. North African revolutions promised to open the decisionmaking processes, increasing freedom of the press to better inform the public. For tribally oriented Africa, the question remains, how can the cultural advantages of extended families be kept while making political and economic decisions more objective and less corrupt? Development of African civil society may need external pressure for freedom of the press, accountability, and transparency of government. Microsoft is collaborating to help e-government systems improve transparency and decisionmaking.

Asia and Oceania: In general, decisions tend to focus more on the good of the family than on the good of the individual in Asian societies. Will the individualistic Internet change this philosophy? Synergies of Asian spirituality and collectivist culture with the Western more linear, continuous, and individualistic decisionmaking systems could produce new decisionmaking philosophies. Kuwait has introduced a national collective intelligence system and a national SOFI for the Early Warning System in the Prime Minister's Office. ASEAN could be the key institution to help improve decisionmaking systems in the region.

Europe: The European financial crises, bureaucratic complexity, lack of transparency, and proliferation of decision heads threatens clear decisionmaking in the EU. Europe is experiencing "reporting fatigue" due to so many treaties and bureaucratic rules. Tensions between the EU and its member governments and among ethnic groups are making decisionmaking difficult. The cornerstone of the EU response to economic and financial crisis is the new set of rules on enhanced EU economic governance that entered into force on 13 December 2011. It has four main components: stronger preventive action through a reinforced Stability and Growth Pact and deeper fiscal coordination;

stronger corrective action through a reinforced SGP; minimum requirements for national budgetary frameworks; and preventing and correcting macroeconomic and competitiveness imbalances. Russia is improving policy decisionmaking efficiency by coordination among stakeholders in nanotechnology research among several Councils, Commissions at the Russian Parliament, the government, and the Russian Academy of Science. It was a response to the cross-sectoral and multidisciplinary nature of nanotech.

Latin America: Chile is pioneering e-government systems that can be models for other countries in the region. For e-government to increase transparency, reduce corruption, and improve decisions, Internet access beyond the wealthiest 20% is necessary. The remaining 80% receive inefficient service, difficult access locations, restricted operating hours, and nontransparent processes. Government institutional design, management, and data for decisionmaking are weak in the region. Latin America has to improve citizen participation and public education for political awareness.

North America: In 1997 IBM's Deep Blue beat the world chess champion; in 2011 IBM's Watson beat top TV quiz show knowledge champions. What's next? Apps on mobile phones for collective intelligence? Blogs and self-organizing groups on the Internet are becoming de facto decisionmakers in North America, with decisions made at the lowest level appropriate to the problem. Approximately 20% of U.S. corporations use decision support systems to select criteria, rate options, or show how issues have alternative business positions and how each is supported or refuted by research. Intellipedia provides open source intelligence to improve decisionmaking. The region's dependence on computer-augmented decisionmaking—from e-government to tele-business—creates new vulnerabilities to manipulation by organized crime, corruption, and cyber-terrorism, as discussed in Challenges 6 and 12.

10. How can shared values and new security strategies reduce ethnic conflicts, terrorism, and the use of weapons of mass destruction

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 regional organizations. Despite the Arab Spring/Awakening, the Global Peace Index's rating of 158 countries' peacefulness improved for the first time in four years.

After the collapse of the Soviet bloc, the types of warfare changed dramatically. All major forms of armed conflict have been decreasing over the past 20 years, but the past two years have seen an increase in internal conflicts, along with non-state actors like Al Qaeda. The UN estimates that 40% of the internal conflicts over the past 60 years were natural resource–related. As growing populations and economies increase the drain on natural resources, social tensions are expected to increase, triggering complex interactions of old ethnic and religious conflicts, civil unrest, and indigenous protests, terrorism, and crime. Substantial technological and social changes will be needed to prevent this; countries will need to include non-traditional security strategies for addressing the root causes of unrest and protecting individuals as well as sovereign states. Although the degree of climate change's impacts is certain, it would be prudent to plan to adapt to increasing floods in wet areas, increasing droughts in dry areas, falling river flows fed by mountain ice, and seawater incursions into freshwater areas. Conflicts related to natural resources and/or environmental degradation are twice as likely to return to violence or become "re-wars" within five years; hence, peace agreements should address these environmental conditions while dismantling the structures of violence and establishing structures of peace.

Conflicts have decreased over the past two decades, cross-cultural dialogues are flourishing, and intra-state conflicts are increasingly being settled by international interventions. But these have increased in the recent past. According to the Heidelberg Institute for International Conflict Research, there were 20 wars in 2011 (with more than 1,000 battle-related deaths). This increase is mainly due to the Arab Spring/Awakening giving war status to Yemen, Libya, and Syria. Furthermore, 11 already existing conflicts escalated to war in 2011: in Nigeria (2 wars), Egypt, Côte d'Ivoire, Sudan (2), South Sudan, Turkey, Yemen, Myanmar, and Pakistan. The 27.5 million internally displaced persons is the highest total since the 1990s. Civilians continue to constitute most of the severe death toll from the worldwide struggle with violent extremism. SIPRI estimates that global military expenditures in 2011 reached $1.74 trillion, about the same as 2010. There are 16 UN Peacekeeping missions, plus a political mission in Afghanistan. These are served by 121,443 personnel from 117 countries.

At the beginning of 2011 there were at least an estimated 11,540 active nuclear weapons, down from more than 65,000 in 1985, with worldwide costs spent on nuclear weapons of over $100 billion. The nexus of transnational extremist violence is changing from complex organized plots to attacks by single individuals or small independent groups. Mail-order DNA and future desktop molecular and pharmaceutical manufacturing, plus access (possibly via organized crime) to nuclear materials, could one day give single individuals the ability to make and use weapons of mass destruction (SIMAD: Single Individuals Massively Destructive)—from biological weapons to low-level nuclear ("dirty") bombs. We have to develop mental health and education systems to detect and treat individuals who might otherwise grow up to use such advanced weapons, as well as networks of nanotech sensors to later alert us to them and their weapons.

The IAEA database records a total of 2,164 incidents of illicit trafficking and other unauthorized activities involving nuclear and other radioactive materials between 1993 and the end of 2011(up from 1,980 last year). During 2011, the IAEA received reports of 147 nuclear trafficking incidents (compared with 222 during 2009 and 176 during 2010), ranging from illegal possession and attempted sale and smuggling to unauthorized disposal of materials and discoveries of lost radiological sources.

Governments and industrial complexes find themselves under multiple daily cyberattacks (espionage or sabotage) from other governments,

competitors, hackers, and organized crime. The sources of these assaults are most often impossible to identify, rendering retribution impossible. Much effort is being devoted to cyber-defense and potential countermeasures. Because society's vital systems increasingly depend on the Internet, cyberweapons to bring them down can be thought of as weapons of mass destruction. Higher-income countries could be at a disadvantage in cyber warfare due to their massively connected society. Advanced army foot soldiers are nodes in vast networks of combat machines, with sibling combatants thousands of miles away controlling killing drones overhead.

Military power has yet to prove effective in asymmetrical warfare without genuine cultural engagement, and there is an urgent need for continuing work on making irregular warfare more humane, such as limiting the use of drones. Peace strategies without love, compassion, or spiritual outlooks are less likely to work because intellectual or rational systems alone are not likely to overcome the emotional divisions that prevent peace. Conflict prevention efforts should work in and with all the related factions, including conversations with hardliner groups, taking into consideration their emotional and spiritual sensibilities. Massive public education programs are needed to promote respect for diversity and the oneness that underlies that diversity. It is less expensive and more effective to attack the root causes of unrest than to stop explosions of violence. Some believe that the collective mind of humanity can contribute to peace or conflict, and hence we can think ourselves into a more peaceful future.

Early warning systems of governments and UN agencies could better connect with NGOs and the media to help generate the political will to prevent or reduce conflicts. User-initiated collaborations on the Web should be increasingly used for peace promotion, rumor control, fact-finding, and reconciliation. Back-casted peace scenarios should be created through participatory processes to show plausible alternatives to conflict stories (see Chapter 3.7). It is still necessary, however, to bring to justice those responsible for war crimes and to support the International Criminal Court. Transitional justice is one of major factors for success in post-conflict peace-building. The Geneva Convention should be modified to cover intra-state conflicts. The Convention on Cluster Munitions has 71 State Parties, and a treaty is being negotiated at the UN for setting legally binding international standards for the transfer of conventional arms. Better land ownership recording systems need to be introduced in developing countries to remove land grabbing as a cause of conflict.

Governments should destroy existing stockpiles of biological weapons, create tracking systems for potential bioweapons, establish an international audit system for each weapon type, and increase the use of non-lethal weapons to reduce future revenge cycles. Networks of CDC-like centers to counter impacts of bioterrorism should also be supported. Challenge 10 will be addressed seriously when arms sales and violent crimes decrease by 50% from their peak.

