

**Forward Engagement:  
Blending Future  
Forecasting and Policymaking**

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Professor Leon S. Fuerth  
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Heather Barnes  
Suzanne Basalla  
Melissa Bez  
Conor Savoy  
Audai Shakour  
Matt Spieler  
Neil Sroka  
Katie Tobin

## **Executive Summary**

The world will be a vastly different place in fifteen years and even more so in fifty. Although it is impossible to predict changes with certainty, it is necessary to identify key issues, known as Future Contingencies of Interest (FCIs), and how they can interact to produce potential futures. Twenty-two FCIs have been identified in the four realms of Science and Technology, Economics, Governance, and Security. In Science and Technology, the FCIs are environmental change, biotechnology, new energy sources, nanotechnology, medical breakthroughs, and pervasive computing. In Economics they are networked information systems, globalization, economic equality, resource scarcity, emergence of a peer economic rival, and a global financial meltdown. In Governance, the FCIs are demographics, state stability, global governance, an Islamic civil war, and domestic unrest. In Security they are emergence of a peer rival, alliance shifts, Middle East peace, hyper-proliferation, and the use of weapons of mass destruction. The examination of the interaction among these FCIs resulted in a system comprising four categories: drivers, first-order effects, second-order effects, and levers. FCIs were placed in categories by time span, certainty, the potential for affecting the outcome, and policy implications. The third and final step was to create an institution to ensure that this practice of forward engagement be included in the policy-making realm. The resulting Executive branch agency, the Office of Future Assessments, comprises a Program Planning Division, Policy Creation Division, and an External Relations Liaison Office. It also tasks Federally Funded Research and Development Centers with identifying FCIs. Although this system cannot expect to predict all FCIs and devise policies to solve them perfectly, institutionalizing forward engagement is the best way to prepare for the future.

## **Introduction**

The U.S. government currently lacks a systematic and comprehensive process to identify and examine long-range trends and discontinuous events that will substantially alter the future. Furthermore, there is no capacity to use the data from any such examination to develop policies and response capabilities that modulate or prepare for the future. Many reasons explain why humanity has failed to properly plan for the future, such as the tendency to discount the unknown, lack of training and resources, and the overwhelming nature of current and near-term problems on an already overburdened decision-making structure. Nonetheless, a need persists for an increase in the government's capacity to perceive and respond to the accelerating rush of future events. To address this critical shortfall, an institutional method of blending forecasting and policy is necessary.

In order to conceptualize and construct an appropriate institutional mechanism, it is essential to be aware of some potential Future Contingencies of Interest (FCIs) in the major issue areas of economics, security, governance, and science and technology. After a survey of future studies literature and consultation with industry experts, a list of almost two dozen FCIs that may have transformative consequences for society are identified in the first section. While these FCIs can generally be categorized into distinct issue areas, their causes and impacts certainly have spillover effects into others. At the same time, important relationships among these FCIs, which generate implications for the development of their policy responses, are discernable. These relationships are explored below, and sample policy response options are offered as a window into the kinds of policy decisions that arise from dealing with FCIs. The exercise of scanning the future for FCIs and considering the types of policy responses required to respond clarifies the need for an institutionalized mechanism for continuing this type of forward engagement. After reviewing the existing mechanisms and viable alternative proposals, it was concluded that they all proved variously inadequate for the task. In response to this vacancy, establishing the Office of Future Assessments, which will be discussed in detail in the final section, is recommended.

## **Part I: Future Contingencies of Interest**

Fifteen or twenty years in the future, the world could be a vastly different place from what it is now. To minimize strategic and tactical surprises, it is necessary to systematically evaluate the status quo for Future Contingencies of Interest (FCIs), scenarios whose outcomes may have transformative consequences for society. The FCIs are grouped into four categories in which their impact would be most prominent: Science and Technology, Economics, Governance, and Security. Due to the magnitude of these events, the consequences would most likely be felt in more than one of the categories, but their separation allows a more focused consideration of the problems they pose. Categorization also facilitates determination of the interaction among the FCIs and their impacts, which allows for a more holistic view of potential contingencies. The key FCIs are examined below, followed by an attempt to understand some important relationships among them.

