

New World Coming: American Security in the 21st Century

Study Addendum

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Prediction is a difficult endeavor, even in modern times with seemingly sophisticated methods. An illustration resides in the project of the noted British magazine, *The Economist*, which in 1984 asked 16 individuals to make some elemental economic forecasts out to ten years. The subjects in question—concerning such basic data as average growth rates, average inflation rates, and the price of oil—were similar to those used by the Organisation for Economic Co-operation and Development (OECD) to underpin much long-term strategic planning. In 1994, *The Economist* unsealed the predictions and measured them against what had actually happened. On average, the forecasts turned out to have been more than 60 percent too high or too low.

The 16 individual forecasters represented four groups: finance ministers, chairmen of multinational corporations, Oxford University economics students, and, as a “control” group, four London garbage collectors. Every group did poorly; the garbage collectors, as it happened, turned out to be the most accurate.¹

Such a result is more than humorous; it is sobering. It forces us to acknowledge that single-point predictions about the future, even by experts, are parlous. It suggests that a more systematic way to think about the future is needed, and it cautions all those who would engage in forecasting to examine both past and contemporary projections as a means to bound their own efforts.² That is what we did during our Phase I study, and here presented is a summary of our effort. Part 1 reviews past studies that we examined, and Part 2 contemporary ones.

Part 1: Analysis of Mid-1970s Era Future Studies

We identified and examined nearly two dozen studies written about 25 years ago—the distance back that the Phase I report looks ahead—whose aim was to forecast what things would be like in 1999-2000. A representative list of 16 is described here. Some studies concentrated on specific issues, others were broader in ambition. Some showed obvious sorts of bias; other did not. This addendum summarizes these studies, and then lists and briefly describes their contents.

As suggested above, our main aim was to identify why some forecasts were more successful than others, and to isolate the key methodological traits of the successful efforts for our own adoption. We learned three important lessons: separate the descriptive and prescriptive approaches or phases of a study; do not let the press of contemporary concerns generate unwitting bias and selectivity; and do not compartmentalize subject matters.

Analysis

While several methodologies were applied in these studies, most of them are best termed “expert prediction.” Subject specialists provided projections based on their knowledge and experience. Some were single-authored, some multi-authored, and some used of the Delphi Method, in which a large number of experts were polled as to their views. Some predictions were trend-based, and some are not. Some relied on quantitative data; others did not.

Many important events occurred during the early to mid-1970s that formed the social dialogue of the day, and that either consciously or subconsciously shaped views of the future. Among these events were the 1969 and subsequent manned moon landings; the increased U.S. reliance on foreign oil and the 1973-74 oil crisis; the advent of détente and the SALT I treaty; the continued conventional and nuclear arms race between NATO and the Warsaw Pact; and U.S. domestic tensions over civil rights, the Vietnam War, and Watergate.

Despite the impact of current events on views of the future, the discussions themselves rarely acknowledged the biases suggested by these events. There was no attempt to forecast the more distant future based on possible changes in the near future environment. Virtually none of the studies foresaw the rapidly diminished political support for space exploration by the mid-1970s, the passage of major environmental protection regulations, the impact of major crises in the international economy, or new technologies such as wireless communications or the Internet.

Compartmentalization of subject areas was also evident. With some notable exceptions, energy analysis proceeded with minimal consideration of the international security environment; the superpower competition was discussed separately from economics and major advances in technology; and the importance of shifting social values played little role in predictions of future foreign policy trends.

Most of the studies were also jointly descriptive and prescriptive in nature. The mixing and merging of forecast of the future environment with strategies to address that future complicated the task of making objective assessments.

Trend-based analyses were extensively used but, as some studies pointed out, certain trends could not long persist at then-present rates. And, indeed, looking back it is clear that many of the analyses were undermined when various trends became discontinuous. Another problem with trend-based analysis, no less applicable today, concerned the accuracy and appropriateness of the data. Observations of the arms race, for example, often focused on numbers of warheads and conventional forces, and failed to consider that broader economic and ideological competitions would eventually bankrupt the Communist system.

Overview of Predictions

A few central themes or undercurrents pervade these studies. No little optimism was driven by hope that technology would solve the planet's environmental problems, improve the quality of life, and continue the manned exploration of space. Nonetheless, pessimism dominated these studies. Fears of annihilation were common given the existence of 50,000 nuclear warheads and the large stockpiles of chemical and biological agents then in existence. There was a broad perception that the environment was being stressed to its limits, and some predicted that by the year 2000 disasters would have resulted in mass dislocations and devastation throughout the world. The oil crisis created a fear that Western civilization would be held hostage by the oil-producing countries, and that a major disruption and shortage of oil would grind Western economies to a halt.

Technology and the Environment

There were broad expectations that man would make significant progress in outer space—an expectation undoubtedly driven by the 1969 moon landing. Experts predicted that giant, self-supporting space stations would float around the planet, that moon bases would open up living space for an over-crowded earth, and that man would land on Mars by the turn of the century.

If space exploration had been trend-based, these would have been reasonable predictions. After all, only ten years had elapsed between the first American flight into space and the moon landing. But significant technical gaps were poorly appreciated. Giant space stations had no real precursors except the planned space lab, but technological constraints alone did not preclude the realization of the optimistic predictions. Rather, economic costs, lack of political will and other national priorities prevented it.

Some also predicted substantial progress in exploring, cultivating, and inhabiting the ocean's depths. Some dreamed of underwater colonies, but most discussed the potential economic uses of the ocean. These included efficient means of sea farming and fishing, geothermal power plants, and fuel and mineral exploration. Predictions were not quantified enough to judge their accuracy, but there has been significant progress in offshore oil production technologies. New systems of modeling and tracking have increased ecological awareness and improved the ability to manage fishery resources. Nonetheless, today's oceanic exploration and exploitation has fallen far below the level envisioned in the 1970s. Moreover, the ocean-use paradigm today is not so much exploitation but preservation.

In some ways, the information revolution was anticipated—indeed, it was already underway during the early 1970s. Computer mainframe systems were used to conduct various calculations and smaller “dumb” terminals were used to facilitate communications in the government. Predictions about the future of computers included automated highways, robots in homes, digitized homes, and the ability to communicate by computer. Computers would make life easier by facilitating home-based work and assisting in daily tasks. Futurists, however, were unable to predict society's reliance on computers, the emergence of the Internet, or how these developments would define the end of the 20th century.

Energy was a recurring theme and concern of the period. There were widespread predictions about energy shortages, wars over oil, inventions and discoveries of new energy resources (such as fusion power) and alternate means of generating energy. The predictions were both positive and negative: negative in that if nothing was done, the world would collapse into a massive oil shortage and violent crisis; positive in that technology would satisfactorily solve the problem before the oil finally ran out.

Some viewed the 1970s as the end of the industrial age, implying that economic growth and production rates would level out. Energy use models assumed a direct relationship between energy demand and economic growth—an historical trend. Slowed economies should have resulted in decreased energy use and vice versa. But the global economy only experienced periodic slow-downs, and the direct link between energy usage and

economic growth was altered in the advanced countries. Others believed that the use of coal would increase and that oil demands would decrease. Hope existed for extensive solar energy and the promise of nuclear reactors that would make clean and renewable energy.