REGIONAL CONSIDERATIONS

Africa: The Arab Spring/Awakening opened the wider Arab world to a variety of future scenarios. While the revolutions already gave rise to new systems of government and democracy in some countries, these first have to prove themselves and stabilize their territories. Some believe the death of Osama bin-Laden decreases Al Qaeda's role from Mauritania to Indonesia, while others see a rising Muslim Brotherhood. Sub-Saharan Africa has slowly decreased conflicts over the past 10 years. Cost of conflicts fueled by imported weapons in Africa is estimated at $11 billion. The Special Court for Sierra Leone convicted ex-Liberian president Charles Taylor for war crimes. South Sudan has achieved independence, but hostilities with the North are continuing. Some 40% of the world's internally displaced persons (11.1 million) are in Africa. Sudan accounted for more than 40% of all African IDPs. The unrest between Christians and Muslims in Nigeria has intensified and threatens to ignite wider sectarian conflict in the region. The current crisis in Mali threatens the stability of all West Africa. Youth unemployment, illiteracy of about 50% among young people, and 11.6 million AIDS orphans may fuel a new generation of violence and crime.

Asia and Oceania: Territorial disputes in the South China Sea present a long-term source of tension as oil reserves diminish elsewhere while demand increases. An internationally acceptable solution to Iran's and North Korea's nuclear ambitions is still lacking, and Pakistan's internal instability and uncertain relationships with India and Afghanistan hinder the peacemaking and counter-extremist efforts in all three countries. The $7.5 billion in civilian aid given to Pakistan over the past five years has been largely ineffective. NATO has finalized its plans for withdrawal from Afghanistan; Iraq's future stability is in doubt. Russia, like the U.S., is turning its principal foreign policy attention to Asia. India is facing spreading Maoist violence. Muslim populations from Chechnya to the Philippines are struggling for

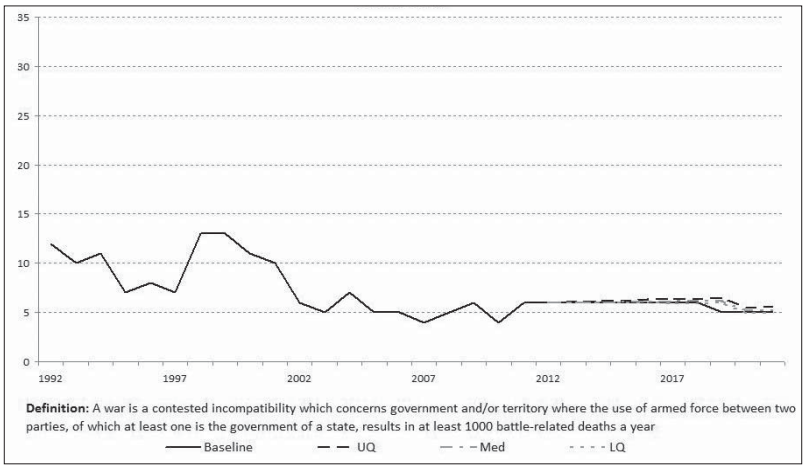
political and religious rights. Ethnic and religious frictions are increasing in Indonesia, the Philippines, and Bali. In the wake of the Arab revolutions, Syria, Turkey, Iraq, and Iran fear possible aspirations for an independent Kurdistan through the Kurdish minorities in their countries. Myanmar (Burma) continues its progress back into the community of nations. Relations between North and South Korea have deteriorated under Seoul's conservative leader Lee Myung-bak and the new dictator Kim Jung Un. Upcoming leadership changes among the major players such as South Korea, China, and the U.S. are expected to affect the developments and dynamics in North Korean issues. China's internal problems over water, energy, demographics, urbanization, income gaps, and secessionist Muslims in the northwest will have to be well-managed to prevent future conflicts. Future geopolitical tensions over control of South China Sea's supplies seem inevitable with Vietnam, Indonesia, Malaysia, Brunei, and the Philippines. Alliances within the Association of South East Asian Nations can broaden the scope of the tensions, including with the United States. Demonstrations in Bahrain continue to be brutally suppressed.

Europe: Increasing youth unemployment and fiscal austerity in some of the Eurozone have been met with violent social protests. In 2012 the youth unemployment rate in Greece and Spain is more than 50%. The large numbers of migrant laborers entering the EU will require new approaches to integrate them better into society if increased conflicts are to be prevented. This is aggravated by the new surge of immigrants from the Arab uprisings that Italy has taken in but other countries are unwilling to accommodate. The Roma population continues to be a challenge across the continent, but the Basque ETA rebels have foresworn violence. Stronger and more stable institutions and further political integration are needed to keep the EU together.

Latin America: Although national wars are rare in the region, internal violence from organized crime paramilitaries continues to be fueled in some areas by corrupt government officials, military, police, and national and international corporations. Mexico's war against organized crime has further accelerated, with nearly 50,000 drug war–related killings since December 2006 (12,900 of them in 2011). Recent political changes have begun to improve opportunities for indigenous peoples in some parts of the region, while political polarization over policies to address poverty and development persist. Brazil proceeds on its path toward world power status. Argentina is resuming a more aggressive stance toward the Falklands question. Violence is impeding development in Central America, a region with one of the highest crime and homicide rates of the world.

North America: The U.S. has withdrawn from Iraq and plans for withdrawal from Afghanistan are under way. As Arctic ice continues to melt, vast quantities of natural gas and oil will be accessible where national boundaries are under dispute. This could be a source of U.S.-Canadian tension, along with Russia, Norway, and Denmark. Cooperation on environmental security could become a focus of U.S.-China strategic trust.

Figure 9. Number of Wars Globally in which more that 1000 People were Killed in the Year



Graph part of the 2012 State of the Future Index computation, with "best" and "worst" values assessed by an international panel through the RTD exercise (See Chapter 2, SOFI 2012)

11. How can the changing status of women help improve the human condition?

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 requests, and demanding accountability. Patriarchal structures are increasingly challenged around the world. The process toward gender political-economic equality seems irreversible.

Suffrage is virtually universal. 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 20 women heads of state or government.

Yet the 2012 Gender Equity Index computed by Social Watch shows that none of the 154 countries assessed has narrowed the gender gap to an "acceptable" level. The Social Institutions and Gender Index computed by OECD—which considered the root causes of gender inequality, discriminatory laws and social norms—shows that countries with better SIGI scores have women participation in paid jobs close to 50%, while in countries with high discrimination, women employment is just above 20%.

Women's share of wage world paid employment is 41%, but they hold 20% of senior manager positions. Although 117 countries have equal pay laws, in many cases women are still paid up to 30% less than men for similar work. Women do most of the informal or un-monetized work in all regions, and they represent 50.5% of the 1.52 billion workers in vulnerable employment, often lacking legal and economic protection. Since old family structures persist, in most cases women's economic roles are added to her traditional housework. Hence, basic services such as preschools and child care should be integral part of strategies to improve the status of women.

About 70% of people living in poverty are women, most of them in rural areas. While representing a large share of the agricultural workforce, women farmers benefit from only 5% of agricultural extension services. FAO estimates that equal access with men to ownership and management of productive resources and assets could raise agricultural output in developing countries by up to 4%, improving food security and reducing the number of hungry people by 100–150 million. Microcredit institutions report that in 1999–2010, the number of poor women reached has increased from 10.3 million to 113.1 million, representing 82% of microloans. However, many of these businesses are too small to significantly improve living standards unless entrepreneurial talent is engaged to scale up the business.

With an estimated control of over 70% of global consumer spending, women strongly influence market preferences. Analysis shows a direct interdependence between countries' Gender Gap Index and their Competitiveness Index scores and that Fortune 500 companies with more gender-balanced boards could outperform the others by as much as 50%.

UNESCO reports that youth literacy is 95% or higher in more than half of the countries. Despite important gains, in 2010 the basic literacy rate for young females was 87%, compared with 92% for young males. Women continue to represent about 64% of the 775 million adult illiterates, and more than 800 million women lack the skills necessary for improving their economic opportunity. Mothers should use their educational role in the family to assertively nurture gender equality.

The health gender gap is generally closing, but women-specific challenges persist. Although maternal mortality decreased 47% over the past two decades, in 2010 about 287,000 women died of pregnancy-related complications. The global maternal mortality ratio was 210 deaths per 100,000 live births, with highest prevalence in parts of Africa and Asia due to high fertility rates and weak health care systems. Recognizing women's reproductive rights and providing effective family planning are crucial to curb maternal deaths and to achieve the MDG goal of reducing maternal mortality to 120 deaths per 100,000 live births by 2015.

