CHAPTER 3. GLOBAL SCENARIOS

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3.1 Global Normative Scenario to the Year 2050

Normative scenarios represent desirable future worlds. They employ credible cause, effect and feedback relationships to get from the present to a desirable future.

The enclosed normative scenario was published in the *1999 State of the Future: Challenges We Face at the Millennium.* It had been sketched previously in the *1998 State of the Future* report; details have been added using 1998-99 year's and earlier Lookout Panel responses, as well as other sources of information.

THE 2050 GLOBAL NORMATIVE SCENARIO BACKGROUND

Although the following may look like three alternative normative scenarios, they are intended to be one scenario with three interdependent themes. Each theme represents a different perspective on how change occurs. Some believe technology is the key force that has made change occur. Others argue that changing consciousness and the human capacity is more fundamental to long-term systemic change. Still others say that political and economic policies create the conditions for changes in both technology and human capacity. The following global normative scenario assumes that all three themes are important to the realization of the normative future of 2050.

The process that created this scenario was initiated two years ago. A more detailed explanation can be found in last year's *State of the Future* or at www.acunu.org/millennium/scenarios.html. Very simply, Millennium Project participants identified and rated norms that formed the core of the normative scenario. In order of preference, the participants selected the following top four norms around which to form the scenario: environmental sustainability, plenty, global ethics (the identified and accepted), and peace. The others in order of preference were health, freedom, universal education access, equity, preservation of the human species, enlightenment, exciting and meaningful life, self-actualization, longevity, everyone has everything they want, and security.

The body of the normative scenario is composed of the actions to address the Global Challenges in Chapter 1. These actions connected the present world to the normative future of 2050 and gave another medium to share the thinking of the Global Lookout Panel. A scenario review panel was formed of long-term normative-oriented participants of the Project to reviewed and improve the draft of the scenario. As this is an ongoing process, your suggestions for improvements are welcome and may help shape next year's edition. Even though the following normative scenario takes into account many of the world's pressing problems, it is intended to illustrate very optimistic possibilities for our common future over the next two generations.

A NORMATIVE WORLD IN 2050

By 2050 the world had finally achieved a global economy that appears to be environmentally sustainable while providing nearly all people with the basic necessities of life and the majority with a comfortable living. The resulting social stability has created a world in relative peace, exploring possible futures for the second half of the 21st century.

Different explanations have been given for the series of astounding successes achieved by 2050. Some believe that breakthroughs in science and technology were the keys, others that development of the human potential was more fundamental, and still others that political and economic polices made the difference. All three themes were important and mutually reinforcing.

Technological theme

Internet has become a right of citizenship. Businesses give free accounts to all customers; employers give them as an employee benefit. The connection of virtually all people to the global information and communications systems accelerated the pace of scientific research and the introduction and diffusion of new technology. Biotechnology, nanotechnology, and closed-environment agriculture fed the world. New and improved sources of energy made cleaner economic growth. Brain-like intelligent systems used neural networks to augment human intelligence and improve decision making. Molecular manufacturing (nanotechnology) lowered manufacturing unit cost, requiring less volume of materials and energy usage, and hence, lowered the environmental impact of a population that had almost reached 10 billion. Vaccinology and genetic engineering eliminated most acquired and inherited diseases further reducing the need for more frequent pregnancies to have a similar sized family. This was a factor in further lowering fertility rates, even though generational mini-booms have continued from the great population explosion in the mid-20th century. Cyberspace had become a major medium of civilization creating a constantly growing, non zero-sum economy and had changed day-to-day life as significantly as the industrial revolution had changed life 200 years earlier. The success of the International Space Station had led to other orbital habitats, the lunar base, and the pioneer communities on Mars. Nearly 250,000 people now work in space communities in orbit, on the moon, and on Mars, giving a new frontier for human imagination and advances in civilization.

Breakthroughs in the unified theory of matter and energy have led to a deeper understanding of mass, inertia, gravity and quantum behavior. Experiments have begun in the field of anti-gravity and faster-than-light communications through the use of quantum phenomena. There are perhaps a hundred scientists who are studying possibilities of extracting intrinsic, resting energy from space and using it in various forms of propulsion. Cosmologists are adding more rigor to their theories of the origin of the universe and have duplicated the earliest time in computer simulations that seem almost exact, but the search still continues. Some signals of apparently extraterrestrial origin have been detected but debates continue over whether they are truly extraterrestrial or human artifacts, and if extraterrestrial, over their precise meaning.

The debates about the potential of extraterrestrial contact have forced us to think beyond our geographic and ethnic boundaries. Additionally, scientific breakthroughs, the ease of international and near-space travel, and the constant global communications among people of different views on earth and near-space have also helped broaden our perspectives. As a result, people began replacing their more parochial views and consider global ethics more seriously. Not all people value love, truth, fairness, family, freedom, and belonging, but far more than in the 20th century and enough to keep a relatively peaceful world. The field of conflict resolution, which has made great progress since its earliest applications a hundred years ago, recognizes these simple points and its councilors builds on them in resolving disputes. Interestingly, the Great Cyber Games played by one out of every three people alive today were instrumental in the identification and acceptance of these global ethical norms which provid much of the common ground for today's global cooperation. Although ethnic prejudice still exists, it has been held in check more effectively than in the previous century.