None of the studies predicted today's oil surplus. The 1991 Gulf War demonstrated that a major war over oil would be waged, but it was not the fight between the two superpowers or with the Third World for mastery of natural resources. Other energy resources have not supplanted or replaced fossil fuels for several reasons. Nuclear energy lost popularity for reasons of economics and safety concerns. Solar energy was not efficient enough to support the energy demands of modern society. Most of all, discoveries of new oil deposits, more efficient engines, and oil's overall portability and efficiency enabled fossil fuels to retain their primacy.

The environment was another significant theme in these studies. This issue crossed over into energy, technology and politics. One scenario proposed a worldwide environmental crisis with the poisoning of the oceans, lung-illness epidemics caused by air pollution, and massive food shortages would cause untenable international resource competition and tensions eventually resulting in World War III. Other predictions were less catastrophic but retained the negative mood by focusing on acid rain, toxic waste, ozone depletion, the "greenhouse" effect, species endangerment, and deforestation. Specific predictions about these issues were varied. Some species have continued to decline or are now extinct, while others have made remarkable recoveries. International laws and norms have mitigated many global problems such as ozone depletion, but this and global warming remain a public concern and debate.

International Politics and Security

No one predicted that the Soviet Union and the Warsaw Pact would collapse, or even be seriously weakened. Fear of a massive nuclear war overshadowed all discussion on this subject. The focus of most proposals or projections of the future was on managing the competition and limiting the likelihood of nuclear war.

None of the studies we examined made a serious effort to predict what would *not* transpire. They did not attempt to debunk other predictions of space exploration, energy, or the environment. This may have been due to a bias towards publishing discussions of change for the future. Statements of "things will be the same" may not have had much market value and are certainly less entertaining. Within their own writings, these early futurists rarely attempted to bound their predictions by proposing the ranges of probable change.

There were other biases built into these studies that had nothing to do with political or ideological persuasion. The issues of the day crafted the intellect, unconsciously directing futurists into the areas that they would predict. The environment, energy, space exploration, and the Cold War were the salient issues that defined both the types of forecasts and the fact that any predictions were made at all. The underlying assumption was that the important issues of the present would retain their importance in the future. Other subjects, not in style, were rarely discussed: the laser; high-speed communications; the importance and possibility of failed states; or foreign terrorism on U.S. soil.

On the whole, however, these early futurists deserve much credit. They examined almost every area that we are concerned about today. Given the variety, scope and breadth of the predictions, almost everything that we find today was predicted by someone. The problem, of course, was determining who was correct. Everyone had something right; no one had everything right. And it is also important to remember, as we write about the future, that between 1970 and 2000 some things changed and some things did not.

Study Descriptions

The studies listed below are grouped into two broad categories—those that are oriented toward specific issues or functional areas, and those that are more general.

Issue Oriented Studies

The seven issue oriented studies that follow pursue a single functional area of inquiry. Their methodology is usually limited to trend analysis and they are often accompanied by heavy doses of prescription. The first study by Lester R. Brown, warned that erosion, urban development, and other problems were reducing cropland availability and potential. This would result in only a 10 percent increase in cropland during the final quarter of the 20th century even as the world's population would increase by 58 percent.³ The obvious implication was widespread starvation. This study underestimated the effects of the “green revolution,” even though Dr. Brown was one of those who first understood and wrote about that revolution.

The second study by George McAlmon focused on industry. McAlmon observed that large U.S. industries appeared to be losing industrial competition to foreign firms—primarily Japanese and German. The problem, he claimed, was that American manufacturers were not producing quality goods at competitive prices. He projected continued decline unless industry became more efficient.⁴

The third issue study was sponsored by the World Energy Conference to explore projections of world energy problems.⁵ Methodologically, the study employed energy-use models to relate demands and economic growth. They projected that world oil and gas production would level off between 1990 and 2000. They predicted, however, that oil and fuel crises of the future would be driven by problems of access rather than supply. Over time, oil use would decline as economies “maximized.” This meant: low rates of oil discovery (4 gross tons/year by 2000); coal comprising a larger proportion of energy production; nuclear reactors solving many energy problems; greater use of solar, hydraulic, and geothermal energy; exploiting unconventional oil sources including synthetics, heavy oil, and shale oil. They concluded that oil would have to be sparsely used by the year 2000.

The fourth issue related study was produced by Thierry de Montbrial, also focused on energy. He predicted a similar shortage of energy in the 1985-2000 time period. He observed that new discoveries might postpone the crisis by a few decades. He noted, however, that solar power would not account for more than 5 percent of the world's energy mix by 2000 and nuclear fusion would not come before 2015.⁶

A UN-sponsored study is the fifth example.⁷ Various individuals contributed their vision of the future, but more often they examined the problems of the 1970s. There was a recurring theme of nuclear weapons and annihilation. The lone exception is Janez Stanovnik's “The Wealth that Makes Men Poor,” in which he predicted increased but poorly distributed wealth. He also de-emphasized material goods and promoted “cultural” goods such as music, literature, and art that would bring “satisfaction” to world citizenry.

The sixth work, by Hollis Vail from the World Future Society, focused on information technologies.⁸ Vail assessed then current technologies and capabilities to present an “expert opinion” about future implications. The information was presented as a discussion of capabilities through short scenarios of a fictional office and home.

Vail projected that routine office and inter-geographical tasks would be conducted by “computer mail services” (e-mail). These tasks included scheduling, discussions, database sharing, and transferring text. Other capabilities included the widespread use of the word processor. The office computers are referred to as “typewriter-like terminals” because computers were more closely associated to mainframe systems. The computer monitor was referred to as the “Cathode Ray Terminal (CRT).” It also discussed the potential of telecommuting. “Fast-talking machines”—machines that play back voice recordings at a fast but original pitch

were predicted to become widespread. The article claimed that the office of the future, with computers and rapid communications, would be different but that many fundamental characteristics—people being at the office, filing cabinets, and desks—would remain for practical reasons.

Larry Booda published the last issue-oriented study reviewed here, which also appeared in a World Future Society collection.⁹ Booda, an oceanographer, used his knowledge to examine the implications of current events and trends. He projected that mineral-rich nodules at the oceans' floors would be harvested; aquaculture—organized ocean farming of plant and animal life—would be widespread; wider use would also be made of underwater thermal energy. Knowledge and the constant monitoring of oceanic temperatures should enable meteorologists to make long-term weather predictions beyond a five-day forecast by the year 2000. Booda also forecast that floating cities, or at least floating industrial plants located near natural resources, would be numerous by the year 2000 as a result of land crowding.

General Future Studies

Nine more general studies follow. The first two were produced by the World Future Society in the late 1970s. The remaining seven were written by various individuals and organizations; Alvin Toffler wrote one and sponsored another.