Regulations should be enacted and enforced to stop female genital mutilation, which traumatizes about 3 million girls each year, in addition to the 130–140 million women already affected, mostly in Africa and some parts of Asia and the Middle East. Thanks to concerted efforts by UN and NGOs, over the last few years some 8,000 communities abandoned FGM/C and almost 3,000 religious leaders declared that the practice should end.

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 life can be as high as 70%—ranging from domestic violence to rape as warfare. These are the most underreported crimes worldwide, continuing

to be perpetrated with impunity. Of the estimated 800,000 people trafficked annually, 80% are female, 79% of whom are trafficked for sexual exploitation. While domestic violence is outlawed in 125 countries, 603 million women live in countries where it is not considered a crime. School systems should consider teaching self-defense in physical education classes for girls. Infringements on women's rights should be subject to prosecution and international sanctions. (See Appendix E for an annotated list of resources addressing gender equity and the study conducted by Millennia 2015 on potential policies to improve the status of women.)

The UN Trust Fund grants to end violence against women are expected to reach 6 million people in 86 countries. Resolution 1325 protects women in wartime and their active participation in peace-building, as do the 15% of UN post-conflict budgets allocated to women. A panoply of international treaties and dedicated UN organizations are vigorously advancing women's rights. With the patronage of UNESCO, the global foresight process Millennia 2015 prepares an action plan for women's empowerment and is developing the first Women State of the Future Index.

Traditional media are not combating gender stereotyping, and women are poorly represented in journalism top management positions. However, more women than men are active users of social media, a powerful new medium for change. A global survey showed that mobile phones make 93% of women feel safer and 85% more independent, while for 41% they increased economic opportunities. A recent Millennium Project study on changing stereotypes concluded that slow but massive shifts in gender stereotypes will occur over the next few decades. (See Chapter 12. Changing Gender Stereotypes.)

Challenge 11 will be addressed seriously when gender-discriminatory laws are gone, when discrimination and violence against women are prosecuted, when the goal of 30%+ women's representation in national legislatures is achieved in all countries, and when development strategies include gender equity throughout all sectors.

REGIONAL CONSIDERATIONS

Africa: Dr. Nkosazana Dlamini-Zuma of South Africa became the first woman Chairperson of the African Union Commission. In sub-Saharan Africa, women representation is 19.7% in legislature and 20.4% in ministerial positions, while Rwanda has a women-majority parliament. Gender-focused programs and initiatives are expected to substantially improve women's status by 2060. Presently, the average fertility rate in the region is 5.1 and is not expected to drop below 3 by mid-century. Sub-Saharan Africa has the world's highest maternal mortality, with woman facing a 1-in-39 lifetime risk of dying during pregnancy or childbirth. According to Save the Children, Niger is the worst country on Earth in which to be a mother. Sub-Saharan Africa has the lowest rates of youth literacy (72%) and secondary school enrollment (34%), and only 50% of adult women and 70% of adult men can read. Although women represent 52% of agricultural labor force, they have little or no land ownership and are further affected by increasing land-grabbing by foreign companies or countries. Women are more likely than men to be in vulnerable employment in North Africa (55% versus 32%), the Middle East (42% versus 27%), and sub-Saharan Africa (nearly 85% versus 70%). In the MENA Arab States, women's rights and liberties are poor, and despite their equal participation in the revolutions, women's representation in the new governments has been overlooked. In Egypt's recent elections, only 6% of the 376 women candidates were backed by political parties, and women represent only 2% in the new legislature.

Asia and Oceania: High incomes and education rate in countries like Japan challenge old family structures; many women are not getting married. Countries as diverse as Japan and Saudi Arabia accept women earning a PhD but not so much that women hold senior executive positions, which may lead to a "female brain drain" to more-tolerant countries. The literacy rate for women 15–24 years old is now 99% in China and 80% in India. In Southeast Asia, a woman faces a 1-in-290 lifetime risk of dying during pregnancy or childbirth, and 20% of worldwide maternal deaths occur in India. The fertility rate in India is 2.7, infant mortality is 50 per 1,000 births, about 43.5% of children are underweight, and 33% are not immunized with triple vaccine. The preference for male children, largely due to inheritance laws and dowry liabilities, is causing a gender imbalance, with some communities in China and India reaching birth ratios of 60–70 females to every 100 males. According to UNICEF, in some parts of Nepal and India about 40% of girls become child brides. With more than a million Indian women now members of panchayats (local village councils), unethical practices are expected to change. Women representation in legislatures is 17.9% for Asia, 14.9% for the Pacific, and 13% in the Arab States (up from 3.6% in 2000). The Arabian Peninsula is still

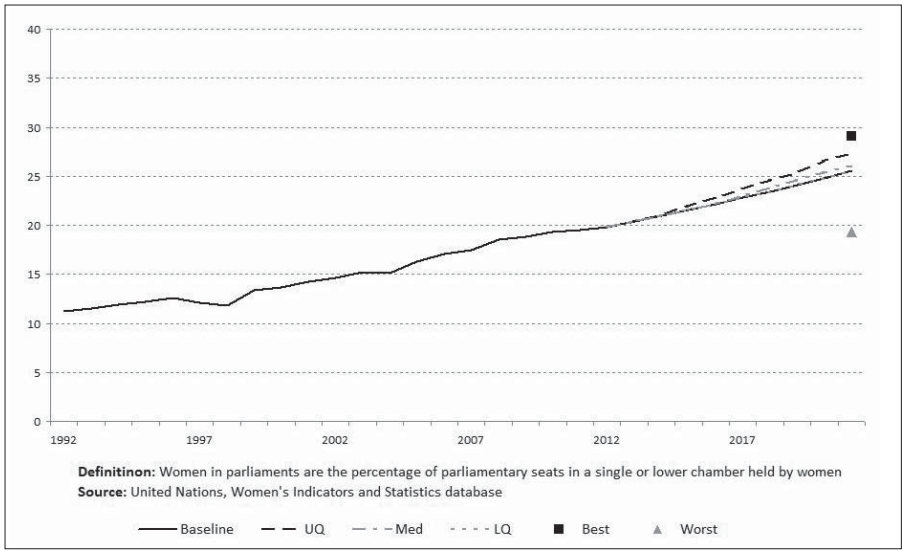
dominated by *purdah* and *namus* customs. In Saudi Arabia, women are promised participation rights for the first time in the 2015 local elections.

Europe: Gender parity is central to the economic recovery strategy and structural changes in Europe. Women represent 25.7% of ministries of the 27 EU governments; they hold 42% of parliamentary seats in Nordic countries, 21.1% in OSCE countries (excluding Nordic ones), and 35.2% of EU Parliament seats. France's new government is composed of equal numbers of women and men. An EU Commission planned directive would require company boards to have 30% women by 2015 and 40% by 2020. In 2010, only 12% of board members were women, and salaries of women continued to be 16.4% lower than men's for the same work. In the UK, only 14% of SMEs are led by women, and the Aspire Fund was set to support female business initiatives. In Germany, a campaign aims to get women 30% of journalism management positions by 2017. In Russia, a draft law proposes that at least 30% of parliamentary seats should be occupied by women (compared with present 13.6%), as well as providing advantages for men to play a greater role in the family life. Poland has passed a law that states at least 35% of local candidates in general elections must be female. However, the number of women in the Parliament didn't increase much after the last election because men got better places on ballot papers.

Latin America: Five of the region's countries have female heads of government. Women's participation in Latin American parliaments improved due to the introduction of quotas in many countries. More women than men attain tertiary education across the region, but wage discrepancies persist. Despite economic and political progress, women's well-being continues to be hindered by the machismo structures. Women are victims of organized crime in various forms, but they also represent an increasingly important force fighting it. Rural and indigenous women work at least 16 hours a day, mostly not paid. As a result of restrictive legislation, one in three maternal deaths is due to abortion, and the lifetime risk of maternal death is 0.4%.

North America: About 10% of women in the U.S. and 31% in Canada earn more than their partners. One third of the Canadian self-employed are women. More women are graduating from universities than men in North America and increasingly in other countries as well. Yet only 15% of senior managers in the U.S. are women, and they earn 23% less than men for comparable work. The Paycheck Fairness Act—a bill not yet approved—aims to counter gender-based pay discrimination. Over 50% of births to women younger than 30 in the U.S. occurs outside marriage. About 4 million women and children of low-income single mothers are jobless and without financial aid. Women's representation in U.S. legislatures is only 16.9%, while in Canada the figure is 24.7%. Both U.S. and Canadian governments made critical cuts in domestic and international family planning programs for women.

Figure 10. Seats Held by Women in National Parliament (% of all parliamentarians)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012) Data source: Inter-Parliamentary Union

12. How can transnational organized crime networks be stopped from becoming more powerful and sophisticated global enterprises?