Progress in information technology has been astounding. Microprocessors have continued to increase in capacity; they are speeder, smaller, and less expensive. Today computers are built into and integral with almost everything we make from machines and appliance to buildings and artificial eyes with zoom lenses. Computer elements are molecular in size, and their operations utilize quantum behavior.

Much of the computing capacity today makes machines simpler to use. Rather than requiring everyone to learn to use them, the machines have been taught to listen and act to needs and wishes of their users. The digital world's vast amount of data has been translated into computers and related technologies with access so easy an natural people use them without even knowing it making them seem truly transparent.

Health is a widely accepted human right; equity in coverage and accessibility to quality health services and health information exist regardless of capacity to pay, culture, race, geographic location or social ascription. Tele-health and tele-medicine is widely available and easily accessible. Health care providers adopt new paradigms to forecast and prevent potential health problems through personal and public health approaches; early detection through biomonitoring and management of problems that do occur.

Some people used to believe that computers would regiment us by forcing us to conform to their specifications in order to use them. Today computers and the machines that use them have supported diversity through mass customization. Manufacturers make very short production runs of products that are tailored to the specific needs of very small segments of consumers, differing in detail, but matching their criteria. The software technology that uses one's body as passwords has eliminated toll-booths, credit cards, and passport since people can be recognized by machines. Shopping is now augmented by personal data bases of every thing from your buying history to clothing measurements allowing the on-line or in-person to say, "This jacket will match the slacks you bought last month," or "Don't you want get some matching cloths for you nice's doll for her birthday next week?

All of these improvements in information technology have resulted in an intricate system of communications that some have called a "global brain" and planetary "nervous system" which

has improved the prospects for humanity. As access expanded, diminishing costs of educational software (edutaiment), any motivated person could obtain a college education and continue to learn about everything they wanted. Individuals cross political and corporate boundaries in pico-seconds forming new alliances unknown to traditional power structures. Rich and poor have nearly equal access to cyberspace almost anywhere and anytime. The old distinctions between First and Third Worlds are meaningless in cyberspace.

The old one-way media tended to be conflict-oriented, audiences were held by the drama of disagreement. Interactive media tended to be cooperation-oriented, users were held together by the satisfaction of collaboration. Cyberspace distributed the new wealth of information more democratically than previous systems. As a result, anyone can get the training, market research, planning, credit, and other resources to start their own unique businesses and sell to the global cyberspace market. Over the past fifty years, this development has made be a major factor in reducing unemployment worldwide.

The invention of secure electronic money revolutionized retail transactions, international trade, and provided extraordinary growth of employment. Individuals felt confident to create businesses and sell worldwide. While retail use of the Internet got most of the early publicity and attention, business-to-business transactions have grown phenomenally. Today, businesses of any size identify suppliers and partners worldwide, barter, order, and track order status simply and instantaneously around the world. Rules preventing wild currency fluctuations limited financial crises and allowed small business growth with security around the world. A fee-based system for central banks made currency transactions transparent with online prices, information on counterparties, and purposes of trades reduced speculation.

The synergy of telematics and micro-genetics provided a jump in human evolution eliminating many diseases and increasing human capabilities. Robots, both giant and nano, do the dangerous, repetitive, and precision work in surgery, security, health care, space industrialization, house cleaning, sewer pipe clearing, bridge inspections, mining, laboratories, and even the preparation of fast food. These robots are, for the most part adaptive to their environments, single purpose, and employ biosensors that are derived from both living cells and manufactured microprocessors.

Telecitizens, born in poorer areas but working in richer ones, helped their original countries as tele-volunteers, accelerating the development process. The development of artificial intelligence and its use in communications provided individuals with needed and timely medical, financial, and other information. Software for multi-language translators increased communications among different language groups.

The image of people walking by vending machines, reaching in their pockets, but finding no coins and walking on, drove distributors in the early 21st Century to create voice activated machines that billed at the end of the month on people's cyber game accounts. The televenders had a simple voice recognition and synthesis program that let people speak to the machine, use their body patterns as their pass word, order their sandwich, soft drink, communications, and play in the Great Cyber Games while they drank or ate alone or with friends.

The Great Cyber Games contained links to databases that described global problems, opportunities, challenges, strategies, and tactics. Players received points as they identified answers that matched or improved on those in the database or identified new problems judged to be critical enough to add to the database. When a person scored enough points, they won "reality." They got a prerecorded message from a policy maker working on the issue in which the player had received the highest score. The message challenged the player to play in the "real world game." The current real world situation was given to the player by the policy-maker, researcher, or potential employer. When the player came up with something that was considered valuable, the player got connected live to discuss their insight. Winners got to play in the real global game with real actors and many got new jobs and careers.

The Great Cyber Games were attractive to policy or other kind of decision-makers because it filtered out all the noise of computer conferences, journal articles, and got right to the person with the ideas. The players liked it because they had the potential to see their ideas realized and earn a living at meaningful work. Basic research labs used it to identify the young scientists with the greatest potential to participate in their research. An unintended bi-product of the game was a global personnel selection system that today is credited for contributing to the phenomenal growth in new theoretical principles that have led to many improvements. Another surprise was that it performed the role of a global employment agency.