### **Science and Technology**

Environmental Change: Epic transformations of the environment are occurring at a scale and pace that are barely comprehensible, much less preventable. Global warming, which will raise ocean levels to swamp current coastlines, alter habitable land due to rising temperatures, and cause shifts in climate patterns, including more frequent severe weather events, is considered a scientific reality. Another major environmental change is the increasing loss of biodiversity. The rate of species extinction is so great as to be considered the sixth major extinction wave in history, the last of which wiped out the dinosaurs. Humanity's ability to out-compete virtually every other species ensures continued habitat destruction, over-fishing and marine resource depletion, and the attendant loss of biodiversity. Genetic diversity is also decreasing within many species as the sperm count falls and more individuals within populations are killed. This trend will weaken the survivability of species, especially those within limited geographic ranges, exacerbating the impact of habitat destruction from humanity and global warming.

Biotechnology: Biotechnology has the potential to change the basics of human existence: nutrition, emotions, life span, and procreation. Society must decide how to tackle the social and ethical ramifications of these developments. Genetically modified foodstuffs have already begun to revolutionize farming in the United States and elsewhere worldwide. Although this technology promises to feed the world's ever-expanding population, it also could potentially divide the world into naturalist versus technologist camps. Neuropharmacology has the potential to improve people's lives psychologically, but raises serious questions about what it is to be a sentient human being. Intertwined with this issue are the questions of free will and biological determinism: if it possible to medicate problems away, where is the impetus to overcome challenges via intellect and determination? Biotechnology could also dramatically increase the human lifespan. This will have serious implications for state-sponsored social security programs, economic development, natural resource consumption, social hierarchies, and foreign policy. Just as important will be the philosophical implications of a bioengineered world. Longer life spans, for instance, might limit ideological transitions between generations and increase the possibility of intergenerational strife. Genetic engineering and cloning will raise divisive ethical and moral issues, such as the status of cloned or genetically altered

individuals as humans. This facet of biotechnology especially offers the chance of creating a genetically engineered “super society,” potentially bifurcating the process of evolution.

New Energy Sources: The discoveries and modifications of energy sources will change not only the nature of interactions with technology, but also give humanity the potential to continue these interactions on a sustainable basis. Both photo-voltaic cells and hydrogen-based energy could accommodate accelerating technological innovations and expanding energy dependencies worldwide, while alleviating the imminent environmental strains caused by an industrializing world. By eliminating dependence on non-renewable energy sources, governments can also avoid geopolitical security concerns often associated with finite resources. Furthermore, sustainable energy will provide a secure foundation for future economic growth worldwide. A challenge for governance, therefore, will be to ensure the equitable distribution of these technologies, and prevent their modification for nefarious purposes.

Nanotechnology: In contrast to the miniaturization that characterizes current technology, nanotechnology works from the bottom up to create self-replicating machines at the molecular level. The potential applications for this technology are limitless. Nanotechnology could revolutionize health care by developing machines to execute surgeries without external implements, help wounds heal faster through molecular compounds that aid the production of scar tissue and skin cells, and perform daily repairs at the cellular level as preventive care. Nanotechnology would be a boon to the environment because machines could clean up waste hazardous waste, eliminate the need for conventional raw materials, and even remove harmful particles from the atmosphere. Nanotech could also lead to a revolution in manufacturing by creating molecular assemblers that utilize self-replication to create any object imaginable using basic raw components like carbon. Although a potential boon for industry, assemblers’ potential for extremely cheap production could very easily eliminate conventional notions of scarcity and ultimately upset existing economic structures. Moreover, nanotechnology could also create a new generation of self-replicating weapons that could create unimaginable doomsday scenarios. Like many other technologies, the potential worldwide impact the development of advanced nanotech will require humanity to look for global solutions that could revolutionize world governance.

Medical Crisis or Breakthrough: Facilitated by globalization and the ease of international travel, pandemic diseases could race across the globe, sparking crises in health care and the world economy. Networked medical and governing sectors that could cooperate and share information to understand, contain, and treat a new pandemic disease could be mitigating factors. However, natural and human-made diseases can be developed much more quickly than corresponding preventative or curative measures. On a more positive side, medical breakthroughs enabled by increased computational capacity, advances in bio- and nanotechnology, and networked cooperation may lead to healthcare advances that could end the ravages of current diseases. In either event, significant alterations to demographics, with impacts on labor, agriculture, resource usage, and energy consumption are possible.