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 a strategy, TOC continues to grow. INTERPOL will open a Global Complex in Singapore in 2014 to serve as a center for policy, research, and worldwide operations. The UN Office on Drugs and Crime has called on all states to develop national strategies to counter TOC as a whole, which can provide input to the development and implementation of global strategy and coordination. Yet UNODC notes that states are not seriously implementing the UN Convention against Transnational Organized Crime, which is the main international instrument to counter organized crime. UNODC, with other agencies, has founded the International Anti-Corruption Academy, near Vienna; one of its goals is to tackle the connection of TOC and corruption. That combination, allowing government decisions to be bought and sold like heroin, makes democracy an illusion.

Havocscope.com estimates the total black market in 91 of 196 countries in the world to be valued at $1.93 trillion. There is some double accounting in some of these numbers, but to share the scope of Havocsope's estimates: corruption and bribery $1.6 trillion; money laundering $1.4 trillion; counterfeiting and intellectual property piracy $654 billion; global drug trade $411 billion; financial crimes $194 billion, environmental crimes $138 billion, human trafficking and prostitution $240 billion. These figures do not include extortion and data from 105 countries; hence, the total organized crime income could be over $3 trillion—about twice as big as all the military budgets in the world.

The UN Global Commission on Drug Policy concluded that the law enforcement of the "War on Drugs" has failed and cost the U.S. $2.5 trillion over 40 years. It recommends a "paradigm shift" to public health over criminalization. Even though there are an estimated 272 million drug users worldwide with 250,000 deaths annually, some people in international meetings in Latin America have said it is time to legalize drugs, considering the cost/benefit. It has become clear that anti-TOC capabilities must be part of any country's development plan and fed by an on-going threat assessment system.

There are more slaves today than at the peak of the African slave trade. Estimates range from 12 million to 27 million people being held in slavery today, with the vast majority in Asia. ILO estimates that 20.9 million people are victims of human trafficking worldwide; UNFPA estimates about 4 million people trafficked per year, while UNODC states that 79% of trafficked people are for sexual exploitation.

The transition of much of the world's activities to the Internet and mobile phones has opened up a wealth of opportunities for TOC to profitably expand its activities from drugs and human trafficking to all aspects of personal and business life. The online market in illegally obtained data and tools for committing data theft and other cybercrimes continues to grow, and criminal organizations are offering online hosting of illegal applications. The financial crisis and the bankruptcy of financial institutions have opened new infiltration routes for TOC crime. Interpol has noted the experts' warning that the cost of cyber crime is larger than the combined costs of cocaine, marijuana, and heroin trafficking. International financial transfers via computers of $2 trillion per day make tempting targets for international cyber criminals. The International Carder's Alliance, a confederation of online criminals, is based mostly in Eastern Europe, the heart of cybercrime, which the FBI estimates costs U.S. businesses and consumers billions annually in lost revenue.

It is time for an international campaign by all sectors of society to develop a global consensus for action against TOC. OECD's Financial Action Task Force has made 40 good recommendations to counter money laundering, but these crimes continue unabated. Two conventions help bring some coherence to addressing TOC: the UN Convention against Transnational Organized Crime, which came into force in 2003, and the Council of Europe's Convention on Laundering, which came into force in May 2008. Possibly through an addition to one of these conventions or the International Criminal Court a financial prosecution system could be established as a new body to complement the related organizations addressing various parts of TOC. In cooperation with these organizations, the new system would identify and establish priorities on top criminals (defined by the amount of money laundered) to be prosecuted one at a time. It would prepare legal cases, identify suspects' assets that can be frozen, establish the current location of the suspect, assess the local authorities' ability to make an arrest, and send the case to one of a number of preselected courts. Such courts, like UN peacekeeping forces, could be identified before being called into action and trained, and then be ready for instant duty. When all these conditions are met, then all the orders would be executed at the same

time to apprehend the criminal, freeze access to the assets, open the court case, and then proceed to the next TOC leader on the priority list. Prosecution would be outside the accused's country. Although extradition is accepted by the UN Convention against Transnational Organized Crime, a new protocol would be necessary for courts to be deputized like military forces for UN peacekeeping, via a lottery system among volunteer countries. After initial government funding, the system would receive its financial support from frozen assets of convicted criminals rather than depending on government contributions.

Challenge 12 will be seriously addressed when money laundering and crime income sources drop by 75% from their peak.

REGIONAL CONSIDERATIONS

Africa: INTERPOL reopened its Regional Bureau in new premises in Abidjan, Côte d'Ivoire, in July 2012 to focus on arms and drug trafficking, terrorism, human trafficking, and maritime piracy. ECOWAS is beginning to foster regional partnerships among West African governments to improve coordinated implementation of counter-crime strategies. The drug traffic from Latin America through the West African coast to Africa and Europe has grown by a factor of four in recent years; more than a third of the $800 million annual flow is consumed there. UNODC is helping Guinea-Bissau improve its internal anti-smuggling capabilities. Piracy is increasing against vessels off East and West Africa; of the world's 439 attacks in 2011, some 275 occurred off Somalia and in the Gulf of Guinea. There were 168 attacks worldwide in the first half of 2012. A multinational naval force is combating the problem, which is complicated by the lack of clear international legal structures for prosecution and punishment and the lack of a strategy to address the root causes that led to the escalation of piracy. Some 930,000 sailors have signed a petition to the IMO to stop piracy. The unsettled future of Somalia and Yemen could leave the oil shipping lanes of the Arabian Sea bordered by two failed states. There are reports of males being trafficked from Kenya to the Gulf states as sex slaves. The 15 million AIDS orphans in sub-Saharan Africa, with few legal means to make a living, constitute a gigantic pool of new talent for the future of organized crime. Corruption remains a serious impediment to economic development in many African countries.

Asia and Oceania: ILO reports that 59% of human trafficking happens in Asia and the Middle East. China has 13% of the value of global illegal markets, the second largest in the world at $261 billion. Drug use is rising in Iran, which is spending $1 billion per year on countermeasures. The amount of opium produced in Afghanistan increased by 61%, from 3,600 tons in 2010 to 5,800 tons in 2011. UNODC estimates that the annual income to all those involved in the Afghan drug trade totals close to $3 billion, with the largest share going to the traffickers. China is the main source for counterfeit goods sent to the EU. The relative scarcity of females in China is leading to their being trafficked in from adjoining countries for marriage. India is a major producer of counterfeit medicines. North Korea is perceived as an organized crime state backed up by nuclear weapons involved in illegal trade in weapons, counterfeit currency, sex slavery, drugs, and a range of counterfeit items. Myanmar is accused of deporting migrants to Thailand and Malaysia, where they are exploited, and has reportedly become a center for the ivory trade and elephant smuggling. Myanmar and China remain the primary sources of amphetamine-type stimulants in Asia; Myanmar rebels are exporting hundreds of millions of tablets to Thailand to raise money. The Tri-Border Initiative protects the vital seaways between Indonesia, Malaysia, and the Philippines against piracy. A report says Australia has a multi-billion-dollar drug enterprise, and Australians are among the world's highest per capita consumers of illicit stimulants. There is a thriving illegal international trade in human organs bought from very poor people and sold to very rich ones. Large tracts of land in Fiji are believed to have been bought up by the Russian Mafia.

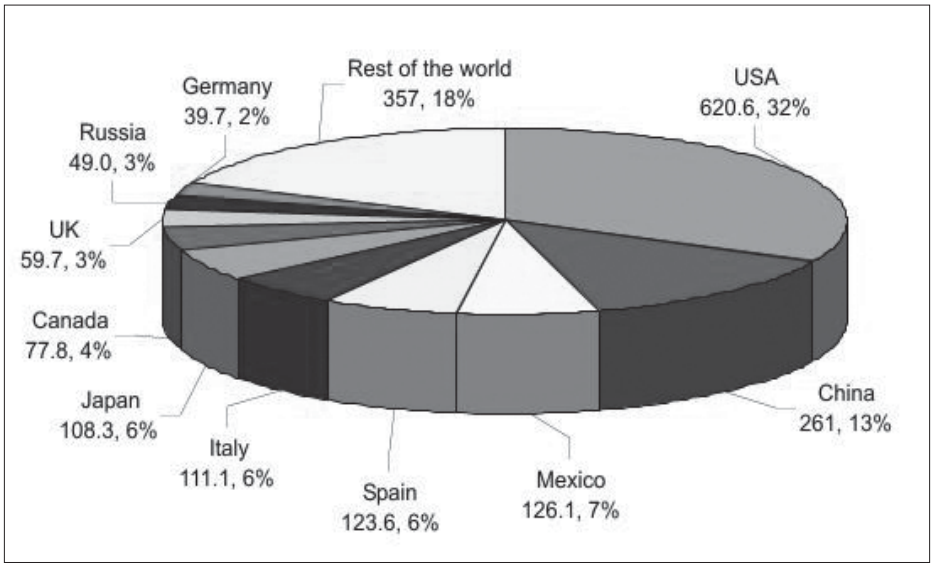
Europe: Europol has published a 2011 TOC Threat Assessment at www.europol.europa.eu, indicating greater TOC mobility, operational diversity, and internal collaboration, and the EC adopted the **EU Strategy towards the Eradication of Trafficking in Human Beings 2012–2016**. While trafficking in human beings generates profits of tens of billions of euros each year, the number of cases prosecuted in the EU decreased from 1,534 in 2008 to 1,144 in 2010. The UK's Serious Organized Crime Agency Annual Plan 2012/13 stressing flexibility in its first national integrated strategy, *Local to Global*, but did not stress anticipation; however, it will create the National Crime Agency. Organized crime costs the UK £20-40 billion a year, and has 38,000 known individuals as part of 6,000 gangs. The EU has strengthened controls on money transfers across its borders to address trafficking and money laundering, especially in Eastern Europe. Russian officials have declared the drug situation in that country "apocalyptic." Operation Pangea, involving 79