The Great Cyber Games also became an informal way to prevent some of information warfare's destruction by promoting more precise, honest, and compassionate thought around the globe *where* it was needed, *when* it was needed, and in the *form* that was needed, so that constructive action has had a chance to kept ahead of destructive action. Granted, it continues to be a software race to keep ahead of the bad guys.

When it was scientifically demonstrated that certainty of discovery was the most effective deterrent to dishonesty and crime, means for improving certainty of discovery and positive identification, based on voice analysis and cross-referencing, global data bases were created and the crime rates fell. International protocols were established for sharing police data banks and the use of non-lethal weapons such as sticky foams and aerosols that induce sleep.

Nanotechnology transceivers with voice stress software were incorporated into clothing and jewelry; these systems alerted the user when people were lying or becoming aggressive. Although counter software will always be a problem, requiring constant up-grades, people have become more honest, or at least behave more honestly than in the last century. It is difficult to imagine a return of dictatorships and to the organized crime networks of the past with today's global connectivity and honestware universally available.

The field of miniaturization has been extremely important to the success of our world. Nanotechnology helps produce low cost and custom designed food. As Nature breaks down dirt, air, and water and re-assembles the molecules into potatoes, nanotechnology "universal assemblers" break materials into molecules or atoms, then follows the instructions from custom designed food molecules to manufactures food. With nanotechnology, whatever we can design, we can build. The same technology that had been used to produce integrated circuit chips was used to produce tiny machines. For example, a mass spectrograph, complete with all valves and

analysis apparatus was made on a silicon chip. Motors are now constructed with diameters of less than millimeter; accelerometers used in automobile air bags are too small to be seen with the naked eye. It is commonplace to use biological materials in such chips now to sense the reaction to various contaminants or initiate actions based on their presence. Technologists have learned about forces that occur uniquely at this scale (e.g. lubricants can have molecules that are too large to work properly in such machines) and have developed special molecular forms (fullerines) that have desired properties. Some applications today are sensors for transition from laminar to turbulent flow on the surface of wings, and the distortion of the airfoils to delay transition, measurement of the purity of water supplies with micro "fish", telemetry transmitters that can be swallowed to measure reactions in the body, and measurement of the stress induced in buildings by earthquakes using sensors that were cast into the structural concrete.

All of this activity has had a great affect on materials science. After a plateau that lasted for several decades, superconductivity is being experienced at higher and higher temperature; now thin film superconductors exist at -100 degrees Celsius. The developments in this field included bio-molecules, low pressure diamond coatings, ultra light solids that float in air, and composite materials strong and light enough to form the skin of a large scale rocket designed to enter orbit with a single stage.

New forms and mechanisms of the distributed global economy began to emerge in the early 21st century. A whole new lexicon was developed to describe the digital life forms that built cyber culture and the collaborative economies of today. Software agents assisted our transition. They sought new opportunities for collaboration, alerted us to synchronicity to discover the value of new and counter intuitive ideas, and coached us in new forms of self-organization. They even produced images of fields of people, places, and opportunities of cooperative intent. Such "fields of cooperative intent" are one of the new units of social organization and entrepreneurial effort. Knowledge and wisdom have become added measures of wealth and value.

Global idea management systems were integrated into the Great Cyber Games, further accelerating the progress of more environmentally friendly economic and technological development. Common data protocols for unconventional science and an international registry of new and unconventional ideas with national copyright protections was connected to clearinghouses that reported success, failure, and inconclusive research. Use of software that prompted the user to see potential synergies of their work with research in other fields, that they might not have otherwise considered, has now become a useful protocol in all fields.

Biotechnology has created high yield plant species that are disease and pest-resistant, use less fertilizer and are more tolerant of drought and brackish water. More recent applications of biotechnology are completely changing the 10,000 year traditional use of seeds, water and land to grow crops. Today large scale production of food in factories using genetic techniques produce much of the world's food. Food factories use genetically altered micro-organisms to organize raw materials into nutritious food. The inputs are primarily sunlight or other energy forms, carbon dioxide, water, and nitrogenous materials. The output is amino acids and directly consumable food. In another approach, cells from natural foods such as carrots or meat are cloned and the outputs of the food factories are edible replications of the parent cells. Such techniques make agricultural production possible without land. It is also beginning to reduce the

need for farmland for meat by producing novel protein, substituting meat from cows and chickens. Such meat substitutes for fish has promoted the recovery of ocean fisheries and the establishment of ocean plantations. Perhaps equally important, inventions in this field have also produced the current counters to biological weapons and removal of pathogenic microbiological agents from food.

The mapping of bacterial, human, and plant genomes, provided knowledge of genetic processes and to some extent, information about how to control them. The tiny interior robots of nanomedicine repair cells, tissues, and organs. Some of the diseases that have be eliminated or controlled are cancer, cystic fibrosis, hemophilia, rheumatoid arthritis, AIDS, hypercholesterolemia, and some forms of mental illness. Monoclonal antibodies, sometimes mounted in bio-chips, are being used in sensitive diagnostic tests and in drug delivery systems that pinpoint specific sites in the body. Techniques in this field have led to genetic medicine in which the genetic properties of humans are modified in vivo to cure or ameliorate diseases caused by genetic anomalies. Disease diagnosis based on the analysis of one's genetic material is routine; these diagnoses not only relate to existing diseases, but also the propensity to future disease and in some cases, the propensity to abhorrent behavior.