As indicated, the first general work was published by the World Future Society.¹⁰ Essentially, it is a bibliographical summary. The book is composed primarily of literature abstracts published in 1978 and 1979 that either predicted the future, addressed the future, or bore important implications for the future. Discussions of international economics, energy, urban affairs, and justice characterized these studies. Each discussion was preceded by a short synopsis of the themes and issues that dominated the topic. Some of the major issues and predictions were as follows:

Demographics: World population would grow to between 5.8 and 6.3 billion.

International security: The U.S. defense budget was very high and risked dragging down the economy; concerns about the military balance with Soviet Union and an escalating and uncontrollable arms race to include nuclear inventories.

Environment: Concerns about acid rain, harmful herbicides and insecticides, ozone depletion, and the “greenhouse effect;” general pollution and waste on land, in cities, and in the waters; many species face extinction.

Energy and natural resources: Exploitable timber could be reduced one-half by the year 2000; towing icebergs as a water source is difficult but possible.

Society: The post-industrial society would be characterized by more material affluence, more complex technology, and the decline of employment in agriculture and manufacturing and increases in service jobs. The size and role of government was debated and discussed, with conservatives pushing for less government role in business and social welfare; liberals advocating community-based activism for the environment and more government support of social welfare. More vehicle congestion in cities; more passenger air travel.

Economics: Questions about the ability of capitalism to survive; mixed projections about the 1980s, from predictions of severe downturns and depressions to moderate growth with inflation at 7 percent. The end of military/defense-based economies and the advent of industrialization in outer space. Fewer communications and information businesses—very large firms would dominate the market.

Technology: Major medical advances such as hearing for the deaf and sight for the blind. E-mail, e-banking, and home computers would be in wide use.

The second general work was also published by the World Future Society, and it too was an anthology.¹¹ The book is structured around four types of futures: The Future as History; The Future as Progress; The Future as Challenge; and The Future as Invention.

The Future as History: The first part discusses history to highlight prior predictions and theories, such as those of Karl Marx, Adam Smith, and a comprehensive discussion of technology written in 1915.

The Future as Progress: Technology continues to advance on all fronts.

The Future as Challenge: If we face emerging problems squarely, we may be able to solve them or at least soften their impact.

The Future as Invention: “Inventing the future” had become a popular phrase among futurists. They did not see the future as something that just happens to people; instead, people create the future by deciding what they want and then working to achieve it.

The third general work is actually a compiled effort appearing under the title *The Futurists* edited by Alvin Toffler. Three chapters were particularly interesting so we begin by examining the work of Olaf Helmer, a technologist.¹² He had a very positive outlook on the future, based in large part on the downward costs and increasing capabilities of computers. Helmer lists numerous predictions, categorizing them by the “likelihood” of realization. These include:

Most likely: GNP grown 3 to 4 times; use of portable video telephones; regular and easy organ replacement to extend life; a permanent colony on the moon and manned exploration of Mars.

Very probable: Competitive and widespread use of nuclear power; weather control; and ocean mining.

Possible: Automated highway transportation; mining in space; control of genetic and life processes through molecular engineering.

The next contributor to the Toffler work was Paul Ehrlich, the noted environmentalist, who used a single scenario to describe the future.¹³ Ehrlich began the chapter by describing the effects of DDT in the early 1970s and by 1979 projected that the world’s water supplies, including the ocean, would be almost entirely destroyed. Pollution would contribute to a global crisis with massive lung-related deaths. Shortages of freshwater and fish would lead to disagreements between the Soviets and the developed countries. It ended with a world war.

Marshall McLuhan is the final contributor selected from Toffler’s *The Futurists*. He relied upon historical analysis of the effects of technology on culture to predict the future of society. Then by examining trends McLuhan successfully predicted the information revolution within society. Knowledge-based skills and society become predominant; rigid industrial processes are eclipsed.¹⁴

The fourth general work is Alvin Toffler’s classic *Future Shock*.¹⁵ Toffler applied research and analysis of sociological trends, culture, politics, economics and technology to construct his view of the future world. He attempted to integrate various technological advances in biotechnology and information technologies. He also took into consideration substantial challenges to society and environmental problems. In some cases, he projected that society would change as a function of natural social evolution; in others it would be driven by the above challenges and advances. He concluded with recommendations, both personal and policy oriented, to cope with the “Future Shock.” Some of Toffler’s key findings were:

Use of Oceans: The oceans will be a key strategic and economic resource, with extensive facilities and exploitative tools. Wars over ocean access and resources were a high probability. Oceanic issues and culture would pervade society with whole new terms and cultures. An oceanic revolution would be similar to past technological/industrial revolutions—and take place by 2000.

Weather: Weather control will be possible by means of massive “space mirrors” and “sun blockers.”

Biotechnology: Biological advances by genetic and biochemical engineering might enable more intelligent domesticated animals, new animals with high IQs and other animals for specialized purposes. Humans had a high possibility of learning how to communicate with dolphins. Microbiology advances would result in new means of food and feed production. Biotechnology would result in wholly new organisms and living machines. Mammals would be cloned within years (of this study); man in zero to fifteen years. Human cloning and human genetic engineering would be possible. He predicts the advent of test tube babies. Controversial advances in biotechnology would be driven by scientific curiosity, ignorance, profiteering, and international capitalism. Use of artificial organs and other body parts would pose difficult ethical and identity questions. Replacing major organs would challenge established identities of being human.

Social Life: Family structures would radically change to include: childless marriage, professional parenthood, post-retirement childbearing, corporate families, communes, geriatric group marriages, homosexual family units, polygamy. Changes in technology and culture would result in highly specialized, customized entertainment, such as in movies, print, or the radio.

The fifth general work, *The Next 200 Years*, was very ambitious and included the noted Herman Kahn as a contributor.¹⁶ Kahn and his associates drew four scenarios that ranged from massive resource shortages to massive resource surpluses. These were contingent on factors such as resource availability, population (predicted to be 6.6 billion people by the year 2000), enough raw materials such as metals, and environmental stability. Kahn recognized that the energy crisis was driven not by a shortage of supplies, but a political restriction of access.

The four scenarios defined were: massive shortages; some shortages; some surplus; and massive surplus. The key assumption within all of them was the continuity of economic data. In general they found the future to be primarily an age of economic growth and human success. There would be: no mass poverty; decreasing energy costs; better/more efficient energy-use items; a bountiful supply of oil-based energy (though cartels may restrict access, as in the early 1970s); enough raw materials; and enough food. However, the environment would not be stabilized and environmental problems, such as global warming or cooling, a biological disaster (such as a plague), or massive ozone layer depletion could significantly alter the potential future.

The sixth general study was published by John McHale.¹⁷ The method he adopted was to canvass older future studies, analyze his current period using statistics, trends and other data, and then guess about the future. McHale placed a substantial focus on man and the natural environment, but also had an extensive technology discussion that included an overview of cutting-edge technologies and ideas, and a large expectation of robotic advances.

