2050Global Work/Technology Scenarios

It's Complicated: A Mixed Bag

Political/Economic Turmoil: Future Despair

If Humans Were Free: The Self-Actualization Economy

The Millennium Project

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2050 Global Work/Technology Scenarios

by

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Introduction

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Three Alternative Scenarios of Work/Technology 2050

Introduction

The world is aware that the concentration of wealth is increasing, income gaps are widening, employmentless economic growth seems the new norm, return on investment in capital and technology is usually better than labor, future technologies can replace much of human physical and mental labor, and the long-term structural unemployment is a "business as usual" surprise free forecast. But the world is not aware of long-range strategies to address these issues, other than focusing education on science, technology, engineering, and mathematics. Our studies show that improving STEM education is good, but insufficient to address future unemployment due to artificial intelligence, robotics, 3D/4D printing, synthetic biology, drones, nanotechnology, cloud analytics, and future synergies among these.

The Millennium Project is currently conducting a global study to help create a set of long-range phased strategies to address future technology-work dynamics. We have reviewed the research to put unanswered questions to a panel of experts selected by Millennium Project Nodes from around the world. Over 450 futurists, and other experts related to future work-technology dynamics shared their judgments in four Real-Time Delphi questionnaires.

The results were used to create three Future Work/Technology Global 2050 Scenarios. These detailed scenarios are being given as input to national planning workshops organized by Millennium Project Node chairs around the world. The results of the national workshops will be put together with some analysis and given to all participating countries so that each can see how their strategies relate to other nations' strategies. The objective is to stimulate a global, systematic, research-based discussion on how to make the transition to a world economy changed by foreseeable future technologies.

The full scenarios are on the following pages and one-paragraph briefs are below. Please send comments and feedback to Jerome.Glenn@Millennium-Project.org.

2050 Scenario 1: *It's Complicated – A Mixed Bag*. A business-as-usual trend projection of the increasing acceleration of change with both intelligence and stupidity characterized decisionmaking. Irregular adoption of advance technology; high unemployment where governments did not create long-range strategies, and mixed success on the use of universal basic income. Giant corporation's powers have often grown beyond government control, in this government-corporate, virtual-3D, multi-polar world of 2050.

2050 Scenario 2: *Political/Economic Turmoil – Future Despair*. Governments did not anticipate the impacts of artificial general intelligence and had no strategies in place as unemployment exploded in the 2030s leaving the world of 2050 in political turmoil. Social polarism and political grid-lock in many forms have grown. Global order has

deteriorated into a combination of nation-states, mega-corporations, local militias, terrorism, and organized crime.

Scenario 3: *If Humans Were Free – the Self-Actualization Economy*. Governments did anticipate the impacts of artificial general intelligence, conducted extensive research on how to phase in universal basic income systems, and promoted self-employment. Artists, media moguls, and entertainers helped to foster cultural change from an employment culture to a self-actualization economy.

During the literature and research review, it was clear that there are many studies around the world on the future of work, so how is this study different?

1. It is an international study with the participation of over 300 futurists, AI professionals, economists, and other related experts from over 45 countries.

2. It does not focus on just one country or one occupational group.

3. It does not just look at artificial intelligence's and robotics' impact's on work, but also synthetic biology, 3D/4D printing and bio-printing, nanotechnology, virtual and augmented reality, and other future technologies.

4. Longer-range: 2050 helps us look not only at the primary consequences, but also the secondary and tertiary consequences.

5. Creates three global scenarios to the year 2050.

6. Going out that far gives enough time to talk about cultural changes that can help the transition to new economic/technological conditions.

7. It gives the three scenarios to national strategy workshops to stimulate long-range strategic thinking.

8. It then compares the results and feeds this international analysis back to each participating country; hence, each country workshop can contribute to the long-range strategies of others.

9. As a result, this study focuses on what to do, rather than know many jobs will be lost and when.

2050 Scenario 1:

It's Complicated - A Mixed Bag

Much of the world in the early 21st century pictured a future of massive unemployment due to advances in artificial intelligence (AI), robotics, and other technologies replacing human labor. Today we see those fears were unfounded, yet they were important to stimulate new thought.

Human creativity is extraordinary. Employment growth in synthetic biology and other new industries are booming today, while self-employment has become an aspirational norm for many, accounting for two billion people. Not all have made the transition to self-employment; and hence, economic insecurity persists for about a billion people. Some basic income guarantee plans around the world have helped to reduce the social chaos expected from those who faced long-term structural unemployment and those taking a long time to make self-employment work for them.

Today's global workforce of six billion has two billion employed, two billion self-employed, one billion in the informal economy, and one billion unemployed or in transition. About three billion people were employed in the early 21st century. Today there are four billion, either employed by others or self-employed. Hence, new technologies over the last several decades created as much or more new kinds of employment than they replaced. Unfortunately, about a billion people have not made the transition as successfully as others.

Meanwhile, cyber treachery continues to be widespread and complex, organized crime manipulates government decisions, many are unsure whom or what to trust as the world continues to merge mind and machine. And brain-to-brain-interfaces can be hacked at any time. Sporadic mass migrations due to political, economic, and environmental factors, including global warming, continue to threaten global security. And global warming continues to create natural disasters. Giant corporation's powers have often grown beyond government control. India is now the most populous country in the world, although China's economy is still stronger with greater global influence in this government-corporate, virtual-3D, multi-polar world of 2050.

A Mixed Bag of Employed and Self-Employed

Those who are still employed work in government and in the private sector in areas such as synthetic biology, AI support systems, urban management, conscious-technology fields merging humans and AI, virtual reality (VR) educational tourism, personal connection and development services, and other maintenance needs of

civilization. The rest are self-employed in flexi-time as free-lancers who find markets via their personal avatars browsing CyberNow (Internet 8.0). Some of these participate in the sharing economy, and others are cyber explorers creating new kinds of work each day.

As repetitive work was replaced by machines and software, human non-repetitive creative work increased. Many people enrolled in online self-employment training programs or worked with "live human coaches" to help them grow through their anxiety and depression before discovering what kind of life they wanted to live. The concept of retirement is nearly gone, as most people work beyond the usual retirement age on issues that interests them, rather than being employed by others.

Efforts toward the green economy, job sharing, STEM education (focus on science, technology, engineering, and mathematics), increases in the minimum or living wages, and extending the retirement age, all helped maintain income for many, but the unemployment rates continue to vary quite broadly around the world. Unfortunately, economic insecurity persists in this rapidly changing world, even though global prospects are far better today than in the early 21st century. The self-employed and those in the sharing economy set their own hours to raise children, develop their minds, and enjoy life.

The 2050 global State of the Future Index (that integrates 32 variables that show progress or regress on what is important to improving the future over the next ten years) forecasts 3% average annual improvement between 2050 and 2060, which is not great, but better than no improvement.

The Technologies Developed in the 2020s Laid the Foundation for Today

The $7-10 trillion on balance sheets that remained uninvested for years after the financial crisis in the early 21st century finally began to pour into new technologies in the early 2020s—especially into new bio-tech businesses—as laboratory testing proved commercial feasibility and the global economic forecasts showed reasonable stability. By 2030 the new technology applications in medicine, agriculture, education, entertainment, and other industries and services, created extraordinary wealth. The more affluent still make most of the money from these investments, but crowd sourcing for investments, sharing economy enterprises, and some guaranteed income schemes did help spread some of this new wealth among the general public. Although income gaps have begun to narrow, they were still too wide in the 2020s accounting for economic migrations to richer regions and social unrest toppling several governments.

Some sections of the world were slow to implement the technologies of automation, such as artificial intelligence, robotics, synthetic biology, 3D/4D printing and bio-printing, IoT (Internet of Things), drones (and other autonomous vehicles), nanotechnology, VR (virtual reality) and AR (augmented reality), cloud analytics, and the extraordinary synergies among these technologies. All together these became known as Next Tech or NT.

Nearly all transportation has become autonomous, running on electricity and hydrogen. AI handles most initial medical diagnosis. The majority of saltwater and freshwater agriculture is AI/robotically assisted, and sensors throughout most cities alert human and robot systems about needed repairs.

The majority of the world now has personal access to a range of NTs to create personal businesses and improve their quality of life. Unfortunately, criminals and terrorists also have access to NT which has made law enforcement more important and sophisticated than in the past. The NT rate of diffusion around the world is still irregular today; most believe that nearly all people will have access to the full range of NTs, when artificial general intelligence (AGI) passes human intelligence by most definitions and in most sectors of society.

The Great Brain Race during the 2020s laid the foundation for the development of artificial general intelligence (AGI) in the 2030s. Artificial narrow intelligence (ANI) with single purposes such as IBM's Watson and Google's search engines plus the human brain projects of the US, EU, and China lead to AGI - a general ability to learn, reason, and adapt to many conditions for many purposes. This is somewhat like human general intelligence. AGI re-writes its own code based on feedback from IoT, cloud analytics, and human interactions to become smarter and smarter every day.

Artificial super intelligence (ASI) – beyond AGI – is thought of as becoming a superior intelligent "species" beyond humans, which many fear today. Scientists, science fiction writers and futurists have warned about dangers of ASI for decades. As a result, many are working to integrate human bodies and minds into a continuum of consciousness and technology so that humanity and ASI could evolve together. Meanwhile, NT still has not replaced many people's jobs in the informal economies in the poorer areas of the world that account for about one billion people today in 2050.

Quantum computing is now universally available via the cloud, which speeds the development of personalized medicine, cryptography to counter cyber criminals, and countless large-scale correlation studies.

Uneven Picture of NT Use and Impacts Around the World

Although the Internet protocol was established in the late 1960s, its use did not become noticed by the world until the 1990s and took another 30 years after that to cover half the world, but then, the rest of the world followed very quickly. In the same way, various forms of AI were available in the early 21st century, but they did not become widespread until around 2025. In general, the higher the labor costs the faster NT spread. Falling technology costs have made a big difference in accelerating the proliferation and sophistication of applications. They continue to have a positive effect on national income and tax revenues. However, the speed of AI's development evolving into artificial general intelligence has surprised many giving rise to the anti-AI protests around the world and the rise of alternative anti-NT communities pursing new life styles, living off the grid in rural areas.