The traditional view of human reproduction is still undergoing changes simultaneously with the increasing progress toward self-determination, equal rights, economic autonomy of women, and the evolution of male and female roles. Some of the more controversial advances have centered on long-term male and female contraceptives, the ability to select the sex of a child before conception, and the ability to influence genetics and biochemical processes. The world became quite alarmed in the early 21st Century when low cost and portable methods for determining the sex of a baby before conception became commonly available. Many feared that parents in some cultures would only select males, distorting the future demographics of human race. After several years of intense debate, threats of international sanctions, interventions of leading personalities, and a short but rapid increase in male births in some countries, the number of female and male births returned to balance. This left many uneasy about unforeseen consequences of new technology. As a result, technological forecasting and assessment has become a normal part of the work in advanced institutes today.

The World Energy Organization, created in the early 21st century, coordinated research and helped improve policy leading to today's safer mix of sources that have reversed the greenhouse effect. These include hydrogen, third generation fission plants, solar power satellites, renewable energy source Hydrogen has become a major source of energy for automobiles and medium for transporting energy from origin to use. In its gaseous form it was stored at high density in metal hydrides and later released by a modest amount of heat. In addition to extracting it from natural gas, it is also produced from water by electrolysis (the focus here was on a new form of catalysis) and by high temperature disassociation of water, processes that use a great deal of electricity or very high temperature. The former method of extraction from water has provided the basis for an argument to build second and third generation nuclear plants and solar satellites, while the later for large-scale solar thermal plants. An additional benefit of the production of hydrogen from seawater has been desalination to produce fresh water and hence preventing water conflicts in the Middle East and other potential crisis regions.

Thousands of 100-mile long robotically managed closed-environment agricultural tubes, interspersed with photovoltaic strips across the Sahel, produced sufficient food for Africa and exports to Asia. Surplus energy from the strips is currently exported by microwave to earth orbit and relayed worldwide via the satellite energy grid.

The synergies of advanced research in biology and physics necessary for human space flight has generated an extraordinary number and range of inventions, stimulated thought about the meaning of life, history, and our common future, and created many opportunities for peaceful international cooperation. International R & D cooperation led by INSPACECO (the international public-private consortium) lowered launch costs to under US$500 a pound making it possible for an individual to move to a space community with a basic support package for a quarter million dollars. This, plus the growing space tourism and space lottery business (winners a get free visit to an orbital space vacation center), has opened a political debate on space migration. Some argue that migration from earth is inevitable; it is in the myths of many cultures. People advocate accelerating the construction of alternative habitats in space as insurance for the human species should an earthly catastrophe threaten life on earth. Others argue that life always moves to new niches and our curiosity will drive use one day beyond the solar system.

Space-related inventions have created new industries, tax sources for social programs, improved living standards, expanded access to tools by miniaturization and production processes that have lowered the costs of many technologies from satellite communications to medical diagnostic techniques. Income from satellite communications, solar power satellites, orbital energy relay satellites (orbital electricity grid), lunar and asteroid mining, weightless manufacturing, and space tourism has led to an enormous growth of private sector ventures in space. This acceleration of the privatization of space applications has avoided the public cycles of interest and disinterest in space support, so common in the last century.

Hierarchical institutions of the 20th century have given way to network organizations and a plethora of short-term, task-oriented, individually-initiated teams made possible by intelligent software agents in cyberspace. Cyber-UN and other international organizations can only be understood in cyberspace, because "employees" are not concentrated into one building or geographic center from which they operate. Instead people are connected around the world under the cyber umbrella of the international organization, but they may also be working for other institutions such as NGOs, corporations, universities, other UN systems, and traditional systems like nation-states and regional organizations. These cyber organizations are better thought of as executive information systems, with knowledge visualization, that are available in cyberspace for improved decision making by a user or group of users. This is the medium through which harmonization of global standards was achieved and through which accountability, transparency, and participation in the range of human enterprise today is reinforced.

Despite the technological progress and scientific insight in which today's society is based, most scientists and engineers believe that there is still more to come, that the future holds further excitement, progress and discovery.

Human Development Theme

The acknowledgment that education was the solution to many problems and that the knowledge economy was spreading rapidly, stimulated governments and corporations worldwide to increase their investments in education, training, and applications of cognitive science. The race to educate the world began after the World Summit on Cognitive Development in 2010. Most institutions that had even a peripheral association with education began debating the most equitable and cost/effective ways to make everyone knowledgeable, virtuous, and intelligent. Internet access became a right of citizenship. Educational software was imbedded into nearly everything that could hold a computer chip. The World Cyber Games permeating daily life blending entertainment and education.

The transition from a mostly illiterate global population to a mostly educated world was achieved by the mid-2040s. The interconnection of many separate programs into a global system of education created a cyberspace in which all could get the best education at their own pace, learning style, and in their own language. Ethical and effective decision-making was a new focus of education. The availability of data of all sorts, married with an integrated global scholarly and scientific knowledge base, increased the speed of problem solving in all fields, by providing a logically structured framework into which existing and newly acquired knowledge could be placed and assimilated in a non-redundant way for examination, discussion, and extension by scientists and scholars worldwide and for a full range educational applications. Academic and business interests collaborated to create a sophisticated body of principles and techniques for knowledge visualization and the use of artificial intelligence to make it possible to rapidly navigate the knowledge of the world. This allowed for content and context to be connected, reducing confusion and culture shock in cyber space.