countries, led to the seizure in the UK of more than £2 million worth of fake drugs and the closing down of 13,000 Web sites selling them. Use of coke in Europe has peaked, possibly due to the recession.

Latin America: About 50,000 people have been killed in drug-related violence in Mexico since 2006 and 12,900 in the first nine months of 2011. Mexico's cartels receive more money (an estimated $25–40 billion) from smuggling drugs to the U.S. than Mexico earns from oil exports. Mexican drug cartels are rapidly moving south, into Central America, and are branching out, with La Familia exporting $42 million worth of stolen iron ore from Michoacán in a year. UNODC says crime is the single largest issue impeding Central American stability. Colombia's government passed a bill for decriminalizing the cultivation of "drug plants," while drugs' processing and trafficking remain criminal. This is part of Latin America's strategy for curbing drug trafficking. Brazil has instituted a $2.2 billion plan to combat crack trafficking and abuse nationwide. The drug gangs have largely replaced the paramilitaries. Ecuador has become an important drug route, with its drug trade being controlled by foreign organizations. The "war on drugs" in Latin America is hindered by the lack of joint strategy among the governments of North and Latin America. The Caribbean has 27% of the world's murders, including gang-related killings, with only 8.5% of world's population.

North America: The U.S. has a third of the world's illegal market value at $620.63 billion.The International Organized Crime Intelligence and Operations Center integrates U.S. efforts to combat international organized crime and coordinates investigations and prosecutions. The 22-month anti-cross-border-drug Project Deliverance ended successfully in June 2010 after the arrest of 2,200 individuals and the seizure of more than 69 tons of marijuana, 2.5 tons of cocaine, 1,410 pounds of heroin, and $154 million in currency. Drug criminal gangs have swelled in the U.S. to an estimated 1 million members, responsible for up to 80% of crimes in communities across the nation. Organized crime and its relationship to terrorism should be treated as a national security threat. Canada continues as a major producer and shipper of methamphetamines and ecstasy. A nationwide poll found that 66% of Canadians support decriminalization of marijuana possession in small amounts, an idea also endorsed by some main political parties.

Figure 11. Value of countries' illegal markets; 10 highest ranked countries and the rest of the world (billions, USD)



Source: havocscope.com

13. How can growing energy demands be met safely and efficiently?

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 addition 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.

Shell forecasts global energy demand to triple by 2050 from 2000 levels, assuming that the major socioeconomic trends continue. This, they assert, will require "some combination of extraordinary demand moderation and extraordinary production acceleration." IEA calculates it will take $38 trillion to meet all energy needs for the world between now and 2035, of which 90% of new demand will be in non-OECD economies. By 2035, China is expected to consume nearly 70% more energy than the U.S., although China's per capita consumption remains less than half that of the U.S. IEA estimates it would cost $48 billion every year until 2030 to ensure universal access to electricity and modern cooking stoves worldwide.

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 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. For the past decade, coal has met 47% of new electricity demand. Assuming that countries fulfill their existing commitments to reduce emissions and cut fuel subsidies, IEA estimates that the world primary energy demand will still increase by 36% from 2008 to 2035, or 1.2% per year, with fossil fuels accounting for over half of the increase. Therefore, large-scale carbon capture and reuse has to become a top priority to reduce climate change, such as using waste CO_2 from coal plants to grow algae for biofuels and food or to produce carbonate for cement. Carbon capture and sequestration could reduce CO_2 emissions in industrial applications by 4Gt if 20–40% of facilities are equipped with CCS by 2050. This can be expensive, requiring the introduction of carbon taxes to make it economically attractive.

According to UNEP, global investment in renewables rose 17% to a record $257 billion in 2011, more than a sixfold increase since 2004. By the beginning of 2012, renewable energy sources (including hydro) supplied about 17% of global final energy consumption and more than a quarter of total global power-generating capacity (exceeded 1,360 GW, including hydro). Seven countries—China, the U.S., Germany, Spain, Italy, India, and Japan—account for about 70% of total non-hydro renewable electric capacity worldwide. However, relying on wind and solar sources for base-load electricity in mega-cities would require massive storage systems, while geothermal would not.

Despite the accidents in Fukushima, IEA forecasts nuclear generation to grow 70% by 2035 beyond today's capacity. Issues of cost, insurance, and public confidence could counter this forecast. There is still no good solution for the nuclear waste problem. The normal life of a nuclear reactor is 30–40 years. According to the IAEA, there are 435 civilian nuclear reactors online today; about 140 of these are 30 years old and 34 are over 40 years old. Not including military or research reactors, 138 nuclear plants have been closed, but only 17 of these have been decommissioned. About 80 civilian nuclear plants are schedule to be closed in the next 10 years. The Next Generation Nuclear Plant Industry Alliance selected a high-temperature gas-cooled nuclear concept as ensuring no internal or external event could lead to a release of radioactive material.

In 2010, the world spent $409 billion on fossil fuel subsidies, about $110 billion more than in 2009, encouraging inefficient and unsustainable use. Global oil production forecasts vary considerably, but assuming no major breakthroughs affecting oil production and demand, IEA expects output could reach 96 million barrels per day by 2035 from 89 million today. Non-OECD countries are forecast to consume more oil than OECD countries by mid-2013. The average cost of bringing a new oil well online increased 100% over the past decade

By 2035, the global passenger car fleet will double, reaching almost 1.7 billion. How will they be fueled? Some see synthetic fuels produced from natural gas,

oil shale, or biomass as the bridge to fully electric cars. Mass production of fuel-flexible plug-in hybrid electric cars at competitive prices could be a breakthrough. A six-year U.S. study to test hydrogen fuel cell electric vehicles released in 2012 exceeded expectations for fuel economy and efficiency, driving range, and durability. Manufacturers are expected to begin sales between 2014 and 2016. Some argue that the transition to a hydrogen infrastructure may be too expensive and too late to affect climate change. Options like flex-fuel plug-in hybrids, electric, and compressed air vehicles could provide alternatives to petroleum-only vehicles sooner. National unique all-electric car programs are being implemented in Denmark and Israel, with discussions being held in 30 other countries. The global share of biofuel in total transport fuel could grow from 3% today to 27% in 2050. Massive saltwater irrigation along the deserted coastlines of the world can produce 7,600 liters/hectare-year of biofuels via halophyte plants and 200,000 liters/hectare-year via algae and cyanobacteria, instead of using less-efficient freshwater biofuel production that has catastrophic effects on food supply and prices. Nearly two-thirds of incremental gas supply to 2035 could come from unconventional gas, primarily shale gas. However, the process of "fracking" to get the gas might release methane to the atmosphere, pollute groundwater from underground wells to dispose of wastewater, and trigger earthquakes.

Innovations are accelerating: concentrator photovoltaics to dramatically reduce costs; pumping water through micro-channels on the surface of a solar panel to make it more efficient and make seawater drinkable at the same time; producing electricity from waste heat from power plants, human bodies, and microchips; genomics to create hydrogen-producing photosynthesis; buildings to produce more energy than they consume; solar energy to produce hydrogen; microbial fuel cells to generate electricity; low-energy nuclear reactions (related to cold fusion); and compact fluorescent light bulbs and light-emitting diodes to significantly conserve energy, which can also be done by nanotubes that conduct electricity. Solar farms can focus sunlight atop towers with Stirling engines and other generators. Drilling to hot rock (two to five kilometers down) could make geothermal energy available where conventional geothermal has not been possible. Plastic nanotech photovoltaics printed on buildings and other surfaces could cut costs and increase efficiency. Unused nighttime power production could supply electric and plug-in hybrid cars.