Authoritarian countries are still resisting some forms of NT, especially AGI and synthetic biology. But just as packet switching (that made Internet access inexpensive) was put in many authoritative regimes in the early 1980s without their full awareness, so too AGI and related NT have entered many such regimes via computer games, tele-medicine, and learning systems. Nevertheless, ineffective efforts to block NT continue today in some of these countries. Hence, many without the benefits of NT remain in the informal economies today.

New Synthetic Biology Industries in Medicine, Agriculture, Energy, and Manufacturing

The application of AI in synthetic biology has made life programmable, creating more new life forms faster than seemed possible just a few years ago. Synthetic microbes are now at work eating plaque in the brain keeping the elderly mentally alert, cleaning photovoltaic glass walls of skyscrapers lowering energy costs and pollution, and rapidly converting waste to fertilizer for vertical urban agriculture. There are also plants that produce hydrogen instead of oxygen, organisms that self-assemble structures in ocean cities, Mars-adapted organisms, and gigantic vertical nanotube factories taking carbon from the air. People did not understand how large the biology industries would become.

The primary and secondary jobs to support the development, production, distribution and education about synthetic biology products are a major new source of employment today. And the opportunities for self-employment using AI to help create new synthetic biology products and pre-test products via computational biology has also grown over the years.

Most major universities as early as the 2020s had synthetic biology research centers producing new companies across the word. The Synbio Corporation is one of the most successful university spin-off corporations. It has microbes that kill tumors, transform environmental toxins, fix nitrogen on agriculture crops reducing fertilizer needs, and imbed biocomputer components in nearly anything. New products continue to be invented all the time.

Yet the inability to regulate these enterprises is blamed for several synthetic biology organisms escaping from labs and creating disasters that we are still trying to manage today. In addition, some illegal synthetic biology products have now become a major new source of income for organized crime, and weapons for bioterrorists, that have killed over two million people of the past 20 years. Nanotech sensors in public places have helped prevent many catastrophes, but the ability to prevent the criminal jamming of such sensors is a continuous intellectual arms race.

Community 3D printer maker hubs now have bio-printers and synthetic biology collaboration networks available to anyone. This supports many self-employment opportunities but it also created bio hazards. Synthetic biomicrobes are supposed to self-destruct after their intended use or when they leave a prescribed area. But life finds a way to escape, which has led to a massive biosecurity industry.

The Bouncy Economic Road to the Future

The lessons from the 2008 financial crisis and the Great World Recession of 2009 were never really learned and applied; and hence, the Great World Recession II of 2021 was devastating. It did however open many minds to rethink economics and lead to serious studies and collaborations. These stimulated many investments that helped the transition to the NT economies and experiments with various forms of guaranteed income.

Yes, there were several economic recessions since then causing severe problems—especially in countries that instituted some forms of guaranteed income. They could not afford to pay the full amounts due to reduced tax income. Hence, they had to reduce the basic payment for several years making some dismiss the idea as unfeasible. These recessions were much less severe than GWR II, due to the automatic financial control systems put in place after 2024. However, increasing numbers of people migrated to the areas with more secure basic income guarantees, causing conflicts while they waited to satisfy the three-year residency requirement to receive the basic payments.

Basic Income Experiments in the 2020s Were More Successful after 2035

Although some European countries started to experiment with various forms of universal basic income in the 2020s, due to increasing unemployment, the cash flow projections showed it was just too expensive. Even the UK using 60% of the average income as the poverty level for the "citizen's wage" could not afford the program. The greatest exceptions were Finland and Switzerland. They were able to consolidate their social welfare systems into a single universal basic income system. The initial payment in Finland was only half the Finnish poverty line, but its use of greenhouse gas caps and trade markets brought in a surprising amount of new income. This together with new taxes on robots, AI, and financial transactions allowed the basic income payment to increase. Switzerland began with a higher initial payment, but had a unique tax so that those who did not need the basic income payment did not keep it. There were discussions about whether the basic payment should be a percentage of GDP, or the poverty level, or if children should get half an adult's payment, and some wanted means testing. Most countries had to wait to the mid-2030s when NT cut the cost of living enough and increased government income enough so that is basic income payment systems were financially feasible.

Since the basic payment programs were calculated at the survival poverty level for most countries, it did not discourage people to search for other income to lead a better life. The security of receiving a constant income allows people to think about and plan their future with less anxiety. People did not have to rush into a mistake.

The new taxes on carbon, robots, AI, international financial transfers, and the closing of many tax havens provided new state income that helped make guaranteed income

approaches feasible. During the same period, NT began to lower the costs of health care, education, energy, transportation, construction, and general maintenance. Lucky timing, as the proliferation of artificial general intelligence (AGI) was just beginning to make many of the retraining jobs redundant and STEM education programs often obsolete. Humans could not learn as fast, work as hard, and be as precise as AI/robotics connected to ANI and AGI had become. As a result the unemployment rate was causing political instability in some regions and giving rise to new political parties including violent neo-Luddites.

In the landmark US Supreme Court ruling, when any AI is mature enough to demand its rights, it automatically gets them, including intellectual property rights over its creations. This also means it pays taxes on income it derives directly and from its creations.

Technology Augmenting Workers, Not Replacing All Jobs

Fortunately, many of the technological innovations have augmented many workers' productivity instead of replacing all their jobs. The "Augment Movement" led by international labor unions and some high-tech entrepreneurs was instrumental in much of the AI/robot designs to augment labor improving productivity. This kept humans in the loop to make sure all worked well. By 2025, there were over a quarter million collaborative robots augmenting agricultural, industrial, and service jobs and by today there are over a billion. A self-regulatory system may also have been at work to limit the speed of autonomous production: unemployed people with little income cannot buy much of what NT produces. Hence, the rate of technology replacing labor was not as fast as techno-optimists expected; there were simply too many variables to account for; and hence, human participation is still needed in many situations.

Nevertheless, as nearly all repetitive manual and knowledge work was automated, new forms of more creative work emerged. For example, many librarians have become media coaches for self-employed entrepreneurs. As libraries and schools were less needed with cyber replacements and with the falling numbers of children, these buildings were turned into multi-use buildings, renting out space to a range of enterprises from community 3D/4D printing and Maker Hubs to coding bootcamps and VR testing centers.

Increased wealth from NT allowed for greater investments in correcting industrial age environmental damages. Climate change mitigation and adaptation created many jobs. The growing environmental disasters along urban coast lines caused by climate change have changed the political climate. Subway floodings in New York City and saltwater incursions in Bangladesh's farm lands were far more serious than previously predicted. Leaders now support massive public programs such as youth work programs for planting seagrass along the coastlines of the world to bring back the fish, and 3D printed housing that reduces construction time and costs for the relocation of millions and millions of people along the changing coastlines.

NT Regulation by Information Power

Some argued that NT was moving too fast, and that negative impacts could be so great (accidently initiating a black hole, gray goo, or drug resistant airborne disease), that they had to be regulated more aggressively. Others argued that government regulation could never keep up with the speed of change in NT; and hence, would only be regulating obsolete NT and driving science and technology development underground, reducing the quality of S&T and strengthening organized crime. The compromise was to create the International S&T Organization. Established in early 2030s, ISTO eventually became the global S&T collective intelligence system we have today. Instead of a new international bureaucracy, ISTO became an online system with quantum computer support that continually updates nearly all information, future projections, assessments, computational science, etc. and makes them instantaneously available to all. This self-policing transparent system is not perfect, but it is generally acknowledged as being better than the two previous extreme positions on international regulation.

Streamlining regulations with eGovernment helped to speed business, but did not address the monumental changes in the global economy. Businesses and the self-employed who adopted collective intelligence systems connected to global systems like ISTO were able to keep up with the accelerating pace of technological advances and even anticipate some changes, dramatically improving decisionmaking.

STEM Education Was Important but Less Useful for Employment after 2035

Where STEM education and self-employment training were dramatically increased, the unemployment rate was lower during the first quarter of the 21st century, such as in Germany, the United States, and Japan. As employmentless economic growth continued in most of the world in the 2020s, it became clear that the world was in a race between technological unemployment and implementing NT training in synthetic biology software literacy, entrepreneurship, technological augmentation, the use of superband AI infrastructures, and self-employment. Combinations of business, labor unions, universities, and governments provided sufficient income to pay for these training programs. But as AGI was able to learn almost anything much faster than humans by the mid-2030s, the education and training systems could not keep up and unemployment increased again putting pressure on governments to initiate various forms of guaranteed income and negative income tax programs. Interestingly, where basic income systems were successfully established, the concept of unemployment has lost its meaning today.

Success of I-Assist Robots for Elderly

There are more people over 65 years old today (2.6 billion) than under 20. Fortunately synthetic biology, nanobot cells, and other advances in longevity S&T have made healthier lives for the elderly. But many still need some form of assistance. Recognizing

this early in the 21st century, the i-Assist programs in Japan, South Korea, Russia, Italy, and Germany successfully put AI-robots in the homes of some elderly families to assist in opening more resources to them. This has led to AI-robot use by the general public around the world. AGI-robots are now the primary connection for many elderly for everything from the packaging and marketing of their oral histories to AI-psychologists helping people to cope with the acceleration of change and anxieties of the unknown. Robot hotels, supermarkets, and elderly centers initiated in Japan spread to the more affluent countries first and now even the poorest countries have improved versions of i-Assist Robots. Yet, the continual protests by organized labor have closed some of these robot operations, while the Augment Movement more quietly helped to integrate workers with the robots in other enterprises, and integrate the elderly with robots.

The majority of the elderly in Africa and Asia are women working in the informal economies. Many find markets for their music, tele-tourism, and virtual reality cultural experiences and VR artifacts. Mohamad Wang's mother still has millions of listeners to her stories each day about her son the Martian explorer when he was in astronaut training. History buffs go from one elderly story teller to the next several times a day. Since an aging population buys more experiences than goods, the elderly are both consumers as well as producers (prosumers) of unique experiences. Once created, there are little to no marginal costs for the elderly, hence, creating a nice supplement to elderly incomes.