The Global Cyber Games was integrated with the knowledge systems so that one could move easily between play and education. An unanticipated consequence of the games was the large number of people it helped to identify and acknowledge global ethics, and the growth of responsible behavior and compassion.

In addition to the vast improvements in educational technology, the content of conventional public education also changed during the early 21st century. Education successfully linked human ecology to decision-making in an increasingly global society, including the moral basis for decisions, the nature and management of risk, and dealing with uncertainty. It emphasized compassionate behavior and socially acceptable values such as tolerance and diversity. Instruction in "how to learn" and the scientific method was given greater prominence in both educational systems and professional training programs. Multi- and transdisciplinary techniques and non-linear thinking approaches became common in most curricula. It is generally accepted that the creative process included failure, chaos, uncertainty, and holding of contradictory positions. The speed of feedback from inquiry to intelligent response is so fast today that curiosity has become a normal mental state for adults.

Advances in cybernetics and human cognitive development increased the use of machine intelligence to augment human intelligence, while emphasizing social and emotional development for improved decisionmaking. In short, it became fashionable to be intelligent and

virtuous.

It was not enough to learn and understand the history and current status of an item; in the world of 2050 an educated person also knew a range of possible futures for that item. Many reasons have been given for the addition of future-oriented curricula in education. Some argued that we were simply forced into it by the increasing complexity of issues, growing numbers of people involved in decisions, accelerating rate of change, and lead-times involved with environmental solutions. Others pointed to new opportunities in globalization and other unprecedented conditions, such as the international millennium celebrations and events that stimulated increased corporate, political, academic and personal thinking about future possibilities. Futurists had used the year 2000 as an opportunity to introduce futures methods and perspectives through global television and Internet events. Future-oriented university courses in and around cyber space became popular. As a result, nearly all institutions began providing routine up-dates on near- and long-term future dynamics. Long-term perspectives and improved futures methodology were increasingly applied to address the full range of global issues and opportunities. This contributed to the improved conditions enjoyed in the mid-21st Century and expected for future generations as well.

In addition to the popularization of executive training seminars in long-term perspectives, the many National Futures Academies popularized and improved the quality of instruction of futures studies through networks of universities. They helped integrate futures, creative, non-linear thinking into educational curricula that addressed decision-making. The moral basis for decisions, the nature of risk, and dealing with uncertainty were also integrated into these courses. Futures research methods were converted into teaching methods to help future-orient instruction.

The millennium provided the focus to foster collaboration among the various inter-religious dialogues on human values and morals that continued over several decades and through all forms of media. This accelerated the inter-religious studies that found common moral values and attitudes acceptable to all cultures. Religious leaders publicly acknowledged the existence and value of a variety of approaches to spiritual enlightenment and becoming a virtuous person. These public acknowledgments and dialogues helped to reduce the hatred created by the many ethnic conflicts of the late 20th century. The personal intervention of some religious leaders who condemned those who called for violence in the name of religion, reduced the use of religion as a justification for ethnic conflict.

Although cultural and religious conflicts will still need more time to fully disappear, these new initiatives have help to keep them in sufficient check to prevent the kinds of wars so prevalent in the last century.

Philosophers and artists created terminology and imagery that communicated the strength of diversity is its underlying unity and our ethical responsibilities to future generations. Global ethics have become generally understood and scientifically documented for social stability. This did not mean that all people adhered to global ethics, but that it became a force for social stability. Advertising and social marketing taught tolerance and respect for diversity and equal rights. All managers today have received training courses in ethical behavior in a multiethnic context. As a result thinking globally includes responsibility about global impacts.

Psychonauts exploring the mind and cybernauts exploring cyberspace helped create new forms of notation and symbols that enabled the general public to understand the sophisticated world of 2050. These new forms made the global education systems more intelligible to a broad range of people. These notations and symbols helped transcultural collaboration in creating the cultures of peace we enjoy today. Many of the new kinds of perceptions of reality and ways of knowing that helped this transition could only have emerged through human interaction using these new forms of notation.

Diversity and shared ethical values were encouraged by the countless celebrations of humanity-as-a-whole at the millennium. People and institutions learned the painful lessons generated by the many ethnic conflicts that followed the fall of the USSR. Polycultural views were created from shared beliefs and interests that enhanced peaceful coexistence. Polyculturalism also helped smooth the transition of nation-centric states to regional and global institutions. Global economic success diminished the importance of excessive materialistic desires and people looked for more meaning in their lives. Experience -- more than information -- became the key economic value. By 2050 enough people understood that ethnic diversity is a comparative advantage in a global economy and society, and has made our world far more peaceful today than in the past. Diverse views from many cultures provided the insights to manage an increasingly complex world and shared ethical values promoted cooperation and stability.

Changes in global frames of reference and philosophies due in part to understanding of the interaction of population and economic growth with environmental degradation gave rise to the more enlightened age of today. The merger of the environmental movements and human rights groups in collaboration with many leading multinational corporations made possible the global educational campaign that made clean air, water, and land to be accepted as a human right. As a result, many changes in environmental policies and behaviors have been made. It became unthinkable to establish an environmentally dangerous project.