Increased Computational Power and Pervasiveness: The world of the future could contain powerful computers embedded in nearly every aspect of daily life. In such a world, humans

will not only look for information, but they will be bombarded by it from a number of sources. Extensive knowledge about most circumstances will become part of the everyday experience, which could create a smarter consumer and make life easier as computers provide all necessary information almost instantaneously. A large increase in computer use, however, could also have negative effects, such as the increased possibility of cyber-terrorism, financial fraud and identity theft. As computers become “smarter,” they have the potential to replace millions of blue and white collar workers and managers. Additionally, if computers can compete with humans in intellectual and emotional terms, this will alter the character of human interactions and the very definition of what it means to be human.

## **Economy**

Networked Information Systems: The coming decades will be defined by breakthroughs in information technology and by increasing access to vastly interconnected information networks. No longer chained to the desktop, information networks, with the help of wireless technologies, will be everywhere and could fully interconnect anyone. Moreover, the ideas generated and transmitted over these information networks, unlike more traditional hierarchical means of information distribution, will increasingly come from individuals who have a similar ability to create and distribute their ideas. The future’s information networks will, almost inevitably, create a similarly designed, rhizome-like network of people: vastly interconnected, sprawling, and with little to no hierarchical relationship between nodes. The presumption of continued advances in information technology also drives business and academia and are necessary to economic development and research.

Globalization: Globalization is proceeding at an uneven pace, with most of the gains being accrued by the wealthy industrial nations at the expense of the developing world. If this pattern continues, it could cause discontent and anger abroad, potentially leading to civil unrest, trade disputes, and terrorist activity. In some cases, this imbalance is due to “false globalization” in the forms of agricultural subsidies and distorted trade practices. “True” globalization, therefore, could potentially alleviate poverty in many places worldwide, raising the standard of living and quality of life globally, and politically stabilizing volatile regions of the world.

International Economic Equality/Development Assistance: As the global economy and ties between nations increase, humans may perceive with greater acuteness the interconnectivity of the world’s populations. The “have” states could reach out with foreign aid to the “have not” states in efforts to boost their economies and societies to improve the global lot. The first implication is a drastic shift of internal national budgets, allocating large sums to international aid. This may reduce social or military spending, or call for a significant rise in taxes. The increased aid could increase international goodwill and alliances. As the nations of the world begin to equalize, the economy will become global in more than just name but in providing diverse economic opportunities to citizens in all parts of the world. Multi-national corporations will be forced to pay workers a fair wage and the living conditions of many in the world will improve. Investment and economic ventures could be geared toward sustainability

and equity instead of mere profits. However, despite efforts at sustainable development, increased wealth and consumption still have the potential to cause environmental damage.

Resource Scarcity. Projections based on demographics, resource availability, climate changes, consumption patterns, and political shifts present a variety of scenarios for increased scarcity of vital natural resources. Of greatest concern are water, oil, natural gas, and fish. Natural disasters, political crises, and market manipulation could aggravate the already troublesome trend lines. Critical shortages would create governance challenges within states, intensify or create regional conflicts, alter strategic relations, or impact global financial markets. On the other hand, such challenges could inspire global cooperation in search of long-term solutions such as resource substitution, equitable global allocation, and conservation. The monetary value associated with these commodities will be key in determining their future demand and availability, as prices serve as motivation for conservation and exploring new sources. One non-natural vital resource that is becoming scarcer is international credit. If a country wants to grow without depleting its resources, it must import them from another nation; however, the amount of time international credit can be relied upon is increasingly limited.

Emergence of Another Dominant Economic Power: Currently, China is a growing economic power. Its economy is expanding, exports and imports are both increasing and foreign investment is on the rise. The future, long or near-term, could prove a time when American economic power is no longer supreme. China may position itself to outpace the United States in manufacturing, engineering and investments. Another potential ascendant economic power could be the European Union. A reduction in America's economic supremacy will have implications for foreign policy, as the viability of unilateralism decreases. A decline in economic power could impact living standards, at least relative to other countries. While the United States will not cease to be an economic power, a faltering economy that is dependent upon foreign nations for its viability, without having a commanding presence to guarantee it, would lead to upset with the government that produced the decline, and force a fundamental shift in the way the United States conducts itself.