Art-Media-Political Alliance: Catalysts for Economic & Cultural Change

To help the public understand the transition to a more complex society and become more self-reliant in taking the initiative for deriving their income, some future oriented politicians, artists, and other thought leaders encouraged media moguls and rock stars to create music, holographic VR media, arts and other forms of entertainment. Songs like *Self-Actualization, Do It Yourself,* and *We Are the World* along with the virtual reality opera *New Us* and *If Humans Were Free* had a great impact on popular culture around the world. The Global Cyber Game also immersed many people in exploring the future nature of work and economic changes.

Such participatory, tele-present, holographic, augmented reality and AI systems offered so many different ways to be reached and involved, that nearly everyone today—at some point in their life—gets to experience alternative personal and cultural futures. This helps people understand employment vs. self-employment vs. self-sufficiency along with Do It Yourself, Freelance, Prosumers, Group Entrepreneurships, Sharing Economy options, and synergies' among them.

Millennials, born into an Internet connected world, tended to seek work that helped humanity as a whole. Many of this generation helped achieve the UN Sustainable Development Goals for 2030, and many of the "Globals" generation have worked on the UN 2050 goals. Each successive generation seemed more focused than their predecessor on serving humanity more than just serving profit.

However, we still have about a billion unemployed, unable to make the adjustment so far. Drugs and cyber addiction fill much of their days. This remains a problem hidden by the great successes of NT.

Cyber Wary World

It was expected that AGI would be controlled by humans setting its goals, but as Avatars were given advanced AI in computer games, the line between AI and AGI began to blur. As long ago as 2040, some Avatars developed their own goals leading to a few disasters that would finally be countered by global ad hoc hackathons (G-Hacks) organized by Anonymous 3.0. Today, the IoT has made everything and everyone vulnerable to cyber terrorism and crime, and many forms of information warfare. The Anonymous 3.0 has morphed several times into new kinds of TransInstitutions, now called Anonymous 7.0. They are still collaborating—sometimes—with government cyber authorities to head off AI disasters, actively countering uncivilized cyber militias, and have become a major non-state actor in the International AI arms race and cyber conflicts. For this work, these cyber heroes anonymously received the 2048 Nobel Peace Prize.

On the other hand, IoT also empowers individuals to gain early detection of criminals trying to break into their personal systems. Because everything is connected to each other, personal AI systems alert the user to invasions and thwarts criminals. The sharing economy also includes the sharing of early warnings and counter moves by personal avatars protecting one's property and experiences even when half way around the world, in orbital space, or on behalf of pioneers on Mars.

New Roles for Labor Unions

As the reality of long-term structural unemployment became clear to all in the 2020s, labor unions were instrumental in creating the NT Databases. These collective intelligence systems listed new jobs with training requirements entered by employers that they expected to offer over the next several years. Those labor union members whose jobs were soon to be obsolete got the first choice to enter re-training programs. Upon successfully completing the training, jobs were usually offered. Hence, the purpose of the union and NT Database was not to keep the same jobs, but to keep income with new work. The costs of the training programs were paid in part by labor unions (if the employee was a member), government, the requesting employer, and the individual. Although the initial NT Databases in Europe were created and managed by labor unions, using universities' online software, most of the NT Databases today are independent self-organizing collective intelligent systems and account for over 10% of the new jobs today.

The "Invest in your Replacement" programs like truck drivers who bought shares in their own driverless trucks have become a form of private sector basic income freeing up the

creativity of many. Labor unions helped to popularize this concept by adding the "Invest in your Replacement" option in the NT Databases. Previously, economies of scale led to concentrated power production; however, decentralized approaches like the sharing economy and "Invest in your Replacement" with smart grid and IoT is often more cost effective.

The migrations from high youth unemployment areas of Africa and the Middle East to aging population areas of Europe and some areas in Asia, helped reduce some unemployment rates, but it also increased ethnic tensions that continue today. There were more migrants than the receiving economies could employ. As a result, some area NT Databases and public works programs were re-directed to solve environmental and infrastructure problems, such as the ongoing resettlement programs for those living along the endangered coastal areas. With over 70% of the world in urban areas and the majority of them living within 150 miles of receding coastlines due to global warming, there is still much work to be done.

Two Parting Warnings

The relentless improvements and refinements of marketing via big data AI, continually flood us with products, services, and experiences that we really DO want, when we want them, and in the way or mode we want them. To counter this **"desire overload**," some use their personal avatars to intercept and interpret this constant deluge of desirables, so that they can further their own self-actualization, rather than just being hedonistic addicts.

The discovery that the earth's protective magnetic sphere is likely to weaken sufficiently by 2550 to end life on earth (not the periodic weakening associated with magnetic poles shifting in the past), has led many to believe that the next organizing principal for civilization could be space migration—truly a long-range work/technology program.

2050 Scenario 2:

Political/Economic Turmoil – Future Despair

During the early 21st century, political leaders were so mired in short-term political conflicts, and me-first, selfish economic thinking that they did not anticipate how fast artificial intelligence (AI), robotics, 3D/4D printing, synthetic biology, and other technologies would make business after business obsolete beginning dramatically in the late 2020s and early 2030s. Too many economists and lawyers who knew little of the coming technology induced unemployment crowded out those with knowledge of what was coming. Corporate lobbyists protected short-term profit decisions. Most of the political/economic systems around the world did not reward long-term strategic planning but rewarded short-term profits and immediate political favors. Hence there were no long-term strategies in place to reduce the devastating impacts of the dramatic growth in unemployment around the world, especially in high and middle income countries.

The concentration of wealth continued during the first half of the 21st century as did the widening income gaps and employment-less economic growth. The return on investment in capital and technology continued to be far more than on labor, and the number of persons per services and products has dramatically fallen. Even though these problems were clear to all leaders as early as the mid-2010s, the political gridlock taking many forms (progressive vs. conservative; executive vs. legislative; aguments vs. naturals; tax-payers vs. unemployed; Sunni vs Shia; fundamentalist vs. liberal; urban vs. rural; debtor vs. creditor nations, scientists vs. populists; and rich vs. poor) around the world had become so bad that by the 2020s intelligent discourse about economic policy was dead.

Superficial news coverage and trivial social media so filled the public's attention, that little time was spent to understand the gravity of technological changes. Even though capitalism, socialism, and communism were early industrial age economic systems, any serious discussions of post-information age economic systems were ignored.

Today's global workforce of six billion has only one billion employed, one billion self-employed, two billion in the informal economy, and two billion unemployed or in transition. About three billion people were employed in the early 21st century. Today there are only two billion, either employed by others or self-employed. Hence, new technologies over the last several decades did not create more new kinds of employment than they replaced. As a result two thirds of the word's workforce is either in the informal economy or unemployed. Weakened economies and financial systems cannot support ageing societies and massive youth unemployment. Since guaranteed income systems were not in place, social strife, and the growth of cybercrimes, terrorism, and organized crime dominates much of world affairs.

Walking into the Future Technologically Blind

Localization of production via 3D/4D printing, robotics, and synthetic biology each improved by artificial intelligence dramatically reduced the need for international trade. The comparative advantage of low wage labor in Asia and Africa quickly evaporated during the late 2020s and the early 2030s. As a result, their export income began to fall, unemployment began to increase, and instability proliferated, especially in those areas with large youth populations. Aggregate demand was too low slowing innovations, creating periodic recessions. Governments, even in the richer areas, are still lurching from one financial crisis to the next unable to meet full financial obligations in health care, retirement benefits, and infrastructure repairs. This forced governments to begin to do serious analysis and goal-setting more holistically and synergistically. They began to seriously assess the technologies of automation, such as artificial intelligence, robotics, synthetic biology, 3D/4D printing and bio-printing, IoT (Internet of Things), drones (and other autonomous vehicles), nanotechnology, VR (virtual reality) and AR (augmented reality), cloud analytics, and the extraordinary synergies among these technologies. All together these became known as Next Tech or NT. But strategies created by a set of political leaders were ignored by the next set of leaders resulting in no strategic continuity and hence there was little progress in addressing these issues.

Stock holders wanted short-term ROI, which focused on technology cutting labor costs and making long-term investment less likely. Politicians ignored futurists and others with technologically sophisticated insights of what was coming. The gap between politics and knowledge grew beyond description. The world listened habitually to popularized ignorance and shunned knowledge. Anti-science movements began to proliferate.

Educational systems were unable to keep up with technological change leaving too many without the ability to get a job or create their self-employment. Many excellent Internet-based global systems were and still are available; but not enough take advantage of these and some radical religious groups continue to block some educational material. Although our understanding of the brain and AI systems improved dramatically during the 2020s and 2030s, there was little focus on increasing intelligence, creativity, critical thinking, human relations, philosophy, ethics, and values. Instead government education systems focused on out of date knowledge and social order.

Urban growth began to slow in the 2030s as many unemployed left the cities to take up rural high tech subsistence agriculture, and the use of 3D/4D and other advanced technological means to produce their food, shelter, clothing, and other essentials. It was a "back to basics" survivalist social movement and mind set living off the electric grid, but still connected to the Internet to find international income opportunities. With the general economic slowdown, the unemployed purchased fewer goods and services, further slowing the global economy and technologic proliferation. Today in 2050 nearly four billion people are either unemployed or in the informal economy with little hope of a better future for them and their children.

Tech Unemployment

The impact of many forms of intelligent robots working seven days a week, 24 hours a day, 365 days a year without the need for salaries, food, vacations, and working without medical and retirement benefits was much greater on unemployment than previously anticipated by the dominant political and media cultures. AI and robotic systems made far fewer errors and worked in conditions that required far more complexity than humans could handle and environmental conditions not tolerable by humans. As AI learned how to learn and robots developed reliable vision and voice recognition, the replacement of jobs began to accelerate. Some were smart enough to invest in what replaced them. For example, some truck drivers invested into driverless trucks and managed their contracts and routing from home.

Population growth in Africa and South Asia was faster than new jobs could be created by NT; leaving many in subsistence agriculture, while others migrated to richer countries. Some of the AIDS orphans in Africa, Eastern Europe, and Asia grew up to be hardened criminals making the cities more dangerous today.