McHale recognized that computers were growing and believed that “biocomputing” was a near-term capability. He observed that “In the United States alone the Federal Government uses 2,600 computers and spends over \$2 billion annually to acquire and operate this equipment.” He projected the earth’s population in 2000 to be 5.9 billion people. He discussed at length advances in space sensing technology (missile detection, weather, and communications). Other characteristics he foretold for the year 2000 included massive space exploration and moon travel, substantial oceanic exploration, and long-term underwater facilities (research centers). He believed that oil and natural gas reserves were much greater than acknowledged in 1969. He projected the world’s effective reserves of oil would run into “trillions of barrels.” He forecast major medical breakthroughs due to material advances, battery miniaturization (pacemaker), and robotics. Lastly, he predicted

that worldwide television coverage would bring people closer together.

The seventh general study was conducted by John Gribbin in the United Kingdom.¹⁸ He determined that the prospect of war and nuclear annihilation were real, and underlying most of his discussion, was the belief that the nuclear era shaped the physical and the international security environment. Gribbin employed several analytical worldviews. For example, he used low, medium, and high economic growth rates. He also correlated “rate of change” as important: conservative (little or no change); reformist (evolutionary change); and radical (revolutionary change).

Despite his structured approach, Gribbin’s predictions fluctuated from the outrageously wrong to the mundane. For example he foretold blocks of 200 to 300 story buildings in major cities and tourist trips to the moon—this despite assertions that defense expenditures would use up most of the world’s production capacity. He saw economic growth as the key to the future, and that high growth would most likely lead to world peace. He believed that disarmament and international peace was one of the most significant (and unlikely) wild cards.

As to population and food, Gribbin leaned toward an adequate supply, barring major disasters, but foresaw inadequate mechanisms to distribute food. He saw fossil fuels remaining the most important source of energy, and stated that the expectations of solar, nuclear, and other energy alternatives to replace them was “science fiction.” There would not be a physical shortage of oil for at least 100 years and the supply of coal was almost unlimited. He forecast that fusion power would be clean and efficient, but would not be possible for at least 50 years. Political concerns of nuclear weapons proliferation would also limit nuclear reactor construction—especially fusion reactors. Access to cheap oil would be the primary concern of the future. Demand for electricity would level off—at a certain point there are “enough” electric devices in a given household or office and not many more would be acquired. Gribbin believed that cars would become more fuel-efficient, resulting in massive fuel savings over time. He also projected that basic metals and minerals had near limitless supplies, but that the costs to exploit them could increase.

The eighth general study comes to us from what was then the other side of the Iron Curtain.¹⁹ The technological and scientific revolution was seen as a major area of East-West competition. This study predicts that nuclear power would constitute 25 percent of energy production by 2000. The author, V. Kosolapov, demonstrated an overt bias against capitalism and a bias for Marxist theories such as historical determination and an ultimate socialist triumph. Reflecting this view, he stated that the exploitation of white collar workers, massive marketing, and monopolization of industries would eventually result in the collapse of capitalism. Citizens of capitalist countries would be generally dissatisfied, even if they were materially wealthy. Home personal communications systems incorporating phone, video, and computer would dominate society. The information industry would be key to the future. Major projections out to the year 2000 in bullet format include:

1980: Half of industrialized countries’ GDPs produced in the “knowledge sector”; more spending on environment; cures for some cancers; average life span of 85 years; synthetic hearts; superconductivity; and novel methods of rapid language learning.

1983: Major shift to automation of production with computers; a global information bank; and advanced countries spend 8-10 percent of GDP on education.

1985: Automation of service industry; robots do housework; work week reduced to 30-35 hours; automatic retrieval and reproduction of materials at libraries; and receipt of news and other events by video phone.

1990: Scientific conferences by TV; a global library; education by TV and computer-based programmed training; completion of the periodic tables; extraction of minerals from the ocean floor; dolphin language deciphered; experimental brain transfers; use of nuclear explosives in mining; oil

shale exploited; universal biochemical immunization; housework fully automated; unrestricted access to information without leaving the home; use of computers in home to communicate with the outside world; and computer-aided decision making.

1995: Eight-fold increase of energy consumption since 1970; half of all energy comes from nuclear reactors; a global communications system by satellite, backed up by a worldwide relay system; and education throughout ones' lifetime.

2000: Fuel cells provide up to 30 percent of total electric power; telepathy-like capability; eradication of arthritis; a capability to predict earthquakes 5-10 days beforehand; life spans reach a 100 year average; deciphering of hereditary codes; a global system of 3D color TV; and economically viable weather control techniques for individual areas.

Kosolapov projected that the 1970s and 1980s would see continued détente with arms limits and then reductions. By the year 2000, WMD and nuclear tests would be outlawed, foreign military bases dismantled and nuclear free zones established. The Third World would receive substantial aid and national economies would be integrated. Illiteracy would be eliminated. Everyone would be able to contact everyone else. Science and industry would be very environmentally conscious and work toward improving the environment. Colonial and racist regimes would disappear while international human rights agreements would be guaranteed by all states and governments as well as signed and ratified.

The last general study was written by Daniel Bell.²⁰ Most of Bell's book discusses the social-political environment of the current day and identified issues that would lead to the transformation of the national and global economy into one of information and technology. Bell found the three key components of the post-industrial transformation to be: economically, a shift from manufacturing to services; technologically, the centrality of new science-based industries; and socially, the rise of a new technical elite and new stratification in society shifting to information and knowledge. Bell saw the information age resulting in global connectivity; man would no longer be connected to nature or machines but to himself. However, this would result in social confusion during the transition.

The studies written in the 1970s provided many important insights. Many were conceived before "future study" had evolved into a very serious discipline. The limited methodologies and "scientific" rigor did not usually produce accurate predictions, but they did produce some interesting forecasts. Intellectual discipline discriminated against many wild predictions and wayward catastrophic visions, but obviously, not always. Unfortunately, discipline also imposed constraints on imagination and intuition that rarely allowed acknowledged uncertainties to unfold in different directions. On balance, the early futurists challenged a new generation of forecasters to make a more accurate range of predictions, and forced them to acknowledge the role of human tendencies and biases.

Part 2: Summary of Contemporary Futures Surveys

The remainder of this addendum examines contemporary "future efforts." The vogue names for many of these projects since the late-1980s have been "scenario construction" or "alternative futures." This survey examines the methods used in a set of 20 studies. They were selected because they used multiple trends and drivers, and projected several different future worlds.

Obviously, it is impossible to analyze the accuracy of contemporary studies because the future has yet to unfold and bear witness to their correctness. Thus we proceed through this section in three movements: first, we explain current methodologies; second, we briefly summarize the studies examined; and lastly, we analyze the contemporary futures and explore the similarities and implications for our own effort.

"Future World" Scenario Methodologies

While focused upon 20 studies, this list was narrowed down from a survey of over 50 such projects. Most of these future world methodologies can be traced back to the scenario-based method originally developed by Pierre Wack²¹ at Royal Dutch Shell in the 1970s and then popularized by his associate, Peter Schwartz, in the early 1990s.²² By the late 1990s, a cottage industry of books and articles matured extolling scenario planning methods.²³ These are typically called the “Royal Dutch Shell method” or the “Shell method” for short. The first category of studies below consists of five examples that followed this method closely. The second and third group of studies employ variations of the Shell method, and do not follow it as rigorously. The fourth category is composed of one source, “Project 2025,” which used four different methodologies, three of which were largely dissimilar to the Shell scenario approach.