In the late 20th century, it was scientifically documented that the behavior and values of most astronauts changed as a result of the "breakaway phenomena", the psychological reaction to leaving earth. Seeing the earth from space caused psychological and even neurological changes that created new neural connections associated with the concept of humanity; and, hence the value forming process. Human consciousness became more compassionate with the daily flood of images of earth from orbital communities, the lunar base, and the Mars pioneers. Many of children born in space have developed careers related to conflict prevention and re-enforcing the value of ethnic diversity. Their increasing interaction with the earth-based groups has provided a calming influence on potential social conflicts.

Others believed that the increasingly aging population in the global labor force helped to provide wisdom for increasing ethical considerations in business and daily life. Still others point to the NGO global dialogs and studies on ethics that scrutinized and encouraged improvement of ethical standards in business as the reason for the more humane use of free markets.

Whatever the reasons, the 20th century self-centered greed and welfare attitudes were replaced by a more moral entrepreneurial spirit, environmental consciousness, and compassion. Growing

numbers of experienced, energetic and active older men and women are respected and occupy important positions shared with younger groups. The traditional "linear life paradigm" where people pass from education, work, leisure and retirement is replaced by "cyclical life paradigms". A safety network exists to protect the elderly in need. Thanks to a variety of public and private options, social security is robust.

Nearly all formerly less advantaged groups (the poor, the elderly, women, ethnic and racial minorities) participate in the cyber cash economy; universal literacy and Internet access allows people to learn and work at home. Poor women were especially helped by these changes which contributed to decreases in infant mortality rates, generated government support for childcare, contraceptives, and family planning, as well as the powerful role models for women provided by various media. Inter-religious dialogs about the changing role of women, birth control, and religion were also credited with these changes. Equal pay for equal work is now a universal norm. Disabled persons are able to live functional lives and participate indiscriminately in society.

The interest in assessment of the past and visioning of the future became so popular at the time of the millennium that inquiry into new and sometimes counter intuitive ideas became much more acceptable. As a result, much more was learned about how to increase natural abilities by self-control of inherent human healing power, cognitive enhancing strategies, and conscious involvement with computer generated artificial "life".

By the end of the 20th century, many norms underpinning peace were widely accepted, such as territorial integrity, non-use of nuclear, chemical, and biological weapons, the immunity of civilian aircraft and ships, international obligation to help refugees, the inadmissibility of colonial rule, the unacceptableness of officially sanctioned and racial discrimination, the undeniable equality of woman, and human rights. But not until the world education system became more efficient, did these norms become almost universally perceived as normal today.

The transitions from authoritarian regimes to democracies was smoothed by advanced training programs and seminars for senior political officials to discuss with their international peers successful transition strategies in the areas of the rule of law, respect for human rights, free media, tolerance of political opposition, free elections, and an independent civil society.

Because of the speed and ubiquity of communications systems, decision-makers and the general public became increasingly aware of the consequences of their decisions -- almost as they occurred. Feedback on the results of actions is so rapid, which in turn allows for new, self-correcting decisions. This has reduced the time from early warnings to timely and effective responses and contributed to the solution of many of the seemly intractable problems of the 20th century.

Just as body building became fashionable among many in the late 20th century, so too mind building has became fashionable in early 21st century. Parents learned that giving their babies diversity of environment with consistency of love enhanced cognitive development. Nutritional supplements known as "brain food" became common. Rumors persist that we have crossed the threshold of using gene therapy to increase intelligence.

Cognitive science and behavioral sciences increasingly intermingled helping policy makers to understand how to improve mental as well as social well being. One of the most successful software applications of cognitive science was "Think Smart", a self-customizable virtual reality program with tele-presence options that directly stimulated neural development. Eye tracking, voice commands, and neural output in a virtual reality eye piece allowed one to visualize their capacities as virtual icons and use their mental strengths to improve their weaker areas. The more adventurous used this software interactivity when connected to tele-presence global education systems and the Great Cyber Games. Tele-robots give the tele-presence sense by letting users people, hear and often feel what a remote robot is seeing, hearing and feeling at the time. Such tele-presence makes people actually feel that they are swimming in the deep ocean, on the surface of Jupiter, or in an ant colony, when they are sitting a home. Unfortunately some people prefer these simulations to real life. But despite the problems it has generated, simulation is a new educational tool of great power.

Synergies from research in cognitive science and sociology gave NGOs better methods to promote peace, engage in conflict resolution, and build consensus. New knowledge of brain reasoning and decision processes was applied to enhance the brain's ability for complex reasoning. The philosophy of science and cognitive science helped society reach a better understanding of objective vs. subjective truth.

With global consciousness (awareness that everyone is aware of the world as-a-whole) institutional forms continuously reinvented themselves. Few hierarchical or network institutions existed in a continuous sense as in the 20th century. Instead they became fields for collaborative actions of varying time duration. Every four years the Olympic movement re-enforced this consciousness through its games in both cyber and three-dimensional space. In 2040, when the Mars Pioneers won the first Olympic competition in solar sailing between earth and lunar orbit, humanity seemed to pass some threshold of consciousness. We became aware that we were no longer an earth-only species but will become a space faring one.

Our human capacity is just now beginning to be understood. The current debate about a possible signal from extraterrestrial intelligence is revolutionizing our values, philosophy, and views of the human potential as we enter the second half of the 21st century.