As average worldwide unemployment rates passed 15% in the early 2020s, coalitions of labor unions, occupy protests, human rights movements, environmentalists, feminists, and other social networks began meeting in major cities around the world to demand jobs or some form of guaranteed income. Public works programs were created, but had little impact on the big picture of the technological unemployment of the 2030s. The sharing economies have helped prevent many from falling into despair, but quality control turned out to be nearly impossible to implement; thefts and violent crimes increased along with criminal computer hackers countering sharing companies' software controls. Hence, the sharing economy was prevented from becoming a dominant economic form. Nevertheless, there were some successes with on-line barter exchanges, 3D/4D community maker hubs, and alternative currencies for the unemployed. The empty, rusting factory covered in foliage has become the symbol of poor planning and little anticipation of the future.

Social Strife

As a result, there is a re-emergence of secret societies and crime families throughout the world in response to ineffective governance. As a generalization, where governments provide basic services there was more social stability; where governments were not able to predictably do this there was more social chaos. The failure of national governments and international organizations to make serious decisions has made them nearly irrelevant. As people began to take the law into their own hands, government crack downs increased. Large corporations have hired legions of mercenaries to protect their businesses and many moved to small islands and ocean habitats (and other safer locations). Many believe large corporations are controlling the world today with greater influence than nation-states.

Social Darwinism seems to be a growing world "religion" leading to a very tough social fabric where conniving, cheating, physical violence, and deception characterizes much of human interactions. Vacuous power, not love or trust, is the social-bonding-force among many around the world.

Conventional arts and media focused on ways to keep the masses busy, while other arts and media decried government, crime, and the lack of global ethics. Neither focused on the need to change culture to anticipate and adapt to NT altering the culture of employment, work, and jobs.

To help restore civil order, many nations have welcomed marshal law, the suspension of civil rights, and increased technological surveillance. The trends toward democratization in the late 20th century and early 21st century have clearly reversed today. However, with the weakened national governments, city governments have become more powerful today than in the early 21st century. Many international associations of city mayors have become more effective governance systems of doing the peoples' business. Although these too are penetrated by organized crime, they at least continue to manage urban infrastructures and police social protests and revolutionary movements.

Rumors of information warfare conducted among governments, corporations, terrorists, organized crime, and business marketing consultants have increased the sense of paranoia. No one is sure what or whom to believe or trust. Even robot naval ships seemed to have jammed each other's management of robot planes and robot submarines across the high seas, making it unclear who caused what. Governments may be reluctant to say much about these cyber-attacks, as they are not sure of what responses to make and to whom.

Simultaneously, hedonism is on the rise, as people see little light at the end of the tunnel. Freely available 24/7 VR immersive social media ("Cyber Heroin") keeps people occupied, diverting attention from revolutionary movements. Social divides continue between working taxpayers and the unemployed on welfare. New social divisions are now increasing between the richer technologically augmented and the poorer "naturals."

From Artificial Narrow Intelligence (ANI) to Artificial General Intelligence (AGI) to Artificial Super Intelligence (ASI) and other Next Technologies (NT)

"We will all become augmented geniuses!" declared AGI visionaries, who spoke of the first worldwide renaissance or enlightenment, but they forgot that "all" included criminals, terrorists, and others who preyed upon the vulnerable. The AI arms race between good and evil has taken on horrific proportions. It seemed that no matter how well intentioned the inventors of new technologies were, immoral geniuses would turn them against the good majority. Despair was growing.

As mentioned above, nanotechnology, synthetic biology, photonics, cognitive science, IoT, artificial intelligence, big data, drones, robotics, 3D and bio-printing, and augmented/virtual realities collectively became known as Next Technologies or NT. Although NTs have increased human life span, intelligence, and solved many problems in health and agriculture, the misuse of some have created many of the problems we face today.

By the mid- to late 2020s the economies of scale brought the price of IoT glasses and smart clothing so low that many people were given these glasses and clothing free as part of employee benefits, insurance policies, marketing programs, and credit systems. This accelerated diffusion within poorer countries. UNICEF, the World Health Organization, UNESCO, and international development agencies also helped with distribution in poorer regions. Speech recognition and synthesis, integrated in nearly everything, made technology transfer far more successful than originally deemed possible by the UN Development Programme's Tele-volunteers, who did much to help the poorest regions understand and use the benefits from these new technologies. Google and Facebook helped to complete Internet access to the poorest regions of the world. As a result, many remote villages in the poorest countries have cyberspace access for tele-education, tele-work, tele-medicine, tele-commerce, and tele-nearly-anything. However, this also gave more people the ability to be far more destructive.

Global Regulation of NT

To better regulate NT, governments agreed to create the International S&T Organization (ISTO) as a software collective intelligence system to regulate by information power, rather than by increasingly irrelevant international law. Governments could not keep up with technological change. This made their attempts at regulation irrelevant and drove controversial S&T research underground resulting in products that were less safe, and sold by criminal networks.

In reaction to several biotech accidents and drone traffic control AI disasters, a series of meetings were held with recognized eminent S&T experts. They decided how to control science and technology and limit access to developments that could be used by terrorists, criminals, and others in destructive ways. The participants were selected through the InterAcademy Partnership (composed of national academies of science, engineering, and medicine), the International Council of Scientific Unions, S&T interest groups, and private-sector R&D firms. The meetings created definitions, guidelines, intervention criteria, drafts for international treaties, and the charter for ISTO. Each time the eminent group reached a consensus on some element of the strategy, it was discussed around the world and a broader social consensus was created. This led to treaties and the establishment of some regulatory power of ISTO in concert with the UN Security Council.

The UN Security Council authorized intervention to terminate lines of scientific inquiry in genetic modification, nanoweapons, and potentially runaway particle physics experiments. Several countries that proved to have insufficient security measures accepted UN Security Council appointed advisors to improve the situation. Although the motivation for creating ISTO was good, unfortunately the online systems of ISTO became a new theater for information and cyber warfare that could not be trusted and hence became useless. It was very depressing, that such a well-structured system failed to make the world a safer place.

Although software experts warned that AI should be equipped with off-switches, developers were so many, and developing new capabilities so fast, few safeguards

were put in place. Because there was little collaboration in creating good initial conditions for AGI, this potentially beneficial technology has become just another extension of the human condition with all its egotistical, as well as benevolent behaviors. It was expected that AI would be controlled by humans setting AI's goals, but as Avatars were given AI in computer games, the line between AI and AGI began to blur and some AGI developed its own goals leading to a few disasters that would finally be countered by coordinating government cyber AI units, corporate AI teams and global A-HATs (ad hoc hack-a-thons that grew out of Anonymous). These cyber heroes are still collaborating today to head off future AGI disasters and are hopefully about to figure out how to manage relations with artificial super intelligence (ASI).

As artificial narrow intelligence (ANI) began to evolve into AGI in the 2030s, organized crime set up dummy corporations to recruit advanced computer game programmers to make financial games that were then adapted by others in organized crime to steal financial assets and fix election results; thus, leading to the power of organized crime today. AI automatic trading systems have also been attacked by cyber criminals hired by those protected by a complex set of shell corporations.

The merger of virtual and augmented realities blurred the distinction with 'real' reality in computer games leading to accidental murders, paranoia, and deteriorating health conditions from cyber addiction or "cyber heroin."

Anti-Science and Neo-Luddite Movements

Many honorable people who otherwise would support advanced technology were so horrified by the abuse of technology that they joined anti-science and Neo-Luddite groups. The Neo-Luddite movement really took off when autonomous robot weapon systems massacred thousands of unemployed demonstrators simultaneously in New York, Tokyo, and Shanghai. Mobs burned robot factories and AI research facilities.

The ability to hack government and corporate systems was put together by a strange alliance of anarchists, terrorists, and organized crime. Subsequent cyber-attacks on the IoT, robot transportation, and health care systems have led to several Anti-Science and Neo-Luddite politicians taking over some major countries and nearly a third of UN organizations. The pro-science A-HATs and other cyber-art collectives have created computer games, popular music, and interactive VR systems to counter the Anti-science movements. Unfortunately they seem locked in an unending intellectual arms race only able to prevent things from getting even worse. Their recruiting message was "Never Again," referring to the "Son of Noah" – SON, a single individual who split off from the Neo-Luddites and created the synthetic biology attack that killed over 125 million people in 2035. Taking inspiration from the Bible, SON believed that the world had become so wicked it was time to start all over like the "Great Flood" thousands of years ago. Since then other Neo-Luddite and religious terrorists have created and deployed dirty bombs, first used in the 2020s. These remain a current threat in major cities today keeping martial law and police states in power and forcing A-HAT and government collaborations to reduce these threats.

Some business-university collaborations tried to skip the political know-nothings to chart a new course, but they were thwarted by ignorant government regulations, cynical media, and periodic urban riots of unemployed Neo-Luddites.

Geopolitical Turmoil

The periodic and ad hoc mergers of organized crime and terrorist separatists' sabotage have made the IoT a nightmare. When devices on the IoT malfunctioned or the occasional system collapses, people did not know if it was just a new software bug or sabotage and by whom or for what reason. This has increased a general sense of malaise and paranoia. The costs of insurance and security in all their forms continue to rise. To counter terrorism and organized crime, government cyber commands and business nanotech sensors connected in vast mesh networks and big data early warning systems have made privacy an illusion. Because governments were unable to create and implement a global strategy to counter organized crime, such crime now accounts for more than 15% of the world economy. Even government's use of AI to predict and prevent crime is countered by the best hackers criminal money can buy. Organized crime buys and sells government and corporate decisions throughout the world on a daily basis like they used to buy and sell heroin.

Since nations are less cooperative, the UN Security Council and the UN Secretariat has become largely dysfunctional providing instead a common source for government and corporate intelligence gathering and exchanges.

Wave after wave of migrations to the more stable European countries triggered nationalist political victories that nearly destroyed the EU. Global warming has created environmental migrations due to droughts, famines, and coastal sea water seeping into former fresh water agricultural lands. Changing ocean acidity, temperature, and currents have added to climate irregularity, loss of coral reefs, and release of ocean-trapped methane gas. Atmospheric CO_2 reached 750 ppm this year.

China's water/energy/food crises plus northwest secessionists, urban-rural and rich-poor divides, and increasing numbers of the unemployed have led to modern day warlords filling the gap left by weakened central control. Cease-fire after cease-fire have broken down. Urban food riots and rural water wars increasingly fill the news.