Studies Using the Shell Scenario-based Method

Many studies use the Shell method without knowing its origin or requirements. As a methodology it begins with the identification of a specific “key decision” or issue—a “focal issue.” The key factors that influence the focal issue are identified, as are the driving forces and major trends in the strategic environment. Next, those factors and drivers are ranked according to their degree of uncertainty, this includes identifying what is considered a “known” or a “given” about the subject. Proceeding from the “known,” trends and uncertainties are combined in consistent ways to produce a given a path along which the future can unfold. Scenarios are developed, implications drawn, and, lastly, indicators and signposts are identified. Thus, scenarios are designed to capture alternative landscapes that facilitate planning in ambiguous environments. Five studies followed this methodology very closely.

First, the U.S. Air Force conducted a major project, “Air Force 2025” during 1995 and 1996. Part of this project consisted of a research effort to develop future scenarios. Titled, *Alternative Futures for 2025*, this paper examined trends, referenced futurists, considered surprises and “wild cards,” and identified key drivers.²⁴ The drivers—U.S. worldview, degree of technology diffusion and the “world power grid”—were interchanged analytically and placed at the edges of a “strategic planning space.” Within this area different visions of the future were created and placed. Finally, the Air Force “backcasted” from 2025 to 1996 and wrote “histories of the future.” Six different global scenarios were created. These consisted of:

Gulliver’s Travails: The United States is overwhelmed and preoccupied with multiple small commitments around world. There is a small defense budget, a high operating tempo, and multiple requirements.

Zaibatzus: Multinational corporations dominate. The world is largely stable, despite the existence of income disparities. Military power retains relevance.

Digital Cacophony: This is a technologically advanced world. Individuals have large amounts of power, but there is also fear and anxiety in society. The military only involves itself with high-technology threats.

King Khan: In this scenario there is a hostile Asia coalition. The United States is preoccupied with domestic problems, including an economic depression.

Halfs and Half-Naughts: There are changing social structures and security regimes. The military must prepare for many threats.

2015 Crossroads: This scenario was a bridge between 1996 and 2025. In 2015 the United States is faced with a strategic challenge. The manner by which the United States responds could lead to several different worlds.

Second, U.S. Strategic Command conducted an analysis and created a briefing that focused on the future world of deterrence. Methodologically, “Implications of Change to Strategic Thinking” identified a focal issue (new tools for strategic deterrence), determined important and uncertain driving factors relative to the issue (centers of power and paradigms of conflict), produced alternative futures, and then, like the Air Force study, wrote histories of the future.²⁵ Four different global scenarios were created. In bullet format, these consisted of:

Federation: Social and economic interconnectivity. Non-physical conflict resolution. Technology leads global cooperation.

Cyber-Militants: Virtual nation-states. Nth dimensional war. Techno-individuality.

Global Cops: Strong international control regimes. Global WMD controls. Global responsibility for the United States.

Feudal Societies: Sub-nation autonomy. No universal rules of conflict. Fortress America.

The third example of a scenario-based approach is that of Allen Hammond. In his book, *Which World?* Hammond analyzes long-term trends out to the year 2050.²⁶ Thereafter, he views an array of “trajectories,” or scenarios, that lead to different worlds. These scenarios are intended “to shed light on the social choices that might distinguish one path into the future from another.” Lastly, Hammond viewed the world by regions in such a way as to combine trends, scenarios, and the social, political, and cultural aspects of each region. Trends and drivers include demographic, economic, social, political, technological, environmental, and security issues. His three global scenarios in bullet format are:

Market World: Economic reform and innovation lead to rapid economic growth, regional integration, and a new age of prosperity.

Fortress World: Economic failures, social wrongs and environmental problems lead to instability, conflict, and the collapse of social order.

Transformed World: Power is widely shared. New social organizations and coalitions emerge. Positive social, political, and environmental policies are followed.

The fourth study was produced in 1995 by Andrew Marshall of the Office of the Secretary of Defense/Net Assessment (OSD/NA).²⁷ Entitled, “Scenarios of the Future Security Environment,” it sought to highlight U.S. defense-planning issues. Trends were examined that led to four distinctive worlds in 2020. For each world Marshall highlighted key implications. The worlds he outlined are briefly summarized as:

Status Quo Extended: Regional aggressors threaten U.S. vital interests. Instability in the rest of world affects important U.S. interests. U.S. military force structure continues to be planned around major regional contingencies. Questions remain regarding type of forces for other contingencies.

Minor Actors, Major Effects: Lethal technologies proliferate offering prospects for anonymous use. Economic failure and demographic pressure generates violent political conflict or extended anarchy in some regions. “Saboteurs” may have ecological niche in open, low security United States and the West.

Another Major Power: United States is replaced as the world’s leading military power by a wide margin. The new major power may not necessarily threaten U.S. interests. Motives and intentions could be unclear.

Benign World: Contingencies used to plan U.S. force structure no longer appear plausible. Global political developments create this condition largely in absence of U.S. policy.

The fifth example consists of an extensive study being conducted for the National Reconnaissance Office (NRO) in 1999 by Deloitte Consulting.²⁸ While still ongoing, this inductively researched project includes both global and regional scenarios out to the year 2020. The research focuses on four drivers: global issues, U.S. domestic and social issues, economic and commercial issues, and communications and information technology issues. The study also draws implications for the environment, technology, economics, infrastructure, and security. The five global scenarios in bullet format are:

New Camelot: A positive world of economic growth, technological progress and political stability. High transnational openness and mobility. Stable structures and influence around the globe. Assertive U.S. global involvement. Low perceived threats to U.S. quality of life.

The Enemy Within: A positive global world but with the U.S. fractured and fragmented. High transnational openness and mobility. Stable structures and influence around the globe. Restrained U.S. government global involvement. High perceived threats to quality of life. Weak U.S. economy.

Amazon.Plague: A negative divided world trying to cope with highly contagious, deadly viruses. Low transnational openness and mobility. Volatile structures of influence around the globe. Assertive U.S. government globally involved. High perceived threats to U.S. quality of life. Weak U.S. economy.

Yankee Going Home: A negative world of transnational terrorism and crime with an isolationist America. High transnational openness and mobility. Volatile structures of influence around the globe. Restrained U.S. global involvement. High perceived threats to U.S. quality of life. Weak U.S. economy.

Militant Shangri-La: A regionalized world of shifting alliances and power blocs competing over scarce resources in a polluted environment. High transnational openness and mobility. Volatile structures of influence around the globe. Assertive U.S. government global involvement. High perceived threats to quality of life. Strong U.S. economy.

Studies Using Shell-like Scenario-based Methods

Other examples of the scenario-based approach include work done at the Strategic Studies Institute (SSI) of the U.S. Army War College, and RAND. The process used in these studies was largely similar to Shell's, but not all of the steps in that methodology were followed.