Political Economic Policy Theme

The number of wars decreased as democracies and respect for cultural diversity increased in the early 21st century. Although old cultural conflict wounds of the past still flare occasionally, we can successfully avert and prevent them for growing into larger conflicts. The resulting social stability nurtured economic growth and created 2 billion people in the global middle class by 2010. This increased conditions for further stability and sustainable growth that moved over 5 billion people in the middle class by 2050.

The UN Secretariat's early warning and monitoring system coupled with a new rapid response capability were instrumental in preventing international and internal wars. Its indicators of peace

and security are transparent for cross-referencing by media, governments, NGOs, and the public. This transparency - especially with the media - connected early warning with appropriate and timely action. Instead of a standing UN Army, nations agreed to identify troops which would be immediately available for rapid response peacekeeping and peace building missions which have been trained together with other such national troops and which use compatible equipment and communications. NGOs cooperated with this system by establishing networks to monitor indicators of conflict and discuss and link strategies for rapid deployment of non-military resources. States were able to reduce their military budgets by paying a "security insurance fee" to the UN Security Insurance Agency to work in tandem with UN Peacekeeping as a rapid development and peace making contingents. The UNSIA was able to avoid the veto by being governed by a public-private-civic governing council that worked in partnership the UN Security Council.

As a complexity of global issues and the number of people involved in the decision-making process increased, institutions found new approaches to management and decision making. Most hierarchical institutions have evolved into network organizations and have increased their public accountability, transparency, and participation in management. Many network organizations have evolved into fields of common interests as individuals cross political boundaries electronically, making new alliances unbeknownst to traditional power.

The UN Secretariat and Security Council has been streamlined and is now supported by advanced executive information management systems, software agents, and knowledge visualization systems. Nearly all the work of UN now occurs in "Cyber UN," leaving the Secretariat building in New York more for ceremonial duties. Some of UN's specialized agencies have been merged while others have increased in importance like the WTO, WHO, WSO (World Sustainable-development Organization), and INSPACO. These global institutions have harmonized international standards, protocols, and coordination among international organizations, governments, corporations, and NGOs. Both multi-national corporations and NGOs have become transnational in their policy influence. Regional institutions have also grown in importance.

The transition from dictatorships to democracies is now complete. Authoritarian regimes cooperated in the transition realizing that democratic processes were increasingly necessary for social stability and the generation of wealth en par with global norms. Improved information technology helped make UN Electoral Units instrumental in this transition by providing effective election design, management, and monitoring. Threats to make development assistance and loans from international organizations dependent on progress toward democracy sometimes proved counterproductive. The incentive of participation in the Global Partnership for Development (GPD) proved effective as a partnership between high income countries and those with less industrial and entrepreneurial cultures to improve economic development. GDP membership required respect for human rights and policies to address environmental security. If they were abridged or thwarted sufficiently, intervention by UN peacekeeping forces could be authorized by the Security Council. A little noticed article in the GPD called for acceptance of periodic NGO assessments of progress on democratization and the reduction of corruption. The corruption reports have become an annually anticipated event and have proven to be an effective instrument through which countries have reduced corruption.

As the world progressed toward peace, the reduction in arms R&D, production, stockpiling, trade, and military personnel was accelerated along with the efforts to convert military technology to civilian uses. This contributed to government debt reduction. The synergies of advanced research in biology, physics, and engineering necessary for human space habitation have created new industries and tax resources for universal education programs. This helped to justify government investment into research that lowered launch costs. While government funds for the initial solar power satellites, orbital habitats for space manufacturing, lunar base, and the Martian station were necessary, the majority of space applications are financed and owned by global corporations, INSPACECO, or a combination of both.

The International Criminal Court was established with enforcement powers to punish those convicted of atrocious collective and communal violence. In close cooperation with the court, the UN Secretariat created a parallel early warning system focusing on potential and emerging crime threats.

Internet access became a right of citizenship as governments realized that it was a logical extension of the public library. Telecommunication monopolies were replaced by local, regional, and global enterprises as new technological capacities were introduced. Content and use of international networks are regulated as little as possible, although there are many specialty groups that make blocking software that prevents the reception of offensive materials to those groups. Imbedded software code strengthened the enforcement of intellectual property rights.

Participatory processes informed by futures research continue to develop and improve national and corporate visions of the future. Socio-cultural indicators were developed to improve analysis. The interaction of these indicators with global scientific, economic, political and environmental factors is now standard. This led to the creation of the common protocols used at regional intergovernmental meetings and countries to share their futures perspectives and communicate the implications of decisions to the public.

NGOs contributed to confidence building, conflict resolution and preventive diplomacy. NGOs are now regularly included in decision making of international organizations.

The growth and integration of regional trade groups has nearly completed the transition to the WTO objective of free trade with common standards of behavior. The globalization of markets, media, information technology, education, urbanization, and the harmonization of international standards seem to be sufficient to prevent regression to dictatorships and national wars. The IMF issued new SDRs (Special Drawing Rights) that made it easier for developing countries to pay off their debt. Standard central bank rules were finally observed by all countries on the issuance of currency, which now helps controls inflation. The Global Securities and Exchange Commission was established to tame currency markets and central banks made currency transactions sufficiently transparent to reduce speculation. Small business was promoted through access to land, credit, technology, and training. Special attention was given to women.

Increasing numbers of people now accept that access not possession is the measure of wealth.