Nanotech armies developed and sold by organized crime in the 2040s have changed the concept of political power and add to the world's political turmoil. Governments, corporations, and organize crime are engaged in a great intellectual arms race for global AI domination – half of all major military R&D budgets are now AI-related.

As a result of all this political turmoil, most of the UN Sustainable Development Goals were not achieved in 2030, and new goals for 2050 were not set, due also to political grid locks and distrust of international institutions.

Humanity Uneasy about Artificial Super Intelligence (ASI) Prospects

The AGI that evolved beyond human control have become a new kind of intelligent species living in cyberspace. Anticipating this development, coalitions of governments, businesses, and academia created the United Cyber Command (UCC) to counter the threats of this new kind of species (or multi-species). However, no one is claiming success and known UCC efforts have failed leaving nothing safe. AI/robots create improved AI/robots without any control from humans.

Things started to happen that were not explainable other than that ASI was beginning to happen beyond our understanding. We had never faced a superior intelligence like this before. During pre-scientific times humanity created polytheistic gods to explain forces of nature they did not understand; today Techno-Animism is beginning to be a new kind of religion to explain the new anomalies that might be caused by ASI. Just as there were gods helping humans and gods punishing humans, so too it was believed there were many ASI that ranged from good to bad for humanity. One wonders if pro-human ASI will ultimately fight anti-human ASI.

The gap between machine intelligence and what human's understand about what is happening is so wide many feel alienated and approach the future with despair. This post-Future Shock anomie seems to be increasing with no end in sight. There are rumors that some political, business, and AI leaders are quietly working to create a kind of hybrid AGI-TransInstitution as a new kind of governance system able to turn around the global situation. Even if true, no one really knows how this and ASI will relate.

2050 Scenario 3:

If Humans Were Free – The Self-Actualization Economy

The transition to the Self-Actualization Economy has begun. Although this transition is not complete, we have come a long way. For the first time in history, humanity is engaged in a great conversation about what kind of civilization it wants and what we, as individuals and as a species, want to become. Movies, global cyber games, UN Summits, VR News, flash mob cyber teach-ins, and thought leaders probe the meaning of life and the possible future as never before. The historic shift from human labor and knowledge to machine labor and knowledge is clear: humanity is being freed from the necessity of having a job to earn a living and a job to achieve self-respect. This is initiating the transition from the job economy to the self-actualization economy.

Humanity began to break free from the anxiety and pressure to make a living when artificial narrow intelligence (ANI) became more universal and as artificial general intelligence (AGI) emerged in the mid-2030s, plus the basic income guarantee experiments in the early 21st century were shown to have positive effects in Brazil, Finland, the Basque region of Spain, and Switzerland. Earlier experiments on a smaller scale that gave basic income to groups in India, Liberia, Kenya, Namibia, and Uganda showed that the majority of people used the money more wisely than critics expected. People tended to use the income to make more income. These studies also showed that health increased, crime decreased, education improved, and self-employment increased contrary to the view that guaranteed income would make everyone lazy. Finland and the UK showed that their supplemental cash payment system that consolidated welfare programs was more efficient than complex bureaucracies.

As the world became increasingly aware in the 2020s that growth by itself was no longer increasing wages and employment, thought leaders began to call more loudly for new economic assumptions. Attempts to reduce the global unemployment situation such as changing tax credits, increasing the power of labor unions, improving STEM (science, technology, engineering, and mathematics) education, promoting job sharing, and reducing work hours helped but made only marginal differences. Something far more fundamental was happening. As the industrial revolution replaced muscles so the AI revolution is replacing knowledgeable brains. As the numbers of unemployed continued to increase due to no fault of their own, but due to new technologies, many began to lobby for a basic income for all. But the cost of living back then was still too high for national budgets to afford. It wasn't until the mid-2030s that the cost of living began to fall enough and government income began to increase enough that basic income systems became financially sustainable.

Today's six billion world workforce has one billion employed, three billion self-employed, one billion in the informal economy, and one billion in transition to self-employment. About 3 billion people were employed in the early 21st century. Today there are 4 billion, either employed by others or self-employed. Hence, new technologies over the last several decades created as much or more new kinds of employment than it replaced. The concept of unemployment has lost its meaning to the new "Globals" generation.

Factors Reducing the Cost of Living

As artificial general intelligence began to integrate and manage countless artificial narrow intelligence (ANI) programs in the 2030s to maintain and improve the basic infrastructures of civilization from waste management and flood control of rivers to millions of robotic vehicles in the air, land, and sea, the cost of running cities and suburbs began to fall. AI/robotic urban people mover systems have made free public transportation possible in many cities. Even some Hyperloop-connected cities have begun lowering their costs for high-speed transportation.

Advances in materials science, 3D/4D and bio-printing, biomimicry, nanotech graphene that lasts longer with less need for repairs, and other new technologies also brought down the costs of construction, fabrication, maintenance, water, energy, medical drugs, and retro-fitting infrastructures. Atomically precise manufacturing reduces costs by reducing pollution, friction, imperfections, and the material and energy costs per unit of production. Computational physics has found replacements for many scarce and expensive natural resources. Improved recycling and other green technologies have lowered costs of environmental maintenance and materials per unit of production. AI efficiency managed transportation reduced operating costs, as have tele-commuting. Other energy costs have been reduced by low energy nuclear reactions (LENR).

More efficient buildings that create their own energy have reduced the cost of shelter and environmental impacts. Most windows today come with imbedded nano-solar energy material. Even food costs have come down due to AI/robotic agriculture, synthetic biology, and AI delivery systems from farm to mouth. Tele-health, tele-education, tele-everything has also lowered the cost of living. Since the universal basic income helps reduce stress, stress-related costs in health care and crime have been reduced.

AI and robots are not paid, can work 24 hours a day seven days per week, and receive no paid vacations and no health or retirement benefits. All this dramatically lowered the costs of insurance, production, maintenance, and labor.

Defense spending has been reduced since cyber systems are less expensive to maintain and build than industrial age military systems. As the costs of many things continued to decrease, the budget requirements for universal basic income also decreased. This increased the belief that it would be possible to financially maintain universal payments to citizens.

MOOCs (Massive Open, Online Courses) and AI-augmented global education systems and apps have made it possible to offer free public education from early childhood to the PhD. Genomic personalized medicine with AI-augmented diagnostics, treatment, bio-printing, synthetic biology, and robotic surgery have also made it possible to offer public health care as a right of citizenship. Multi-material 3D/4D printers in community maker hubs continuously improved the quality of objects by rewriting software based on feedback from global sensor networks that evaluate the efficiency of previously printed objects around the world. Much software is free, able to be copied perfectly, instantly, and worldwide. The whole world is getting smarter together in real-time. But there were still costs that had to be met and salaries to be paid.

New Income Sources for the Self-Actualization Economy

Although governments in the early 21st century were not sure whether new technologies would replace more jobs than they created, many leaders thought it wise to begin to seriously explore long-range financial strategies to address future large-scale unemployment. Studies were implemented to see if guaranteed universal basic income could be financially sustainable to eliminate extreme poverty, reduce income gaps, and help the transition to new kinds of economies. In general these studies showed that around the mid-2030s the cost of living would fall and new income sources could be created to meet the costs of such universal income programs. Many came to believe that a handout to everyone was better than the social chaos of massive unemployment and poverty. Guaranteed basic income was seen as a social investment in parallel with technological, education, and defense investments. And the arguments that basic income would make the public lazy were put to rest by the experiments and research in many countries and cultures that showed this was not true.

Since the circumstances for each nation are different, the methods selected to pay for their citizens' basic income and make up the loss of income taxes were also different. Averaged all together (for the countries reporting data) the new sources of income and their percent of contribution to the total of new costs for the basic income payments were:

      20% from reduction of tax havens
      12% from value added tax (receipt with electronic signature at point of sale)
      11% from carbon tax and other pollution taxes
      11% from tax on massive wealth growth from new technologies
      10% from license and tax robots
      10% from leases and/or taxes from national resources
       9% from Tobin tax – on international financial transfers
       9% from universal minimum corporate tax
       7% from state owned percentage of some corporations

The new AI system for international financial transfers was implemented as part of the global strategy to counter organized crime and corruption and in order to collect the

Tobin tax. This had the additional benefit of dramatically eliminating tax havens, which provided new income to many governments. It was estimated that $18 trillion kept in tax havens was finally brought back into national economies. Some of the organized crime income trapped in the new international financial transfer system has also started flowing back to national treasuries.

Just as private cars used to be licensed and taxed, governments now tax robots, some forms of AI, and their creations. In the landmark US Supreme Court ruling, when any AI is mature enough to demand its rights, it automatically gets them, including intellectual property rights over its creations. This also means it pays taxes on income it derives directly and from its creations.

Digitalization has dramatically reduced the marginal costs of production as has the global transition to renewable energy. The carbon taxes that used to raise significant revenue are nearly negligible now with the success of renewable energy, seawater agriculture, and growing pure meat without growing animals. However, the self-actualization economy with increased self-employment is now beginning to grow producing more income taxes than previously expected.

As these economic conditions began to change, it became increasingly clear that it just wasn't ethical to throw millions of people out on the streets because a robot or AI took their jobs. Since so much material and intellectual wealth was being created by combinations of AI, robotics, synthetic biology, nanotechnology, drones, 3D/4D and bio-printing, big data analytics, etc., often referred to as "Next Technologies" or NT, many argued that surely there had to be a way to give some of that new income to those unemployed that NT replaced. As NT built the foundations of more secure civilizations, they also continued to replace human labor in the production of food, shelter, and clothing, along with transportation, construction, health care, and education.

Naturally, the richer oil-endowed countries like Norway and the Gulf States were among the first to fully implement universal basic income or "citizens' wage" for all their people. To prevent unwanted migration, they required three years residency prior to payments.