Japan plans to have a working space solar power system in orbit by 2030, and China plans to do the same by 2040. Such space-based solar energy systems could meet the world's electricity requirements indefinitely without nuclear waste or GHG emissions. Eventually, such a system of satellites could manage base-load electricity on a global basis, yet some say this costs too much and is not necessary, given all the other innovations coming up.

Challenge 13 will have been addressed seriously when the total energy production from environmentally benign processes surpasses other sources for five years in a row and when atmospheric CO_2 additions drop for at least five years.

REGIONAL CONSIDERATIONS

Africa: In Africa, 66% of land deals cross-referenced by researchers are intended for biofuel production, versus 15% for food crops. Over 70% of sub-Saharan Africa does not have access to electricity. Africa Standard Bank Group plans to invest $1.5 billion in South Africa for most wind and solar projects, $50–75 million in Kenya's Lake Turkana wind project, and $3 billion in Mozambique's Mphanda Nkuwa hydropower project. New oil fields have been established in Ghana and Kenya. South Africa has the fifth-largest—485 trillion cubic feet—technically recoverable shale gas. Algeria will invest $60 billion in renewable energy projects by 2030. By 2050, some 10–25% of Europe's electricity needs could be met by North African solar thermal plants. The $80 billion Grand Inga dam could generate 40,000 MW of electricity, but the project is progressing slowly. Barefoot Power, the winner of the Ashden Awards, will provide energy-efficient, affordable light-emitting diode lamps, home lighting systems, and phone chargers to 10 million people living in off-grid communities in Ghana, Senegal, Nigeria, and India by 2015.

Asia and Oceania: Nearly 2 billion people in Asia rely on biomass for cooking. India has 289 million people without electricity. All 54 nuclear reactors in Japan went offline in May 2012 for the first time in 42 years. To make up for an electricity shortfall, Japan increased fuel imports, leading to a record $54 billion trade deficit for fiscal 2011. Meanwhile, Japan is building a large offshore wind farm off the coast of Fukushima. China uses more coal than the U.S., Europe, and Japan combined; meanwhile, it leads the world in terms of investment in renewable energy sources. China invested $52 billion in clean energy in 2011 and plans to invest $473 billion in the next five years, with the goal of meeting 20% of its total energy demand by wind and solar by 2021. India will invest $37 billion in renewable energy to add 17,000 MW of capacity by 2017. Oil and gas production in the Caspian region will grow substantially in the next 20 years; Kazakhstan and Turkmenistan lead the growth in oil and gas respectively. China had 14 nuclear reactors in operation and 27 under construction by late 2011. India had 20 operating nuclear reactors and 7 in construction. Singapore plans to increase the energy efficiency of buildings by 80% by 2030.

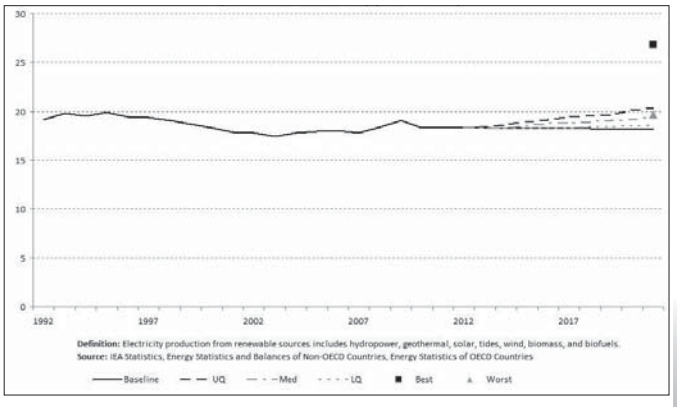
Australia has vast renewable energy resources, but the new carbon tax of AU$23 per tonne of CO_2, may be too low to stimulate serious change.

Europe: Europe is on track to generate 20% of its energy from renewable sources by 2020. The highest shares of renewable energy consumption in 2010 were in Sweden (47.9%), Latvia (32.6%), Finland (32.2%), Austria (30.1%), and Portugal (24.6%); the lowest were in Malta (0.4%), Luxembourg (2.8%), the United Kingdom (3.2%), and the Netherlands (3.8%). Over 70% of electricity capacity additions in 2011 came from renewable sources in Europe, increasing renewable energy's share of total electricity capacity to 31.1%. Finland's new-generation nuclear plant (European Pressurized Reactor) was planned for completion in 2009 but now is not expected to ready even for the revised 2014 target. Conservation and efficiencies could reduce EU's energy consumption about 30% below 2005 levels by 2050. Low-carbon technologies could provide 60% of energy by 2020 and 100% by 2050, according to the EU's low carbon roadmap. EU plans to have 10–12 carbon capture and storage demonstration plants in operation by 2015. Germany and Switzerland plan to phase out nuclear energy. Poland imports more than 80% of its natural gas from Russia, but its shale gas reserves may provide Poland with enough gas for more than 50 years. Meanwhile, Bulgaria imposed a temporary ban on the exploration and extraction of shale gas in January. Oil extraction in the Arctic offshore territories in Russia might peak at 13.5 million tons a year over the next 20 years in the most optimistic forecasts, compared with 500 million tons produced today. Amsterdam plans to have 10,000 electric cars by 2015. Five geothermal power plants in Iceland meet 27% of the country's electricity needs. Demark plans to have 100% of its energy from renewable sources by 2050. Some Spanish renewable energy experts are leaving after the government cut financial aid to that sector. Shale gas in Central Europe is expected to lower energy prices there within 20 years.

Latin America: Brazil has been the cheapest biofuel producer for years, but it is losing its competitiveness due to the real's rise against the dollar and the high price of sugar. Brazil imported 70m liters of U.S. ethanol in 2010, up from just 1 million in 2009. Its first commercial-scale plant of second-generation biofuel (cellulosic ethanol) will start production in December 2013. Some 90% of the automobiles produced in Brazil are flex-fuel. Argentina is the world's second largest producer of biodiesel, with 13.1% of the market. Geothermal, solar, and wind are vast untapped resources for the region, as are gains from efficiencies. Ecuador announced that it would refrain from drilling for oil in the Amazon rainforest reserve in return for up to $3.6 billion in payments from industrial countries. Venezuela's Orinoco heavy oil reserves (requiring advanced production technology) are larger than Saudi Arabia's reserves. Cuba plans to increase its renewable energy production by 12% by 2020. Spain's electric company was nationalized in Bolivia.

North America: Canada has the second largest oil reserves in the world but also the most environmentally damaging. If fully exploited, the total GHG impact could be the tipping point of no return for climate change, argue those opposed to the Keystone pipeline. Nine states in the U.S. generated more than 10% of their electricity with non-hydro renewables in 2011, up from two states a decade ago. The U.S. invested $51 billion during 2011 in renewable sources of energy. For the first time, natural gas has tied with coal for fueling electricity production in the United States. Nearly half of U.S. natural gas production in 2035 will come from shale gas. Lesser-known potential clean energy sources in the U.S. include high-altitude wind off the East Coast, OTEC in the Gulf Stream, solar thermal in the Midwest (four corners), drilled hot rock geothermal, and nano-photovoltaics. BP started production at a new underwater oilfield in the Gulf of Mexico. Algae farms for biofuel may cost $46.2 billion per year to replace oil imports. California requires oil refineries and importers of motor fuels to reduce the carbon intensity of their products by 10% by 2020. San Francisco's mayor called for the city to go 100% renewable by 2020. Pacific Gas & Electric Company of California agreed to buy 200 megawatts of space-based solar power by 2016 from Solaren. Recycling waste heat from nuclear power plants to home air conditioners and recycling body heat to recharge batteries could reduce CO_2 by 10–20% in the U.S.

Figure 12. Electricity Production from Renewable Sources



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

14. How can scientific and technological breakthroughs be accelerated to improve the human condition?

The continued acceleration of S&T is fundamentally changing what is possible, and access to the S&T knowledge that is changing the prospects for the future is becoming universal. Free online university courses proliferate; open source hardware and software are sharing the means of production. The ability to learn this knowledge is also improving with Web-based asynchronous highly motivational educational systems, adaptive learning models such as cellular automata, genetic algorithms, neural networks, and emerging capabilities of collective intelligence systems.

IBM's Sequoia system became the world's fastest supercomputer, at 16.32 petaflops (quadrillion calculations per second)—passing the computational speed of a human brain (not cognition). Watson, the IBM computer that beat the top knowledge contestants on a TV quiz show, is now planned for use in 2013 for cancer detection, diagnosis, and therapy. Computational chemistry, computational biology, and computational physics are changing the nature of science, and its acceleration is attached to Moore's law.