Global Financial Meltdown: With the advent of affordable and efficient global communications, capital markets operate almost instantaneously across the world. This has given rise to a very interconnected and responsive global economy. The rest of the world can very rapidly experience economic downturn from problems arising in one nation. The stock market in the United States appears resilient to the stresses of the status quo; it could, however, face difficulties from future meltdowns abroad similar to the Asian financial crisis of 1998. The U.S. dollar also could lose value to competing entities, such as the Euro. This would be disastrous for the United States, whose enormous current account deficit is financed by the world's preference for the dollar. Global financial meltdown could also be caused by terrorist acts against strategic and significant world financial centers.

## **Governance**

Demographics: The United States will face enormous responsibilities to the baby-boomer generation in the coming years. They will represent the biggest social, political, and economic

entity in the country and will carry the most influence in the direction of the United States. It is unlikely that the social security system will remain solvent, and there will be difficulties in serving such a large and influential group in a manner that allows equitable resource allocation to other segments of the population. If the United States is saddled with a large, retiring population and an economy lacking adequate physical and capital resources, it will lose its economic place in the world. Other nations, mostly Western Europe and Japan, also have aging populations, but lack sufficient immigration to keep the work force from shrinking. This will cause severe economic decline if the situation continues unabated or social crises if there is a large influx of immigrants into mostly homogenous societies. Furthermore, much of the developing world faces the opposite problem, which is a youth explosion. These countries face sharp increases in resource consumption and in young people in need of education and jobs. Societies unable to provide for their populations may face severe instability, potentially leading to revolution or mass emigration.

State Stability: Governments that do not provide their citizens with adequate state services or rule through corrupt autocratic practices may begin to lose control over their countries. As governments lose legitimacy in the eyes of their peoples, opposition groups may form, which will continue to erode the stability of the countries. Eventually it is possible that these states will collapse altogether and descend into chaos as various groups vie for power. When this occurs it creates a dangerous situation for regional stability and for the great powers with interests in the destabilized countries or regions.

Global Governance and the Decline of State Sovereignty: As the strength of the “traditional” nation-state declines, new actors emerge to create a pluralistic international system. Already, the impact of multinational corporations, Non-Governmental Organizations (NGOs), terrorists, international organizations, ethnic groups, transnational criminal organizations, and religious groups has challenged the notion of state sovereignty. Furthered by globalization and the decline of hierarchy, this trend will increase. Two potential outcomes emerge: national governments will no longer be able to control what occurs within their borders, leading to anarchy in the domestic realm similar to the one traditionally associated with the international realm. On the other hand, national governments can work together with the other actors to address global problems, forming a system of pluralistic global governance.

Domestic Civil Unrest: In the coming years multiple states may experience widespread civil unrest due to a growing income gap between different regions within countries, a continual loss of industrial jobs in developed states, the possibility that the educated class will find it difficult to find appropriate jobs, or exacerbated tensions among races due to economic hardship or fear of terrorism. These situations could all lead to large scale riots, succession struggles, and terror attacks against government targets. Many nations are not properly equipped to deal with the threat of massive civil unrest, and most would not be able to withstand substantive internal pressure for an extended period of time.



## Security

Emergence of a Peer Rival: The United States has enjoyed a period of supremacy in almost every dimension of power. However, in the future, China could establish itself as a competing power. With a strong economy, modern military, and friendly or allied relations with key Confucian-Islamic states, such as Saudi Arabia, Iran, Pakistan, Burma, Indonesia, Malaysia, Taiwan, and Korea, China could develop a presence and influence that rivals the United States in the critical Sea Lines of Communication (SLOCs) between the Arabian Gulf and the Pacific, giving China's military global reach. The United States may find itself again threatened with a major rival to its power along every dimension, which would require a major commitment of economic and political resources to compete and deter.

Alliance Shifts: If there is a relative decline of U.S. hegemony, other countries could realign against the United States to assert regional influence and counter-balance to deter U.S. interference. Japan could grow closer to a lucrative and democratizing China; The United Kingdom could side with the European Union and its continental neighbors; Australia and New Zealand could align with their Asian neighbors to balance China; NATO could disband in favor of a continental defense alliance more suited to European security needs. Without its allies, and the attendant forward basing capabilities and fly-over rights, the United States has very limited capacity to power project. If the United States is unable to exercise a stabilizing influence outside of its immediate vicinity, power vacuums could develop around the world and much destabilization could ensue as other countries rush to fill the void, and inevitably come into conflict with one another.