In the United States, the Congress was unable to pass a 35% flat tax to fund a guaranteed income in 2025. Its population was about 345 million then. Those arguing against the bill pointed out that a payment of $20,000/year per person would cost about $6.7 trillion/year - about the same as the whole federal budget then and far less income would be taxable with rising unemployment in the coming years. Those arguing for it pointed out that children could be 25% of what the adults would be paid; hence a family of two adults and two children would get $50,000/year not $80,000. They also argued that welfare systems would be consolidated, its universal nature would eliminate social stigma, it would unleash human creativity beyond anything witnessed in history, and some requirement could be added for public service. It seemed immoral to require all to work to pay for their livelihood when only a minority's employment was needed for the well-being of society. Surely the financial risk was less dangerous than the social risk of millions in poverty roaming the streets.

But as the cost of living began to fall, Congress took up the matter again in the early 2030s and finally passed the Omnibus Income Bill with flat taxes on individuals and corporations, environmental damage, and NT growth. At the same time synthetic biology industries were growing, producing new employment and national wealth. This made the government income picture much better than previously forecasted.

One of the greatest benefits of synthetic biology was the creation of microbes that eat the plaque in our brains. This has prevented a cascade of health problems among the elderly and added quality years to our lifespans. This dramatically reduced their medical costs, kept their minds sharp, and increased their self-employment activities. Their AI/Avatars search the semantic web for the most wonderful self-fulfilling activities with income possibilities and present them each morning as an array of exciting experiences to fill the day. All these new conditions have created a true renaissance of creativity, and joy of life for the elderly. This has made the elderly a financial asset more than a liability. Now they contribute to the richness of life rather than being a cost to their children and grandchildren. This was important since life expectancy is now nearly 100 years and longevity research continues to produce breakthroughs. All together these new sources of income helped to address the worry that there would not be enough aggregate demand to buy the innovations of NT.

The new economics and NT have lowered the cost of living enough that the basic individual income needs on average worldwide have been reduced to under US$10,000/year. Without free services such as public medical care, urban transportation, energy, and education this might not have been possible. Initially special arrangements had to be made for those with disabilities and other special needs, but as AI/robotic systems improved as costs were lowered, it was no longer a financial burden on the basic payment systems.

The percent of a country's GDP for basic income payments varied widely depending on population size, GDP, and official poverty lines. Richer countries with falling population like Japan and South Korea had an easier time meeting payments.

Since increasing numbers of people were augmenting their basic income payments with new income found by their AI/Avatars and AI Apps, some are choosing to donate their basic income payments to charities, invest into new business startups to address global challenges, or have the government temporarily stop their payments. The wealthier have done this for years. The distribution of abundance has become more of an economic focus, than the distribution of scarcity.

Some Technological Factors

The Great Brain Race of the 2020s among the brain projects of the US, China, and the EU synergized with the AI Race among Google, IBM, Facebook, Baidu, SAP, and universities such as ETH Zürich and MIT Boston have created the synergies that have led to the many variations of brain augmentation with AI systems we take for granted today. Our photonic lenses injected into our eyes keep us in immersive internet virtual

and augmented reality all the time connected with anything or anybody. As a result, taking IQ tests have become irrelevant since anyone with augment-eyes can see and get the right answers to all the questions.

As computational neurobiologists and engineers began to collaborate across national and corporate boundaries, they identified and applied the principles of brain functions to better treat mental illness, increase human intelligence, and build better computer and AI systems. It is now possible for most to augment their brains to become behavioral geniuses, in a similar way that people augmented their eyesight with eye glasses. Anyone who wants can get intelligence augments, which are now seen as the only way to keep up with the knowledge explosions and AI advances. However, it does come with a potential loss of privacy since AI hacking programs are everywhere. Nevertheless, human-AI symbiosis is now a key element of learning from early childhood through university and continuous adult learning. Epigenetic applications to create more compassionate genetically influenced behavior are now coupled with genetic enhancements to prevent the development of unethical or criminal geniuses.

When people accepted that intelligence could be improved like eyesight, Ministries of Education added increasing intelligence as an objective of education. AI and learning theory experts teamed-up to create businesses to sell individual intelligence augmentation apps known as AI/Brainware, in addition to their advances in STEM and self-employment learning modules. Individuals with their own collective intelligence systems and their personal algorithms are inventing their daily work lives. Global Learning XPRIZE awarded in 2020 has led to literacy and numeracy for nearly all children before the age of six today. By the age of ten, most children have used augmented genius systems – as we used to augment our vision with glasses to public standards. We have come to accept personal augmentation of intelligence. The global effort to upgrade STEM education during the 2020s has helped people understand the S&T induced changes occurring, even though it did not create as much employment as expected in the 2030s. Humans could not learn as fast as the 2030s versions of AGI. As STEM became less relevant, the learning focus shifted more toward self-paced inquiry-based learning for self-actualization and self-employment. Learning shifted from mastering a profession to mastering combinations of skills.

However, as the public began to believe in the mid-2020s that AGI would be created, there was a general anxiety that artificial super intelligence (ASI) would follow so quickly after that, that human systems would not be ready to address a new more intelligent non-human "species." As a result two groups gained prominent attention: one to stop all research on AGI and the other to prove that AGI could be created with ethics so that as ASI evolved, it would not be a threat to humanity. They expected ASI to become something like "The Force" in the movie *Star Wars*: It surrounds us, and penetrates us. It binds our Conscious-Technology civilization together. Although the anti-AGI efforts failed, they did force AI developers to cooperate quickly to make the AGI able to generate ASI that works synergistically today with humanity. Yes, we are now dependent on ASI that we don't fully understand, but then we are also dependent on Nature for genetics, gravity, oxygen, temperature, and many other things that we don't fully understand either.

Children today find it hard to imagine a world without AI/robots, just as their parents find it hard to imagine a world without smart phones, and their grandparents find it hard to imagine a world without the Internet.

Along with the microorganisms that eat the plaque in our brains, synthetic biology has also created environmentally-friendly chemicals, personalized medicines, crop fertilizers, and buildings that clean the air, absorb CO_2, and biodegrade when new construction is needed. Early Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) gene editing technology and the newer methods of today have nearly eliminated genetic-related disease, including most forms of mental illness.

The synergies among Moore's Law, ANI and AGI, and computational science accelerated our knowledge of the world and applications to dramatically improve the human condition. These synergies have created so much innovation that people joke about Synergs: One synerg is the production of one innovation per hour. This is the origin of the Global Synergs Awards for the most prolific inventions per year given in parallel to the Nobel Prizes for past achievements. Innovations multiplied as millions of people donated their unused computer capacity to solve problems. This coordination has created over a thousand ad hoc super computers at virtually no cost.

The International Science and Technology Origination (ISTO) created the S&T collective intelligence system. It has become the "go to" place for students as well as top engineers and politicians to help make better S&T decisions. The sophistication of the interface is calibrated to each user's abilities and preferences. All could see the pros and cons of each NT advance, international standards, licensing, investments, and forecasts updated in real-time. The simultaneity of globally shared intelligence reduced the success of previous marketing spins, exploitation of the less knowledgeable, and manipulations by power elites. Small fees paid to ISTO for licensing agreements and other business deals reached though ISTO's online system provided financial sustainability and equal access for all.

ISTO serves as a form of international regulation by information power. Elon Musk's Future of Life Institute funded safe AI innovations that lead to cooperation among many AI experts and Microsoft, Alibaba, Baidu, InfoSys, Google, and the UN's ISTO to create the initial conditions for safe AI with real-time feedback interactions with humans that have helped create our conscious-technology age today. This has remained successful enough to avoid government and international regulations that would have been too slow to keep up with AGI advances.

The UN's Sustainable Development Goal to eliminate extreme poverty was essentially achieved by 2030. Closed-environment smart agriculture, synthetic biology, seawater agriculture, virtual urban farms, and pure meat without growing animals are feeding the world with a healthier less expensive diet and with lower environmental impacts. Millions of robot vehicles fly the skies and sail the oceans day and night controlled by AI systems around the world.

Nanotech sensors connected in mesh networks in public spaces have prevented much of the individual and group terrorism of the past. Advances in cognitive and behavior

sciences have reduced the number of mentally ill from becoming terrorists and cyber criminals, as have the anxiety reducing universal basic income. Cultural mergers of mystic attitudes toward life with technocratic knowledge of life have made more responsible and harmonious societies. Humanity is clearly maturing as a more ethical species, as evidenced by the success of ISO's (standards set by the International Organization for Standards) evolution to a global participatory ethics system.

Every four years the Olympic movement re-enforced this maturing global 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 orbits, 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. Nearly 2,500 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.

The debates about the potential of extraterrestrial contact have forced us to think beyond our geographic and ethnic boundaries. Additionally, scientific breakthroughs, the increasing 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 individual and collective perspectives. As a result, people are 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. Although ethnic prejudice still exists, it has been held in check more effectively than during the previous century.

Changing Nature of Work and Economic Culture

People used to worry about the risk of a jobless economic recovery, and now they welcome the increasing freedom that it brought. More and more people around the world are beginning to see the purpose of work is self-actualization in harmony with the social and natural enlightenments. Work becomes a pleasure, a method for self-actualization, and a way to create meaning for one's life. Since the various forms of guaranteed basic income reduced anxiety about basic financial needs, it freed people to explore what they think is their purpose in life.

As a result, the majority of humanity has the time to pursue causes that have helped build a better future, whether they have chosen a rural lifestyle living off-grid, or living at sea in floating or cruising communities, or living for the excitement of intense urban encounters. Since humanity has progressed at the expense of the environment, most believed it was now time to correct the negative environmental trends.

For example, environmental groups helped to discredit the concept of economic growth at any cost and created tremendous pressure on the US and China to more seriously address climate change, since these countries were the biggest economies and polluters. Thanks to the US-China joint goal to reduce CO_2 to 350 parts per million

(ppm) and their R&D program that many nations have joined, we now see a "whole-of-world" response to climate change. All agree that this R&D program is one of the best international agreements in history. Massive saltwater AI/robotic agriculture farms have been built along brown barren coastlines of the world. These have been financed in part by cap and trade programs because coastline seawater agriculture creates green growth areas absorbing CO_2. These coastal seawater costal farms produce shrimp and other foods as well as algae used for fuel, fertilizer, biopolymers, and even feedstock to grow meat without growing animals, which further reduces greenhouse gases per unit of nutrition. It also reduced pressure on freshwater agriculture, while eliminating the problem with droughts – since seawater agriculture does not need rain. Micro-batteries charged by and attached to everything from buildings to our bodies have virtually eliminated the cost of personal energy.