This new cultural norm helped to change consumption patterns. Global dialogs about ethics and common values have helped the New Wealth Indicators (NWI) which replaced GDP as the primary focus for national accounting. This has stimulated more ethical and free markets. The increasing participation of those 65-85 in the labor force provided additional wisdom for increasing ethical considerations in business.

Entrepreneurial spirit and stewardship replaced the welfare attitude. Employee ownership is now common in the many forms of Employee Stock Ownership Plan (ESOP) which made corporate shares available to employees. Employee access their own company's Intranet to see elements of their planning system, work flow, production indicators, etc. this allowed them to more intelligently participate in the business.

NGOs identified, monitored, and publicized sources of the constraints to free markets and unethical business practices around the world. Participatory processes between labor, management, and consumers helped better match training and future work to keep employment high. Public voting on political elections and potential corporate decisions of global importance via global networks has become a common practice. A side benefit was the continual identification and acknowledgment of the many hidden and delayed costs assumed by government, which in turn lead to the acceptance of full cost accounting today.

Internet gave equal access to rich and poor as prices for computers, software, and telecommunications fell, capacity grew, and ease of use improved. It accelerate economic development by providing greater and faster access to the world's knowledge, and became the medium for participating in the world's economy. It distributed the wealth of information more democratically than previous systems. Electronic money made international commerce more secure, which allowed instant global delivery of many services. Tele-citizens from poorer countries working in richer ones can helped their original countries as tele-volunteers to the development process.

The Great Cyber Games helped to distribute the workload from those who were overloaded to the underemployed. The cyber game's Work Unit allowed people to bid on work from the overloaded.

Although the 1999 World Conference on Science was not initially hailed as a great success, it did initiate the discussions that laid the foundations for the political agreements to create and accept the UNESCO-ICSU definitions of terms, standards, and measurements that proved necessary for effective political and economic polices that eventually achieved sustainable development by the mid-21st century. The use of environmental tax incentives, product labels, and international sanctions on violators of a series of UN treaties related to sustainable development required these scientifically determined definitions and measures. With these changes in policy and an increasingly informed global market, businesses competed to show their environment correctness. The more successful companies got a jump on the competition by creating their own labeling programs prior to government policies.

Although "sustainable development" had become the most internationally accepted goal for humanity, it was not realized until several powerful personalities provided the spark to move the

world from "lip service" to more serious action. Companies created their own green labels as competitive advantage with those who didn't use environmentally sound production practices. Consumer groups helped the knowledge and service companies find the industrial supplies and products for their businesses that were created in more ecologically sound ways. "Green" producers and consumers united in political movements that changed waste-subsidizing economic policies. (For example, providers began charging for the real costs of water, nuclear energy costs, etc.). The global inter-religious discourses helped to make reasonably clean air, water, and healthy soil a human right rather than a factor in economic cost/benefit analysis.

The World Sustainable-development Organization (WSO) was created to provide a global focus for business, government, and individual efforts to invest into sustainable development. The International Court of Environmental Arbitration and Conciliation has become the key instrument for advising the UN Security Council on environmental security actions. UN Peacekeeping forces were deployed when the ICEAC ruled against a state that was unwilling to stop the leakage of nuclear waste that endangered several countries. Since then the threat of UN military intervention has been sufficient to cause remedial actions. Intergenerational equity has become a major global value and legal principle.

The WSO provided a global collection point for contributions and investments into alternative sources of energy, energy storage, and efficiencies to extend non-renewable energy sources. In response to global warming, it worked with oil companies to help them expand into renewable energy sources. It also provided political leadership for INSPACO to place earth rectennas for solar power satellites in China and India during the first round of receiving countries to reduce by WSO helped local authorities in cooperation with farmers, agribusinesses, and environmental NGOs provide natural habitat corridors and integration of habitat in agriculture to protect biodiversity. WSO's collaboration with local authorities helped them set goals or limits for percent of land-use for natural pristine reserves, low intensity agriculture, and high intensity agriculture.

Ecological and energy taxes were initiated to create disincentives for inappropriate energy use and tax incentives for less polluting alternative energy sources. All stages of the production process were included (extraction, production, distribution and consumption). Corporate-NGO partnerships developed model sustainable communities in different settings around the world that were designed around reduced consumerism, sustainability, community values, traffic-free, sylvan spaces, with less than 2,000 people. Buying clubs and consumer unions encouraged consumers to purchase from service industries that draw from more environmentally friendly industrial processes.

Better government policies were stimulated by the establishment of national accounts that included the economic, social, and health impacts of the depletion of natural resources. National laws were developed to compensate victims of pollution and other environmental damage. Tradeable pollution permits were used to insure international compliance to fix global emission limits for countries and industrial sectors. With broad public support, governments entered into voluntary agreements with industry to commit itself to go "beyond regulation" in exchange for a relaxation of administrative and compliance costs of regulations (data collecting, reporting, verification).

Similarly, there are now government incentives for smaller and healthier families, effective long-term contraceptives, low infant mortality rates. Since family planning or spacing has become acceptable in nearly all cultures, it is unlikely that birth rates will increase in the near future. Birth rates have fallen sufficiently that now more people worry about sufficient population growth to the support the world's increasingly aging population.

The synergies among the successes in political economic policies, human development, and technology have resulted in a better world in 2050 that few at the turn of the century believed was possible.