Steven Metz wrote an SSI monograph entitled *Strategic Horizons*.²⁹ His approach analyzed overarching “currents of change”—interconnectedness, time compression, and “demassification”—that will shape the strategic environment within six areas. These included economic, political, social/demographic, ethical/psychological, and military. A second portion of his work postulated five alternative futures presented here in bullet format:

State-based, Balance of Power: Sovereign nation-states using military force. Shifting coalitions with a peer competitor involving coalitions. Other actors use asymmetric counters.

Trisected Global Security: Three tiers of security: advanced, stable regions with information economies; diverse, autonomous nation-states with industrial economies and WMD; areas of endemic violence, ungovernability, and a range of ecological problems.

Ideology-based Conflict: Violent conflict due to transnational ideologies and mass belief systems.

Military force used frequently with the possibility for escalation high. Large U.S. military force with power projection to support allies.

Internal Collapse: Internal violence with weak states. U.S. military develops “Special Forces” capabilities.

Economic Warfare System: Struggle for resources and markets. Transnational entities with security interests. Intelligence and security is privatized. U.S. military focuses on information war.

Zalmay Khalilzad and Ian Lesser edited *Sources of Conflict*, which was published by RAND.³⁰ The goal of this effort was to characterize the security environments that the U.S. could face. They began by analyzing key trends affecting the strategic environment in 2025, discussed “alternative strategic worlds,” and then developed regional scenarios that offered an array of demands and constraints on the use of air power. Drivers included: democratic and economic reform in Russia and China; European Union integration; eastern and central European reintegration into the political-economic affairs of Europe and Russia’s response; the internal dynamics of the Middle East; U.S.-Chinese relations; and the spread of nuclear, biological, and chemical weapons. Briefly, their three scenarios are:

Base Case: Europe muddles along. Russian confederation stays weak. Regional competition in Middle East. An assertive China. Continuity in Japan. U.S. preponderance in Asia. Modest NBC proliferation. Evolving global power relations and an uncertainty regarding a global competitor.

Benign: Europe is federalist. Russian is dynamic. Stable prosperity in the Middle East. Liberalization in China. Japan is a proactive partner. Pax Americana in Asia. Low NBC proliferation. Stable global power relations with no global competitor.

Malign: Europe is fragmented. Russian becomes “sick man” of Eurasia. Anarchy in the Middle East. A hegemonic China. Japan becomes a regional competitor. Regional powers dominate Asia. High NBC proliferation. Unstable global power relations with a global competitor.

Four additional Shell-like scenario-based approaches deserve mention as well. The first is the Report of the National Defense Panel, *Transforming Defense*.³¹ In this work, the National Defense Panel (NDP) reviewed key trends, hypothesized scenarios, identified operational challenges, and then worked backwards to identify the principal factors that could drive change. The four scenarios they developed in bullet format are:

Shaped Stability: International economic cooperation expands. Wealth more evenly distributed globally. Cooperative security relationships exist. The U.S. public is involved and the U.S. is engaged internationally. The rule of law is followed. However, this world also includes a shortage of resources, demographic problems, proliferation, and ethno-national tensions.

Extrapolation of Today: An international system characterized by competition, political diversity, and unequal economic distributions. The U.S. remains “number one,” but sustaining that position remains an issue, as does proliferation.

Competition for Leadership: This is a “balance of power” world with a hostile nation or alliance. Nation-state conflict is resurgent and new alliances form. WMD and delivery systems continue to proliferate. U.S. public support expands and military power is frequently used.

Chronic Crisis: The global economy deteriorates. International institutions collapse. States and non-state actors fight over resources. Alliances are fluid. National and ethnic hatred expands. Proliferation of WMD increases. Migration and urban chaos arises. U.S. will is questioned.

A second study worthy of mention was done by Michael Oppenheimer and Stanley A. Feder for the Central Intelligence Agency's "Futures Group." This unclassified study was titled, "Four Scenarios of Global Relations, 1996-2005."³² The authors did a scenario-based analytical exercise that used drivers and scenarios to generate ideas about the types of threats and security environments the United States might face in the future. The factors or drivers that influenced the future included: the U.S. global role, the degree of international cooperation, the importance of U.S. governmental actions, the degree of government authority, the resources available for policy, intelligence needs, the importance of speed, and the use of technology. Exercise participants interacted to generate a range of threats. The threats were then subdivided into adversarial and systemic threats. The former were defined as deliberately harmful actions undertaken by humans (individuals, organizations, and states), while the latter referred to anomalous or unstable threats from ecological, economic, or communications systems. From this base, Oppenheimer and Feder extrapolated scenarios and used them to analyze the probability and consequences of the drivers. Briefly, the four scenarios are:

Global Integration: The realization of current U.S. international economic policy—free market world, global growth, and globalization.

Engagement and Conflict with Russia: A nationalist/communist coup occurs in Russia which reverses market and democratic reforms. Russia reasserts power and influence in the Near East and Central Europe.

Multipolar Mercantilism: Less collaboration and cooperation between developed countries on issues ranging from WMD proliferation to preventing environmental decay. More competition for access to markets and subordination of other goals (anti-proliferation). International organizations exist but effectiveness is reduced. Other organizations for other problems—environmental, communal conflict, terrorism—do not get built.

Disengagement from the South: Economic, social, and political deterioration in the have-not "South." Systemic threats from demography, ethnic divisions, and resource scarcity. Developed countries turn away and international institutions are ineffective. Globalization and its consequences are rejected.

The third alternate example using Shell-like methods is a study by the Center for Naval Analyses (CNA).³³ This project for the USMC identified key drivers (economics, politics, technology, culture, environment, and security) and two key uncertainties with divergent properties—integration versus fragmentation, and rigidity versus flexibility. Employing a two dimensional matrix, CNA produced four major scenarios characterized as: global with rules; global and flexible; local with rules; local and flexible. The four scenarios in bullet format are:

Network.org: Everything comes together economically, technically, and politically. The international system functions smoothly and there are no cohesive threats.

Wildweb.com: Everything loosens up but progress is too fast and furious. Globalization and the information/technology revolutions expand. Many small technology-type threats emerge.

Firewall.gov: Regions come together at their own pace, but paths diverge. The "have" and "have-not" worlds divide with the threats kept in check.

Standalone.mil: A fragmented, rigid world with globalism replaced by resurgent states. Nationalism is rampant and economic growth is stunted.

Lastly, Richard Kugler writing for RAND produced a book entitled *Toward a Dangerous World*.³⁴

Kugler analyzed geopolitical, economic, military, and ideological trends from “idealist” and “realist” perspectives. Kugler highlights “regionalism” by distinguishing three “critical variables” or uncertainties: the degree of tension in Europe, Middle East, and Asia; the degree of rivalry between the West and Russia and China; and the degree of cohesion within the Western alliance. Kugler then used these variables to create one-dimensional scenarios based on a single variable, and then multi-dimensional scenarios based on a “matrix” of any two variables. This resulted in the development of four “strategic scenarios” highlighted here.

Strategic Scenario 1: Traditional geopolitical rivalry with Russia and China. High tensions between Europe, the Middle East, and Asia. A cohesive Western Alliance.