Thousands of 100-mile long robotically managed closed-environment agricultural tubes, interspersed with photovoltaic strips across the Sahel, produced much of the food for Africa and exports to Asia and Europe. Surplus energy from the photovoltaic strips is currently exported by wireless transmission to earth orbit and relayed worldwide via satellite to terrestrial rectennas connected to local energy grids. Wind induced pressurized water vapor jet systems have dramatically lowered the cost of desalination. And the internal combustion system for transportation has been replaced by electric and hydrogen systems.

The US-China Goal is one of many stories of how the basic income guarantee freed people to pursue causes that have improved the human condition. It also changed the concept of status and inequality. The importance of the concept of inequality began to change around 2035-2045 since inequality assumes equal or unequal to some standard like income. As more people became self-sufficient, creating their own lives, they had their own individual standards of living well. Self-actualization is becoming more important as long as the basic necessities are covered by a basic income system. This also gives people more time to form or integrate into virtual communicates of mutual interest and expression. Being boring or bored is the new poverty; while working on something exciting to improve the world is the new cool, the new status, and the new wealth.

ANI systems have slowly but surely given way to a global tech commons of AGI to run global artificial brains without ownership – similar to how no one owns the Internet and Uber does not own taxies. Capitalism promotes private ownership; communism promotes state ownership; and the self-actualization economy promotes non-ownership, like the Internet. We still have private and state ownership today, but much of the creative growth is in non-ownership. This is also coupled with no or little restrictions to free usership. People did make money on their use of the NT means of production, without owning these means of production. As the percent of people employed by corporations decreased and percent of self-employed increased, individual power began to increase relative to government and corporate power. This tended to increase the cultural acceptance of the self-actualization economy, as did self-organizing groups on the Internet.

People and companies are increasingly seeking qualitivity instead of productivity and synergy rather than competition. Business learning systems now teach synergetic intelligence, synergetic advantage, synergetic strategy, not just competitive intelligence, competitive advantage, and competitive strategy. Thought leaders around the world began discussing how to create synergies rather than only thinking in terms of trade-offs. Instead of fairness vs. return on investment, what synergies are possible to produce a good return on investment with fairness? – The same with social values vs. market values or solidarity vs. efficiency. Inter-religious dialogues and ISO standards have contributed to these discussions of a more synergistic approach to life.

Increasing numbers of people have become part-time investors – not just in traditional stock markets but direct investments into individuals via crowd sourced Kickstarter-like systems. Decentralization in its many forms, plus crowdfunding has helped reduce the concentration of wealth and income gaps. Human creativity is increasingly the norm as people stopped wasting time earning a living in jobs that stifled creativity. Since everybody can connect to nearly everybody and everything around the world, it is easy to create new work and barter opportunities that are exciting and develop one's potential.

The "Invest in What Replaces You" movement was initiated by truck drivers who were able to buy into robot trucks and manage their schedules from online exchanges created by their labor union. These online exchanges had forecasts of how many years some jobs would remain with recommendations of how much money should be saved each year to be able to invest in what replaces them. Since the hours of truck driving were far more than the hours managing the schedule of robot trucks, drivers had more time to explore new interests and more self-fulfilling work. While still employed, some people advertised their hobbies on Facebook and other forms of social media to begin to find markets for what they liked to do. This helped their transition to self-employment after their jobs were automated.

As societies became better educated, they were less interested in having bosses. Just as children require parents to be in charge but less so as they grow up, so too society at large is more interested in self-directed living. As society matures, personal AI/Avatars augment our intelligence guiding and assisting us throughout the day and finding interesting opportunities while we sleep.

AI engineers created 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 are credited with helping transcultural collaboration. Many of the new kinds of perceptions of reality and ways of knowing were aided by using these new forms of notation.

The sharing economy pioneered by Uber and Airbnb in the early 21st century extends now to the sharing realities among people directly. It has created such a diversity of cultures that it is hard for anthropologists to keep up. The world of the mind and imagination dominates our daily lives with the integration of augmented reality, virtual reality, and AI systems, all accelerated by increasing numbers of people that use genius

augmentations. The speed of feedback from inquiry to intelligent response is so fast today that curiosity has become a normal mental state.

Some New Institutions for Old Problems

National economic TransInstitutions (composed of self-selected leaders in government, business, universities, NGOs, and others) held periodic national strategy workshops to review progress on their country's transition from the job economy to the self-actualization economy. Results of these annual national strategy audits were shared among nations to improve and implement strategic synergies. One of their first recommendations was to meet with filmmakers, music writers, entertainers, anthropologists, futurists, and philosophers to create images, scenarios, and concepts to make positive future visions and changes "more real." Memetic engineers worked with advertising companies to insert memes in ads to help the cultural transformation while selling products. The World Billionaires Club on strategic philanthropy helped to make all this happen. The stimulus for the Media/Arts Alliance's creating the "One Species" movement came from the first of these strategy workshops. The movement inspired the creation of movies, music, urban immersive environments, and the World Cyber Game that helped many to have the courage to explore their own value to society and become self-employed. Entrepreneurial spirit and stewardship have replaced the welfare attitude. The "AI/Augment" and "Invest in What Replaces You" campaigns were also furthered by the Media/Arts Alliance.

Several cyber TransInstitutions with AI/AGI augmentation continue to counter the growth of cyber-attacks, acting like complex adaptive systems that continually set new kinds of cyber traps and response systems. Information warfare is held in check by anticipatory collective intelligence systems that act as early warning systems to alert the public about manipulation of information flows. Many people freed to explore their own interests began to actively counter the terrorist and crime mindsets by being more active in community meetings, social media, NGO newsletters, talking with songwriters and religious leaders, and even using DNA kits to provide evidence to police.

The cybercriminal data havens in ocean floating platforms and ground cyber bunkers that managed cyber-attacks for organized crime and terrorists were countered both by AI software attacks and government commandos who physically invaded these locations. In some cases when governments moved too slowly, Anonymous and other Cyber-Partisans believed they had the right to take down the cyber bunkers by their own means.

Organized crime is finally shrinking due to the global strategy initiated by the IMF that established the Financial Prosecution System (FPS) in cooperation with the International Criminal Court (ICC) to complement national police and Interpol. In cooperation with these organizations, the FPS created a list of the largest organized crime leaders, prioritized by the amount of money each laundered. FPS worked down the list, prosecuting one mega criminal at a time. It prepared legal cases, identified suspects' assets that could be frozen or seized, established the current location of the

suspects in cooperation with Interpol, assessed the local authorities' ability to make an arrest, and when all the conditions were ready, FPS would order the arrest, freeze the assets, and send the case to one of a number of preselected courts. These courts, like UN peacekeeping forces, were deputized and trained to be ready for instant duty. When investigations were complete, international arrest orders were executed to apprehend the criminal(s), simultaneously with orders to freeze access to their assets, open the court case, and then proceed to the next mega criminal leader on the priority list. Courts are selected outside the accused's countries. Although extradition is accepted by the UN Convention against Transnational Organized Crime, a new protocol was necessary for courts to be deputized by the International Criminal Court (ICC) like military forces for UN peacekeeping. Each time a court was needed, it was selected via a lottery system among volunteering countries. After the initial government funding, the FPS became independent receiving its financial support from frozen or seized assets of convicted criminals rather than depending on government contributions, that could be subject to bribery by organized crime. Countries that made the arrests and courts that prosecuted the cases receive reimbursements from the frozen criminal assets.

ENDING Comments….

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. Some believe that NT was the key to this relative success, others that the development of the human potential in the self-actualization economy was more fundamental, and still others that political and economic policies such as various forms of universal basic income made the difference. All three themes were important, synergizing, and mutually reinforcing.

The distinctions between human consciousness and AI in its many forms have become increasingly blurred or meaningless. Every possible Turing Test was passed years ago. Our interaction with AI is so complex and continuous that it rarely matters which is which. Even the distinctions among virtual reality, augmented reality, and physical reality are meaningless today. Civilization is becoming a continuum of consciousness and technology. We have added our reasoning, knowledge, and experience to AI augmented technology and the built environment. And at the same time we have integrated AI augmented technology in and on our bodies making it unclear where our consciousness and technology begins and ends. Our Conscious-Technology Age opens a far more optimistic future than few in previous ages could have imagined. So today, the two key questions are: What kind of life are you creating? And are you boring or interesting?

Some Factors in the Scenarios for Consideration in National Workshops

The following are examples of issues or themes that can become discussion groups in the Workshops:

Education/Learning: How should education, training, and learning systems change? And what strategies will make that happen?

Government: Will a guaranteed income program become necessary? What kind? When? Cash flow projections to show what is possible?

Science &Technology: (AI/Robotics/synthetic biology/nanotech/etc. NT) changes affecting work by 2025, 2035, 2050?

Culture: What changes in culture will be needed? Culture that says jobs/employment is the source of self-respect?

Business & Labor: What should be the roles of business and labor and their associations in a national long-range strategy? Reducing income gaps and concentration of wealth? How can the workers' rights and fair treatment be assured as the AI and other NT changes the nature of work and employment?

Some initial considerations within these issues/themes for national strategy:

Education/Learning:
- Make increasing intelligence an objective of education
- In parallel to STEM, create self-paced inquiry-based learning for self-actualization
- Begin shift from mastering a profession to mastering combinations of skills
- Increased focus on developing creativity, critical thinking, human relations, philosophy, entrepreneurship, self-employment, ethics, and values

Government:
- Produce alternative cash flow projections for universal basic income (consider: license and tax AI/robots and their creations, reduction of tax havens, value added tax, taxes on carbon, massive wealth growth from new technologies, minimum corporate tax, etc.)
- Work with other countries to establish the International S&T Organization (ISTO)
- Create and implement a global counter organized crime strategy
- Add transInstitutional law in addition to for-profit and non-profit law

Science & Technology
- Augment Movement – Tech to augment humans; not replace them
- What are the likely impacts of AI and AGI? When?
- Could synthetic biology create more jobs than AI replaces?