Synthetic biology is assembling DNA from different species in new combinations to create lower-cost biofuels, more precise medicine, healthier food, a way to clean up pollution, and future capabilities beyond current belief. Craig Venter, who completed human genome project in cooperation with the U.S. NIH, created a synthetic genome by placing a long strand of synthetic DNA into a bacterium that followed the synthetic DNA's instructions and replicated. A U.S. Presidential Commission concluded that it was not yet the invention of "life " but that synthetic biology research should continue with scientific self-regulation. Others call for a moratorium on the research until regulations are in place. Venter forecasts that as computer code is written to create software to augment human capabilities, so too will genetic code be written to create life forms to augment civilization.

The cost of 3D printers has fallen to under $2,000, allowing micro-businesses and individuals to become industrial producers. Open source digital designs at Thingiverse.com can be downloaded and printed—something like YouTube for 3D printing. Future forms of 3D printers with stem cells serving as "ink" are being considered for manufacturing personalized organs and limbs.

In a process known as transdifferentiation, scientists have manipulated human cells, converting pancreatic cells into liver cells and skin cells into heart cells; skin cells were converted into functioning neurons that could integrate into neuron networks of the sort found in the human brain. A new anti-virus strategy is being pursued to develop artificial "proto-cells that can lure, entrap and inactivate a class of deadly human viruses." Tiny cameras can be swallowed and steered by an MRI machine for more precise diagnosis. Self-propelled devices can float through the blood stream to deliver drugs. With these advances, synthetic biology, nano-medicine, and various forms of computational science, it is reasonable to assume we will live longer, healthier lives that seem possible today.

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. A new "smart dust" of millions of wireless sensors is being developed to monitor chemicals, biologicals, and radiologicals. Each dust particle is an autonomous computer and communications device in a swarm connecting the "dust particles." Another program plans to embed up to a trillion pushpin-size sensors around the world. These programs involve self-organizing networks that interconnect almost everything to improve system resiliency. Nano robots now roam inside the eyes in tests to deliver drugs for conditions such as age-related macular degeneration. At an even smaller scale, nanometer robots have been demonstrated and appear able to link with natural DNA. Nanobots the size of blood cells may one day enter the body to diagnose and provide therapies and internal virtual reality imagery. Although nanotech promises to make extraordinary gains in efficiencies needed for sustainable development, its environmental health impacts are in question.

Approximately 150,000 industrial robots were sold worldwide in 2011. Some are becoming extremely human-like, with facial emotion-like expressions; others are remote-controlled surgeons with better than human precision, and some will provide old age care in Japan. Scanning electron microscopes can see 0.01 nanometers (the distance between a hydrogen nucleus and its electron), and the Hubble telescope has seen 13.2 billion light-years away. Photons have been slowed and accelerated. External light has been concentrated

inside the body for photodynamic therapy and powered implanted devices. DNA scans open the possibility of customized medicine and eliminating inherited diseases. MRI brain imaging shows primitive pictures of real-time thought processes. Paralyzed people have controlled computers with their thoughts alone, and eventually robots as well.

CERN announced that it discovered a Higgs-like boson particle that might be a Higgs boson particle. Theoretically, Higgs bosons exist in a field that permeates the universe, and their interaction and attraction gives mass to particles that make up the known universe—of which scientists only know about 4%. The Higgs would explain the fundamental ability of particles to acquire mass. Some speculate that a second particle called the Higgs singlet might be discovered that should have the ability to jump into an extra, fifth dimension where they can move either forward or backward in time and reappear in the future or past.

In another area, CERN has also trapped antimatter (in the form of 309 atoms of antihydrogen) for an astonishing 17 minutes in an electro-magnetic containment. All this work at CERN can lead to new physics that allows for the inventions of more efficient production of energy, transpiration, construction, and medicine.

On another frontier, one group is attempting to entangle billions of particle pairs (quantum entanglement is the simultaneous change of entangled objects separated in space). Quantum building blocks, qubits, have been embedded into nanowires—important steps toward quantum computers. Quantum theory also encompasses the "many worlds interpretation" of our existence. In the MWI, every event is a branch point that may go this way or that, creating an almost infinite set of branches. Follow any one and it describes a simultaneously existing alternate world, a remarkable and counterintuitive reality. Although seemingly remote from improving the human condition, such basic science is necessary to increase knowledge that applied science and technology draws on to improve the human condition.

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 history of S&T clearly shows that advances have unintended negative consequences as well as benefits. Challenge 14 will have been addressed seriously when the funding of R&D for societal needs reaches parity with funding for weapons and when an international science and technology organization is established that routinely connects world S&T knowledge for use in R&D priority setting and legislation.

REGIONAL CONSIDERATIONS

Africa: The focus of African R&D is shifting from agriculture to medicine and related fields. The African Development Bank organized the first Africa Forum on Science, Technology and Innovations in Nairobi to stimulate investments into sustainable development, human capital development, and employment. The Inter-Parliamentary Forum on Science, Technology and Innovation promises to increase the percent of GDP for S&T. Low levels of R&D investment, weak institutions, brain drain, and poor access to markets continue to impede Africa's S&T innovation potential. Primary commodities continue to dominate Africa's explorts; S&T innovation is needed to create added value to exports and to leapfrog into future biotechnology, nanotech, and renewable energy prospects.

Asia and Oceania: China launched the Shenzhou 9 spacecraft, China's fourth manned space launch—this time with three astronauts, including the first Chinese woman astronaut for the first rendezvous with Tiangong 1 China's space lab. Japan has launched a Venus probe that also carried a space sail that gains its energy from solar pressure in space. Japan's R&D as a percent of GDP is about 3%. Although China's is a little under 2%, its annual R&D budget has been growing about 12% per year, and it has the second largest R&D government budget in the world. Chinese patent filings have gone up 500% in the last five years; it is investing more in cleaner energy technology than the U.S. does. Other Asian countries with double-digit economic growth also have double-digit growth in R&D expenditures. India graduates 20 engineers for every law graduate. Australia is investing heavily into its National Nanofabrication Facility.

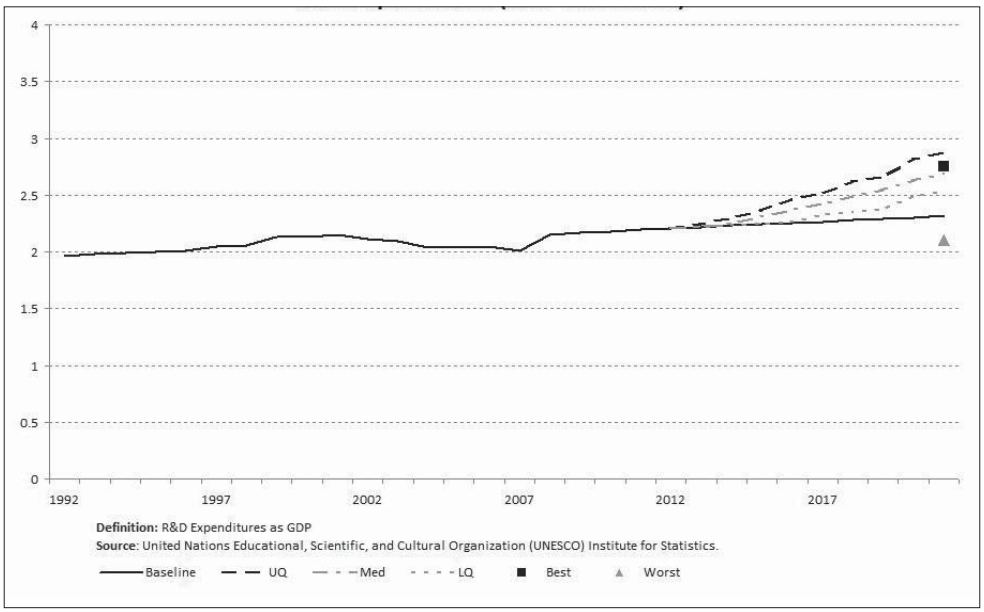
Europe: Virgin Galactic is planning tourist trips to space and has already collected deposits from more than 500 people willing to pay the $200,000 ticket price. The EC's 2013 budget for research and innovation is €10.8 billion. Of this amount, €8.1 billion will fill fund proposals under the EU's Seventh Framework Programme for Research. This is the largest ever package of FP7 calls for proposals. The EU is establishing

a single European system for registering patents. Although the Lisbon Strategy expired in 2010, succeeded by Europe 2020, the EU target of 3% of GDP for R&D has been kept. Only two EU member states have achieved the 3% target so far, while the average R&D expenditure of the EU27 stood at 2.01% of GDP in 2009. The newer members' R&D expenditure remains low, with many under 1%. Russia has lost over 500,000 scientists over the last 15 years, but a reverse trend is beginning, salaries have increased, innovation is encouraged, and high tech is being supported. Russian investments in nanotechnology R&D and corporations have been substantial, even during the recent recession. Russia is building the Skolkovo Innovation Center with multinational corporations to accelerate R&D and applications.