Strategic Scenario 2: A non-cohesive West that has good relations with Russia and China. Friction in two or three regions.

Strategic Scenario 3: A cohesive West competes with Russia and China. Also, there is friction in the Middle East and Asia.

Strategic Scenario 4: A non-cohesive West and traditional rivalry with Russia and China. High tensions in Europe, the Middle East, and Asia.

Scenarios Using a Minimal Shell Methodology

These variants employ a truncated version of Shell’s scenario-based methodology. Whereas the previous “Shell-like” studies used the essential Shell process while the components differed, the “minimal Shell” methodologies focus on trend description. Instead of providing multiple strategic environments, qualitative descriptions of various trends are proffered. There are two examples of trend analysis, however, that do lead to at least one scenario. In this respect, the following studies are better characterized as “forecasts,” an approach that limits itself to qualitative descriptions, certainties, and linear projections.

Several U.S. Government efforts adopted this approach. The Defense Department Futures Intelligence Program, *Global Threat Assessment*, is an example.³⁵ This report begins with a global trend analysis of political, socioeconomic and military issues. Next, the analysis characterizes Major Powers, Hostile Coalitions, and Regional Powers. Transnational issues, such as migration, refugees, resources, drugs, and terrorism are analyzed before an assessment is made of technology and its implications for selected warfare areas (information warfare, asymmetric warfare, and irregular warfare). However, no single global environment was described.

Other studies repeat the previous steps—assumptions, trends, and description, and a condensed environment—but also include uncertainties in an explicit manner, such as the Defense Intelligence Agency’s *The Decades Ahead*.³⁶ In 1992, Andrew Marshall of OSD/NA also used this type of descriptive effort. Although his analysis is incisive, it does not actually lead to an environment(s). Instead, it examines opportunities and constraints for the United States, changes in U.S. strategy and capability, and issues for U.S. strategy.³⁷

The Report of the Commission on Integrated Long-Term Strategy, *The Future Security Environment*,³⁸ analyzed major trends (economics, demography, AIDS, military budgets and capital stocks, and technology) and then described the changing security environment. “Shocks and discontinuities” are developed as a means of depicting a future environment. Examples of such discontinuities include shifts in alliances, the use of nuclear weapons, U.S. loss of forward bases, and technological surprise.

The National Intelligence Council (NIC) assisted by the Institute for National Strategic Studies (INSS) produced a widely circulated report for the first Quadrennial Defense Review and the National Defense Panel.³⁹ *Global Trends 2010* starts with assumptions, trends, and descriptions and then illustrates the consequences of

those trends in a single future environment. Looking out to 2010, the NIC assumed that there would be “no radical surprises,” but a steady accumulation of observable trends over time. They also assumed that the United States would remain engaged and that there would be no world economic depression. They noted that population increases, economic growth, and expanded communications would diminish the authority and reduce the capacity of governments to influence events. In turn, this would create internal disorder, migration, ethnic conflict, and failed states. New norms of international intervention were required to cope with these eventualities.

The last trend-oriented work examined here is Michael Mazarr’s *Global Trends 2005*.⁴⁰ This project was done for the Center for Strategic and International Studies. Mazarr begins with a basic assumption: current trends are so profound as to replace the industrial age and rearrange the “familiar landmarks of our world.” Mazarr provides a context for larger trends and organizational schemes in six “interdisciplinary trend areas.” These are called “The Foundations” (demography, environment and natural resources, culture), “The Engines of History” (science and technology, socioeconomic modernization), “A Human Resources Economy,” “An Era of Global Tribes,” “A Transformation of Authority,” and “A Test of Human Psychology.” Mazarr seeks to characterize the evolution and transformation of the world into one described as the “knowledge era.” Other scenarios and vignettes include “surprise” related to the emergence of genetic testing. The important lessons he derives about the future are: education is the key to the knowledge era; the primacy of moral values and social responsibility; and the need for “new capitalism.”

Project 2025

In 1992, the Institute for National Strategic Studies at the National Defense University responded to a tasking by the Vice-Chairman of the Joint Chiefs of Staff with the report, *Project 2025*.⁴¹ This study stands out for its scope and because it was conducted by five major institutions. Three of these institutions used methods different from the Shell scenario-based methodology. A total of thirteen scenarios were constructed.

SRS Technologies developed three scenarios using a “systems approach.” This deductive method described the future in “aggregate terms,” distilled general notions and organizing principles, and then “linked” today (1992) with that future construct. SRS produced three scenarios that explained what a future world might look like and how it might work. While all three were plausible to one degree or another, they collectively exemplified broad principles that SRS argued would influence the future: ideology, economics, the anarchic nature of international politics (as opposed to its more linear implementation during the Cold War), and the continuing effects of technological innovation. The SRS scenarios follow in brief format:

Clash of Civilizations: Assertive Islam leads to a Cold War-like ideological rivalry between United States and unified Arabs/Islamic nation-states. Religious schisms between the two camps. Religion figures larger in international politics. Weapons capabilities in the hands of religious extremists are a key concern.

Balance of Power Redefined into Economic Blocs: Economic tensions between allies. The EU and the United States attempt to preserve economic stability while Asian nations are in recession and experience political-military struggles. Trans-regional economic blocs vie for power. Economic calculations dominate state decisions. War still prevalent to protect allies, secure trade rights, and discourage protectionism.

Nationhood Revisited: States divide along ethnic, religious, and cultural lines. China fragments and Japan becomes assertive. Devolution into anarchy.

The University of Houston used another type of methodology—deductive engineering—in Project 2025. They “imagined” three scenarios by creating multiple futures, and then engineering those futures back to the present. The purpose of this approach was to provide “desired” scenarios that would “sensitize” policy

makers to the future. Briefly, their scenarios are:

New Security Structure: International system changes from political-military competition to economic competition. Incremental change to economic blocs and multinational corporations. Industrial regions and developing regions become the arena for competition. Military threats exist from “world maverick-states” and terrorists. The UN has a prominent role, including military forces. The United States also remains militarily significant.

High Technology: International concerns dominated by proliferation of information technology and biotechnology. Technological effort is focused almost exclusively on commercial use since national security is defined in economic terms. Have/have not gaps widen within societies, leading to an upsurge of social Darwinism. Intellectual basis of policy moves from control to adaptation based on organic models. U.S. military remains the guardian of the nation and must stay in front of technological developments.

Green Scenario: The greatest global threats come from ecological problems, the AIDS epidemic, the costs of protecting Middle East oil, and declines in the number of biological species. The United States becomes a “mature manager” of the planet. Military resources are devoted to environmental problems. A “National Planetary Service” evolves with a two-year conscription. NGO importance increases.

Media-dominant World: Widespread technological “escapism” occurs in a world filled with problems: military-security, debt, resource scarcity, global warming, pollution, crime, and the neglect of children. The U.S. military’s mission is internal security with large information warfare requirements.