Middle East Peace: If democracy and the benefits of globalization take root in Iraq and spread peacefully through the Middle East, it is possible that those states will reach an accommodation with Israel and crack down on terrorists in their midst to create a stable and peaceful region. This would immediately have consequences for the United States. The United States would no longer need to expend massive resources to be the outside balancer that maintains peace in the region, allowing U.S. wealth to go to other needs. It is also possible, however, that the countries of the region could reach some kind of accommodation with Israel, but without flourishing as liberal democracies.

Hyper-proliferation: States—whether friendly, neutral, or hostile—may increasingly find it in their national interest to maintain nuclear and biological weapons. Rationales can range from responding to shifting regional security dynamics, belief that weapons of mass destruction will deter aggression, prestige, and desire to inflict mass casualties. Security in a hyper-proliferated world may require new doctrine and appropriate military forces and capabilities, with significant costs and inherent trade-offs. Failure to plan for a hyper-proliferated security environment raises the risks of miscalculations or negligence leading to use of weapons of mass destruction. It is possible that states with nuclear and biological weapons could settle into a new global order that offers even more stability and security than today.

Use of Weapons of Mass Destruction: When the United States used nuclear weapons for the first time, it ushered in a new era in security and warfare. Should another nuclear weapon be used, it would again change the world. If used “successfully” (that is, to achieve strategic ends

without causing catastrophic environmental damage), it would give nuclear weapons a powerful new legitimacy, triggering further proliferation and sliding down a slippery slope of additional (and more lethal) usage. Use of a nuclear weapon may also lead to catastrophic environmental damage, with cascading effects. In many scenarios where usage might be imagined, the social upheaval and financial crisis could be devastating. Use of a biological weapon could be even more threatening to world order and security. Inability to recognize, much less quarantine and treat victims to prevent further spread, could lead to uncontrollable movement of the disease across the globe. In either case, the use of WMD may galvanize the world to come together and create a truly global non-proliferation effort and eliminate potential for future attacks. There remains a real risk that even the most concerted global effort will be too little, too late.

These future contingencies of interest are but a sampling of the major changes that could affect the world in the future. As time progresses, the scope of possible outcomes increases geometrically as new events and inventions compound on one other. While there is no crystal ball that can provide an accurate picture of the future, indicators and trends evident in the status quo can provide a sketch of what the future could be, and hopefully, the foresight to influence the way it develops.

## **Categories and Relations**

FCIs can be grouped into one of several categories: key drivers, first-order effects, second-order effects, or levers, which can be distinguished by the criteria of timelines, certainty, and degree to which it can be shaped. For a summary, please see Appendix I.

Key drivers: These are the FCIs that project the impact of current trends and dynamics into the future. Barring any wild card that dramatically alters progress or ameliorative measures taken by society, these trends will present major challenges in the next 15-20 years. Key drivers are the least speculative of the FCIs, because they are already well under way, loaded into the system and hard to change. While their ultimate impact and shape may still be unknown, they are relatively easy to assess, understand, and perhaps gradually affect. Another characteristic of key drivers is that their eventual path, consisting of course, pace, and intensity, plays a pivotal role in the likelihood and shape of other FCIs under consideration. Four FCIs that are key drivers are environmental changes, networked information systems, globalization, and demographics. Generally, policy responses can seek to shape their course but, out of recognition of their momentum, the primary policy focus should be on dealing with their consequences.

First-Order Effects: This refers to those FCIs that are direct, but longer term consequences of the key drivers. The first order effects identified include resource scarcity, pervasive computing, collapse of hierarchy, state instability, and economic inequality. Each of these is a likely logical outcome of environmental changes, networked information systems, globalization, and demographics. Even though the relationships between key drivers and first-order effects is not one of simple cause and effect (due to the possibility of other causes and effects of each of these contingencies), they are sufficiently linked to be considered first-order.

At the same time, policies can be construed to affect their likelihood or deal with their consequences because these are derived from current trends. Policy towards these FCIs should anticipate a range of scenarios for development, and search for a robust policy response while there is an opportunity to manage events.