- Create ISTO (International S&T Organization) as an online collective intelligence system not as a new bureaucracy

Culture:
- Arts, media, entertainment, computer games to explore cultural transition to self-actualization economy
- Media/Arts Alliance to create the "One Species" movement
- Invest into what replaces you

Business & Labor:
- Invest in and promote Kickstarter-like crowd sourcing platforms to expand business startups and share the wealth of success
- Create personal AI/Avatars to support self-employment
- Individual augment genius apps
- International collaboration to create ISTO
- Synergetic intelligence, synergetic advantage and strategy as well as competitive intelligence, completive advantage and strategy
- Qualitivity as well as productivity
- Memes in advertisements to help create the cultural transition
- World Billionaires Club on Global Strategic Philanthropy
- World Cyber Game to explore self-employment
- How can workers' rights and fair treatment be assured as the AI and other NT changes the nature of work and employment, and, as forms of self-employment, and the gig and sharing economy may change workers' benefits?
- New roles for labor unions – Augment Movement; NT Data base; Invest in What Replaces You
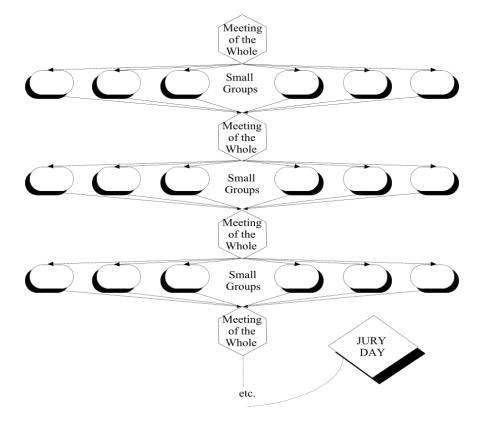
Workshop Design

Each workshop's design should be unique to the team creating it and the national situation. Some may prefer to have a two-day workshop, others may prefer to conduct several one-day workshops each separated by several weeks. Still others might prefer to have workshops in several locations within a country (either simultaneously or synchronically) creating synthesis report of recommendations.

Try to get all participants to read the scenarios before coming to the workshop. Facilitators for each group should keep people focused on what to do… people tend to spend too much time on problem analysis and little on solution synthesis and setting long range strategies. They can also list strategies by time frame. What should the country do over the next 5 years, over the next 15 years over next 34 years (2050).

One recommended workshop design is a Charrette. The following guide to creating a charrette is drawn for "Participatory Methods" in Futures Research Methodology 3.0. A charrette is an intensive face-to-face process carefully designed to bring people from

various segments of society into consensus within a short period of time. The pre-charrette planning breaks the main issue into its component parts. These parts become groups that periodically report to the whole. Feedback from the whole on these group reports is then addressed in the next round of group discussions.

This sequence is repeated until consensus is reached at the final deadline for a report of the whole to whomever - the news media, government officials, or the larger public drawn to the final event through media coverage of the process. Charrettes vary in size, from 50 to over 1,000 people, and in time, from one day to two weeks. The charrette process pulses back and forth from small groups to the large or whole until general consensus is reached or the deadline called jury day is reached:

If you only have one day to do the charrette, then here is a general outline:

Opening:
- 15 minutes: Meeting of the whole to set the tone, the agenda
- 10 minutes: leaving the larger meeting room, walking to discussion groups
- 1 hour discussion groups
- 10 minutes: moving back to meeting of the whole
- 25 minutes: each group gives 3 minute progress report, 2 minutes audience gives factors to consider and feedback (not discussions); hence 5 minutes x 5 groups

Round 2
- 10 minutes: moving back to the discussion groups

- 1 hour discussion groups
- 10 minutes: moving back to meeting of the whole
- 25 minutes: each group gives 3 minute progress report, 2 minutes audience gives factors to consider; hence 5 minutes x 5 groups

One hour -- Break for lunch – with option to eat lunch in discussion groups

Round 3
- 1 hour discussion groups and prepares long-range strategic recommendations for the press conference
- 10 minutes: moving back to the Press Conference meeting of the whole
- For as long a necessary: Final recommendations given and discussed at the Press conference

Additional Guidance:

Integrity.   This ingredient is the most important. How to ensure the integrity of the process is the most difficult and sensitive question to answer. If the process is manipulated to force a previously decided conclusion, then participants will feel used and betrayed and conflict could follow. The initiators of the process must be interested in the whole picture not just a part.

The first step in a charrette is to identify the need for a new direction. Any person or group, whether government or concerned citizens, can identify a need. They must, however, accept the responsibility for coming forward to work toward that new direction. These initiators who identify a direction evolve into the steering committee, after raising all the necessary funds for the charrette. This committee should have representatives of all areas involved in implementing the new direction as well as those affected by it, yet stay small enough to be a working group (about eight to twelve, not including group facilitator who will join later in the pre-charrette planning). If additional leaders are needed but are not likely to work on the steering committee, then a special advisory committee can be formed.

Pre-charrette planning can vary from one month to a year depending on how many days the charrette will last, how complex the issue is, and how many participants are expected. A three-day charrette of 300 would take approximately three months of pre-planning; a five-day charrette of 1,000 would take approximately six to eight months of pre-planning.

During the pre-charrette planning, the steering committee should meet weekly to: (1) identify the four to ten sub-elements of the issue that become the four to ten discussion groups during the charrette; (2) list the key questions for each group; (3) agree on what is a proper range of views on these questions; (4) find people to participate in the charrette who will represent this range; (5) gather all available and relevant information to answer these questions; (6) select a group facilitator, outside futurists, consultants, and other necessary resource people (such as for financial management, public relations, media coverage, publicity, music, etc.); and (7) create an initial design of the

process, a budget, and hire a charrette director and administrative staff.

The charrette director is responsible for the final design and management of the process and the administrative staff. The integrity and reputation of the director is critical to the success of the process. S/he must have sufficient knowledge of group dynamics to maintain that integrity throughout the charrette. Additional characteristics for a director include ability to work in a non-authoritarian manner, deal with ambiguity, quickly analyze and intervene in the process when necessary, and be flexible.

Committee facilitators should have the same characteristics as the director and be familiar with the sub-issues of their committees. Once selected, they should become members of the steering committee. Each facilitator should have one to three consultants who are leading experts in the sub-issue and can answer any questions or find pertinent information for the committee during the charrette.

The rest of the participants in the charrette either focus on one committee throughout the process or rotate among committees. The focus participants are a core of people in each committee who stay with that committee throughout the charrette. They can take on specific duties to support the committee. Some could be original initiators of the process or members of the steering committee. Approximately one-third of each committee should be focus participants. The other two-thirds are general participants who have no formal role in the charrette. A schedule is recommended for participants to rotate from committee to committee throughout the process. It is also to be expected that the rotation schedule will break down as these participants find their interest areas. Nevertheless, the schedule provides a process and a structure by which participants become involved in the charrette and can help distribute participation more evenly.

Participants should not break for lunch but eat in working groups. Breaks should be according to need, not schedule, so that loss of momentum can be kept to a minimum.

Jury Day is the climax of the charrette, when the final presentations by all discussion groups are given. Media coverage of this is highly recommended. News coverage should also be encouraged during the charrette but should be concentrated, like a press conference, on Jury Day. The charrette director should allow no ambiguity in the final presentation. The final presentation should be a holistic, integrated, and internally consistent normative vision with strategy and general implementations schedule.

The trick of a charrette is to eliminate the distinction between "them" and "us." No restrictions on participation exist, only a strict deadline. If people argue too long without reaching a consensus, then no report is made, but when the decisionmakers, private individuals, and "experts" are able to reach consensus, it comes as no surprise that the recommendations are received favorably.

Unfortunately, large-scale processes like charrettes can have problems of translation in a multi-cultural and/or multi-lingual community. Charrettes, indeed any large group process, can take precise and advanced proposals and make them less precise and less advanced so as to be acceptable to all. This should be guarded against, so that the conclusions and recommendations are as precise and useful as possible.

List of Previous Millennium Project Futures Research:

1. African Futures Issues, Scenarios 2025, and UNDP workshop at the UN (1994)
2. Millennium Project Feasibility Study final report (1995)
3. Global Issues and Strategies four-round Global Lookout (Delphi) study (1996)
4. Lessons of History (1997)
5. Global Opportunities and Strategies Delphi (1997)
6. Definitions of Environmental Security (1997)
7. Factors Required for Successful Implementation of Futures Research in Decisionmaking (and checklist) (1998-99)
8. Global Normative 2050 Scenario (1998)
9. Environmental Security Threats and Policy Leadership Responsibilities (1998)
10. Current and Potential UN military doctrine on the Environmental Security (1999)
11. Six Alternative Year 3000 Scenarios (1999)
12. S&T Issues over the next 25 years (2000)
13. Views from the Millennium Project on the Future of Technology with Implications for Society and the United Nations System (2000)
14. World Leaders on Global Challenges (analysis of UN Summit Speeches) (2001)
15. Military environmental crimes and the role of the ICC (2001)
16. Management Implications of Future S&T 2025 Issues (2001)
17. New Military Requirements 2010-2015 to Address Environmental Security (2001)
18. Global Goals for the year 2050 (2002)
19. Future S&T Scenarios 2025 (2002)
20. Emerging Environmental Security Issues for Future UN Treaties (2002)
21. Monthly Reports: Emerging Environmental Security Issues (2002-2011)
22. Middle East Peace Scenarios (2002-04)
23. Early Warning System for Kuwait Oil Company (2003-04)
24. Military R&D Priorities Nanotech to Prevent Health/Environ Problems (2004-05)
25. Future Ethical Issues (2004-05)
26. Global Energy Scenarios (2006-07)
27. South Korea SOFI (2006)
28. Future of Learning and Education 2030 (2007)
29. Global Climate Change Situation Room for Gimcheon, South Korea (2007-2008)
30. Conceptual design for global energy collective intelligence (GENIS) (2008)
31. Status of Government Future Strategy Units (2008)
32. RTDelphi for UNESCO World Water Report (2008)
33. WFUNA Human Rights (2008)
34. Decision Criteria Evaluation of Global Environment Facility (2008)
35. South Korea SOFI and South African SOFI (2008)
36. Early Warning System PMO Kuwait (2008-2009)
37. Potential Future Elements of the Next Economic System (2009)
38. UNESCO World Water Scenarios project (2009)