Latin America: Mexico's National Center for Genetic Resources is a leader for genetic resources for developing countries in agriculture, livestock, aquaculture, forestry, and microbial research. OECD, UNESCO, EU, the U.S., and China are helping countries in the region with innovation systems. Chile has started a scientific news network for Latin America in order to reverse some of the lagging indicators in the region. Argentina, Brazil, Chile, and Mexico account for almost 90% of university science in the region, and half of the 500 higher education institutes produce no scientific research. University S&T courses could be required to focus some attention on helping the poorest communities. Mexico is leading the Innovation Network for Latin American and the Caribbean.

North America: The U.S. National Institutes of Health remains the largest source of scientific research funding in the world. NASA is supporting privately built launch systems to lower launch costs in order to open space to more people and applications. SpaceX's "Dragon" rocket successfully sent a cargo module to the International Space Station in spring 2012. Bigelow is pursuing inflatable orbital stations. Boeing has proposed low-earth orbit fuel depots. Blue Origin is working on reusable rockets and spacecraft to launch astronauts to suborbital and orbital space. Stratolaunch plans to use a huge airplane to air launch space capsules. In 2011, three AI courses were offered free online by well-known Stanford University professors. Over 150,000 students registered and 35,000 actually handed in homework. Other universities that offer free access to courses are MIT, Harvard, Princeton, and the Universities of Michigan and Pennsylvania. Research by the U.S. National Academy of Sciences, National Academy of Engineering, and Institute of Medicine is available for free downloads. About 35% of world R&D is in the U.S. Each week the U.S. Patent Office makes thousands of new patents freely available online.

Figure 13. R&D Expenditures (% of World GDP)



Graph using Trend Impact Analysis; it is part of the 2012 State of the Future Index computation (See Chapter 2, SOFI 2012)

15. How can ethical considerations become more routinely incorporated into global decisions?

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 around the world.

The world is still recovering from the proliferation of unethical decisions that led to the 2008 financial crisis. It clearly demonstrated the interdependence of economics and ethics. Although quick fixes avoided a global financial collapse and pulled the world out of recession (although Europe is entering one now in 2012), the underlining ethics has not been addressed sufficiently to prevent future crises. 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. But 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 acceleration of scientific and technological 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?

Should we invent anticipatory ethical systems? Just as law has a body of previous judgments upon which to draw for guidance, will we also need bodies of ethical judgments about future possible events? Despite the extraordinary achievements of S&T, future risks from their continued acceleration and globalization remain (see Chapter 6) and give rise to future ethical issues (see Chapter 11). For example, it is possible that one day in the future a single individual could make and deploy a bioweapon of mass destruction. Society will naturally want to prevent this, requiring early detection and probably invasion of privacy and abridgment of other civil rights. Is it ethical for society to impose sanctions before the fact? To reduce the number of such potentially massively destructive people in the future, healthy psychological development of all children should be the concern of everyone. Such observations are not new, but the consequences of failure to nurture mentally healthy, moral people may be much more serious in the future than in the past.

At the same time, new technologies also 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.

It is quite likely that the vast majority of decisions every day around the world are perfectly honorable. 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.

By March 2012, a total of 160 countries and the European Union had ratified the international convention on corruption. This agreement established definitions and rules of behavior and is the only legally binding universal anti-corruption instrument. The UN Global Compact—with 8,000 participants, including over 5,300 businesses in 135 countries—was created to reinforce ethics in decisionmaking; it has improved business-NGO collaboration, raised the profile of corporate responsibility programs, and increased businesses' non-financial reporting mandates in many countries. The Compact encouraged corporations to urge their countries to ratify the UN Convention against Corruption. The International Criminal Court has successfully tried political leaders, and proceedings are Web-cast. The Universal Declaration of Human Rights continues to shape discussions about global ethics and decisions across religious and ideological divides.

Yet 12–27 million people are slaves today, more than at the height of the nineteenth-century slave trade; organized crime takes in possibly $3 trillion annually; over $1 trillion is paid each year in bribes; and rich countries send some 50 million tons of waste to developing countries annually. Transparency International reports that 80% of those surveyed in their international poll said that political parties are corrupt, 25% of the respondents said they paid bribes in the previous year, and 50% said their government's anti-corruption measures are ineffective. According to Transparency International's 2011 Bribe Payers' Index, companies from Russia and China, which invested $120 billion overseas in 2010, are seen as most likely to pay bribes abroad. Companies from the Netherlands and Switzerland are seen as least likely to bribe. The Extractive Industries Transparency Initiative backed by the World Bank, launched in 2002, to oblige companies and countries to make public the terms of oil, gas, and mineral deals with third world countries now has 14 compliant countries, 22 candidate countries, and 113 reports.

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." Ethical and spiritual education should grow in balance with the new powers given to humanity by technological progress. Challenge 15 will be addressed seriously when corruption decreases by 50% from the World Bank estimates of 2006, when ethical business standards are internationally practiced and regularly audited, when essentially all students receive education in ethics and responsible citizenship, and when there is a general acknowledgment that global ethics transcends religion and nationality.

REGIONAL CONSIDERATIONS

Africa: Special attention will have to be given to millions of AIDS orphans in Africa who have had little choice about growing up in unethical environments. The North African uprisings in 2011 were calls for ethics in decisionmaking. Transparency International chapters in sub-Saharan Africa work to counter corruption. The Business Ethics Network of Africa continues to grow, with conferences, research, and publications. Most African government anti-corruption units are not considered successful. Eight African countries surveyed by Transparency International reported that 20% of those interviewed who had contact with the judicial system reported having paid a bribe.

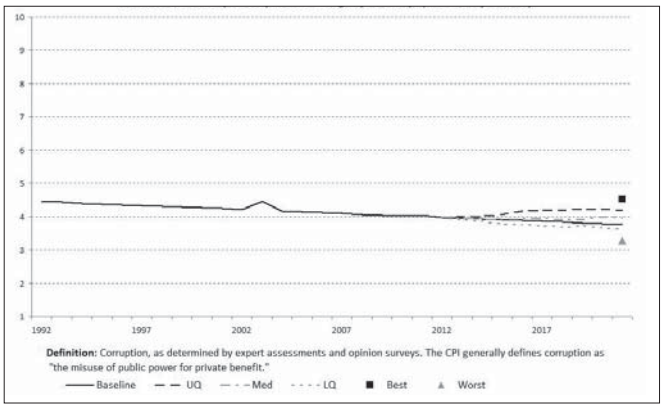
Asia and Oceania: As China's global decisionmaking role increases, it will face traditional versus Western value conflicts. Some believe the rate of urbanization and economic growth is so fast in Asia that it is difficult to consider global ethics, while Asians do not believe there are common global ethics and maintain that the pursuit to create them is a Western notion.

Europe: Global outrage at the manipulation of the Libor rate by Barclays Bank continues the pressure for more ethical management of the global financial system. Spain and France have the greatest number of businesses in the UN Global Compact. The financial crisis involving Greece and other Southern European countries raises moral issues about the interdependent ethical responsibilities among citizens, the state, and members of the Euro zone. The growing Muslim population in Europe will challenge European integration processes, ethical standards, and future immigration policies, all increasing discussions of ethics and identity for Europe. The European Ethics Network is linking efforts to improve ethical decisionmaking, while Ethics Enterprise is working to mobilize an international network of ethicists and organize innovative actions to attract attention for ethics in business.

Latin America: The Mexican Government has recently enacted the Anti-corruption Federal Law on public procurement to punish individuals and companies. The $24 million Walmart Mexican subsidiary bribery of government officials throughout the country and cover-up is being investigated for criminal prosecution by both the U.S. and Mexico. Problems such as lack of personal security, limited access to education and health services, lack of faith in politics, badly damaged institutions that do not fulfill their role (such as the Justice system and police), and the accelerated environmental degradation in some countries are aspects of a serious lack of ethical values. The prevalence of legal formality, in other countries, does not guarantee equal rights, as large sections of the population remain excluded from the guarantees of goods and people. It also manifests a serious lack of ethical standards in the mass media.

North America: U.S. plans to adopt legislation to make it compliant with the Extractive Industries Transparency Initiative, and the European Union is considering following suit. Although the U.S. has provided some leadership in bringing ethical considerations into many international organizations and forums, its ethical leadership is compromised—there is still no generally accepted way to get corrupting money out of politics and elections or to stop "cozy relationships" between regulators and those they regulate.

Figure 14. Levels of Corruption (from =highly corrupt; 10=very clean)



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