Second-Order Effects: Further derived future contingencies that are less certain (though no less consequential) and are less able to be predicted or affected are designated second-order effects. They arise from overlapping impacts of various first order effects and key drivers combined with “wild cards” and other exogenous events. What distinguishes these from first-order effects is the discernible level of certainty and predictability. Second-order effects identified in this paper include global financial breakdown, domestic civil unrest, the emergence of another dominant economic power, and an Islamic civil war. Most of the security-related FCIs, including hyper-proliferation, use of WMD, Middle East peace, the rise of a peer rival, and alliance shifts, fall into this category as well. Also, unlike first-order effects and drivers, these FCIs are less prone to being manipulated to arrive at desired outcomes. Policy responses towards these should be flexible and broad, with iterative reviews to respond to increasing complexity.

Levers: Levers are emerging technologies that hold the potential to change or mitigate the character of other FCIs. Current levers include biotechnology, nanotechnology, artificial intelligence, alternate fuel sources, and medical breakthroughs. These are developments whose implications and outcomes have yet to be determined, but present possibilities for drastic intentional change of the future. It is possible to shape their utility, especially as means to mitigate the negative impacts of some of the other FCIs. With proper research, levers could change the course of drivers and their first and second order effects.

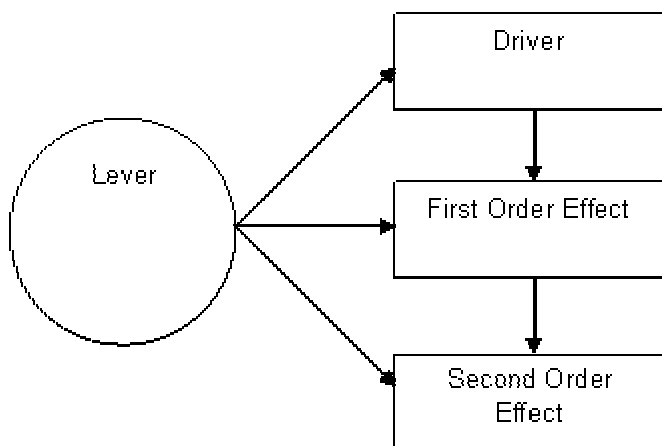


Diagram 1: A Graphical Representation of the Categories’ Relationships

## Part II: Policy Implementation

### A Case Study

Implementing policies that attempt to shape future developments is a complicated and risky process. Policies developed for situations that do not yet exist can have unexpected outcomes, and the future itself may not turn out as predicted, so policymakers must be prepared to deal with the complexity that defines modern social and political interaction and project it fifteen or twenty years into the future. A policy that attempts to mitigate one FCI might exacerbate other FCIs, so each plan must be considered carefully as component of a comprehensive view of the future, not just a single element. Policy concerned with the future does not just attempt to deal with problems; it can very easily create them. At the same time, the complexity of these interactions can be paralyzing. Every policy action does not need to be robust and able to address all FCIs at once; it is important, however, to stress the value of developing policies with an appreciation for the related and affected FCIs. Also, it is a necessity to monitor policy implementation, effectiveness, and spillover impact to adjust as appropriate.

It is beyond the scope of this paper to propose policy alternatives for each of the FCIs introduced; it is useful, however, to highlight the kinds of considerations that would be raised within each category. To illustrate policy interaction, the focus will be on one set of interactive policies. What follows is an examination of how the policy approaches to each kind of FCI (a key driver, a first-order effect, a second-order effect, and a lever) impacts those that follow.

This particular example will examine one particular “train” of FCIs: networked information systems, state stability, hyper-proliferation, and nanotechnology. Networked information systems are a driver that have been well underway and already reverberating in the economy and society. These networked information systems can undermine traditional hierarchy and relations with authority, with implications for the role and position of government vis-à-vis its people. This is not the only outcome of networked systems, nor is it preordained. But it is one plausible outcome with impact on state stability and governance. Networked information systems and state instability are, in turn, linked to hyper-proliferation. While no decisive linear connection can be drawn between either networked information systems or state instability and hyper-proliferation, there are important connections. State instability, whether caused by collapse of hierarchy or caused by other factors, can create conditions that favor a state’s decision to arm itself with nuclear weapons or other WMD. Moreover, instability may weaken a state’s control over its nuclear material and knowledge. Networked information systems, besides potentially weakening state stability, can contribute to hyper-proliferation in other ways. The technological expertise for creating nuclear weapons has become increasingly available to more actors thanks to information technology. Also, networked information enables non-state actors, especially terrorists, to bring the knowledge, materials, and technology together to create weapons of mass destruction that were not previously possible.