The Defense Intelligence Agency’s (DIA) methodology in *Project 2025* began with a series of assumptions and then built scenarios. The first scenario rested on assumptions of economic integration and international cooperation. The second scenario was a more evolutionary departure from today, and the last was a revolutionary departure. The scenarios contributed by the DIA are:

Increased Competition Within a Cooperative World Order: Extensive economic integration and international cooperation with supranational bodies, interdependence, and war seen as a very high-cost proposition. The military becomes mostly a symbolic deterrent. Legal codes, international norms and arms control exist. Growing power within three economic blocs—North America, Europe, and East Asia.

Baseline from 1991: Prospect of global war is less but not gone. A multipolar world exists. An “Americas-bloc” competes with five other regional blocs. Nation-states exist, but sovereignty and freedom of action are constrained. Population explosion is occurring in the developing world with social unrest and migration. The proliferation of WMD is a key challenge. Economic and technological strengths are the keys to national security. Arms control monitoring through remote sensors becomes a first line of defense, and offensive operations are last line of defense.

McFuture 2025: Interdependence, accelerated technological change, and stresses upon authority structures lead to revolutionary change. New ideology or reinterpretations of old ideologies emerge emphasizing need for managed disagreements, restrictions on sovereignty, and cooperation. Direct linkage between technological development and ethical frameworks that advance the human condition.

Lastly, the Battelle Corporation used a quantitative approach to describe worlds for *Project 2025* and to evaluate the probabilities of wild card events. They began with a set of “descriptors.” For example, research and development expenditures and military investments interacted with each other. Education, information processing and storage, and material performance were also “descriptors” that influenced each other. The

“descriptors” most affected by others were global GNP distribution, nourishment, and health care quality. Next, Battelle identified “descriptor states” and then attached probabilities to wild cards (political upheaval, financial disaster, and technological breakthroughs in superconductivity) that were considered low probability but of high consequence. From this, three scenarios were constructed:

Continuity and Progress: Significant technological progress but with gradual overall change. A better world but not very different from 1992.

Broad Technology Advances: Obviously an acceleration of technology. An improved and radically changed world.

Global Malaise and Technology Stagnation: A world of slowed technology development. The world is much worse and unable to solve growing problems with technological solutions.

Analysis and Implications

Of the 20 studies analyzed, five followed the Shell methodology very closely. Six used a variation of the Shell methodological process, including depicting alternative futures. Another six were very simplified versions of the Shell methodology and resemble forecasts more than scenarios. In these examples, the emphasis was on trend identification and description, not painting strategic landscapes. That said, two of them suggested a future environment and another two formed a single scenario. Lastly, *Project 2025* depicted 13 scenarios using four distinct methods, only one of which followed the Shell method. Two were deductive and reverse engineered. Another method was quantitative in nature, and the last was a Shell-like method of beginning with assumptions and building scenarios.

Unlike studies of the 1970s, the contemporary efforts used much less prescription, thus their methodologies and prognostications were more easily identified. They were also much less compartmentalized than their predecessors, and some exhibited sophisticated efforts at cross-functional integration of broad subject areas. Most of the contemporary studies employed some combination of inductive and deductive research. Studies rarely used a pure inductive approach because of the research burden imposed by the subject. Only a minority of the studies attempted to produce both a global and a regional analysis. Most developed either one or the other.

Several important implications were drawn from these studies. Like the earlier future studies reviewed from the 1970s, many contemporary studies appear to be oriented on issues considered important to the present decade. For example, common themes recurring in these studies include: the uncertainty of the post-Cold War security environment; the impact of technology and the information revolution; the focus on global economics; the problem of failed states; and challenges to sovereignty. Other issues often arise, but the overly common threads are noted above. This raises an obvious question, also identified as a limitation in the earlier 1970s studies, as to why projections are shaped by present concerns and rarely focus on other possibilities that produce startling emergent behavior.

It is too easy to attribute this to simple shortsightedness. A possible answer lies in the problem of “weak signal strength,” wherein small patterns are difficult to detect in the midst of overwhelming noise. This problem is compounded by group efforts, where the efforts of a large numbers of “experts” will tend to wash away any weak signals. We attempted to pay attention to the possibility of emergent behavior.

Another import implication became evident as we studied the Shell methodology in the studies and attempted to modify it to our own use. As the scope of a study expands it forces one to move from a single or a few “key decisions” in the Shell method to considering multiple interacting decisions in the world environment.

Thus it becomes more difficult to structure a simple, useful methodology. Also the 25-year period under consideration causes the distinction between “knowns” and trends to blur. Even traditional “knowns,” such as demographics, can produce a wider range of potential outcomes over 25 years which forces more factors to be treated as trends—and by implication—more trends to be treated as uncertainties. As one gets into the “out” years, uncertainties multiply exponentially. This makes empirical quantification difficult and reinforces the requirement to produce a range of *possibilities* rather than a range of *probabilities*.

Reading the contemporary studies closely, one readily discerns several similarities and differences between them and this project. Structurally, we focused on four global trends versus the common approach to consider five, six, or even seven functional areas. However, we stressed integration and interaction between these trends more than was commonly addressed in other studies. Contemporary studies frequently failed to discuss Africa and South America, and their range of possible regional and inter-regional outcomes was often narrower than those explored in our effort. Few contemporary studies make more than a cursory effort to examine the role of America’s domestic future and its potential impact on national security. Obviously, however, the global scenarios presented in the current study can find related cousins in many of the contemporary efforts.

Rather than giving us comfort, however, the similarities between our effort and current studies should remind us that we might have fallen prey to the same human predisposition and errors of judgement as our contemporaries. The differences between them and us—our focus on possible emergent behavior, our acknowledgement of wide uncertainty, and our development of competing, interrelated trends—give us hope that we may have laid a proper foundation for considering the future.

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² This addendum was inspired by suggestions from Commissioners Norman Augustine and Newt Gingrich.

³ Lester R. Brown, *The Worldwide Loss of Cropland*, Worldwatch Paper 24 (Washington, DC: Worldwatch Institute, Oct. 1979).

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⁶ Thierry de Montbrial, “Energy: The Countdown. A Report to the Club of Rome” (Elmsford, NY: April 1979).

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- ²¹ See Pierre Wack, "Scenarios: Uncharted Waters Ahead," and "Scenarios: Shooting the Rapids," in *Harvard Business Review*, September-October 1985 and November-December 1985.
- ²² See Peter Schwartz, *The Art of the Long View* (New York: Bantam Doubleday Dell Publishing, 1991).
- ²³ For example see, Kees van der Heijden, *Scenarios, the Art of Strategic Conversation* (New York: John Wiley & Sons, 1996); Liam Fahey and Robert M. Randall ed., *Learning from the Future, Competitive Foresight Scenario*, (New York: John Wiley & Sons, 1998); Gill Ringland, *Scenario Planning, Managing for the Future* (John Wiley & Sons, 1998); and Paul J.H. Schoemaker, "Scenario Planning: A Tool for Strategic Thinking," *Sloan Management Review*, Winter 1995.
- ²⁴ See Joseph A. Engelbrecht, et al., *Alternative Futures for 2025: Security Planning to Avoid Surprise* (A Research Paper Presented to Air Force 2025, April 1996).
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