The lever for this train of FCIs, nanotechnology, remains an emerging technology that can have significant implications for dealing with the others. Nanotechnology could create the potential to even further accelerate networked information systems, and increase their power

and pervasiveness. This could increase the challenges to state stability by accelerating the collapse of hierarchy. Alternatively, nanotechnology may so fundamentally alter the economy and society that it could pose different challenges to stability and governance.

Nanotechnology, if used in weapon technology, could alter the nature of weapons and introduce new weapons of mass destruction or facilitate the production of such weapons. But nanotechnology, if its potential is achieved, could provide previously unimaginable defenses against WMD. Nanotechnology could dramatically improve surveillance and intrusive inspections. It might permit the building of a defensive shield, and enable civil defense and environmental clean up capabilities.

### **The Key Driver: Networked Information Technology**

Networked information technology (IT) is already occurring on a large scale and has become essential in almost all sectors of developed economies and societies thanks to a developmental spur by the defense sector and accelerated by market forces. Because of its ubiquitous nature and its essentiality to the economy, very little policy can be developed at this point to halt the development of networked IT. Businesses, academia, and the public sector are already dependent on the availability of information resources and look to the advances that future technological developments might bring to drive research and the economy.

Policymakers do have the ability, however, to consider how involved the public sector should be in furthering the advancement of network information technology. In essence, policy makers can still ask themselves if support for the development of networked IT is in the best interests of government. Obviously, this question has two possible answers: Either it is or is not in the best interests of government to continue the development of information technology resources. The policy reactions to these answers are equally intuitive, with government either ideologically and sometimes financially supporting the development of new IT resources or not directly participating in the development of new resources and sometimes making an active effort to prevent that development. In dealing with this already established key driver, policy options are limited to a scale of rhetorical and financial support because more direct efforts would not be able to overcome the driver's pre-existing momentum. Policymakers cannot halt the momentum, so their policy objective is to ensure that continued development is consistent with the functioning of democracy.

### **The First Order Effect: The Decline of State Stability and the Collapse of Hierarchy**

The rise of a vast IT-driven network (like the Internet) and the smaller, rhizomatic organizational methods it stands to promote could very easily lead to a relative decentralization of authority in society and to large questions about the role of traditional hierarchical authorities in a new information-rich world. Networked information technology's potential to decentralize governmental authority and reconstruct political power in a non-hierarchical fashion creates a great likelihood for significant erosions in state stability and, more generally, hierarchy. Like all first order effects, this FCI has a very clear relationship with key drivers, in this case, networked information technology in particular.

Three basic policies emerge to handle networked information technology's ability to decentralize government and promote non-hierarchical political authorities:

- Conclude that decentralization and non-hierarchical organization are good goals for government and actively promote their realization.
- Conclude that these developments are dangerous to the U.S. government's domestic and international standing, and actively work against their development.
- Realize that government is unable to evaluate the merits of these developments and pursue no activity for or against them.

One will quickly note that these general policy directions are very similar to the basic directives outlined to deal with the key driver – this is not a mistake. As previously stated, policies designed to provide answers for first order effects usually attempt to address their key drivers' elements to get at the core of their problems.

The key to reaching a decision about which basic policy to apply to a first order effect will then usually be found in weighing the pros and cons of each policy and then trying to decide which policy would help government maximize benefits and minimize costs. For example, one way government could reduce the effects of networked information on the decline of state stability and hierarchical organization is to actively reject or work against the development of networked information resources. Seizing control of ISPs and clamping down on freedom of speech online would be a thoroughly effective way of limiting the effects the technology might have on declining state stability and the collapse of hierarchy. This course of action, however, would also erode prized civil liberties in democratic nations like the United States and most likely be met with great resistance that could lead to the very state instability that policy meant to combat. Having weighed the pros and cons of this particular policy and course of action, policymakers would undoubtedly conclude that this course of action would not be advantageous because it stands to lose as much as it hopes to gain.

Again, reaching policy conclusions for first order effects is extremely difficult because there are various different policies you can pursue and a wide variety of possible courses of action underneath each policy. Each policy and each potential course of action must be carefully determined, understood, and weighed for pros and cons. In this example, three possible policies lead to at least nine potential courses of action that must be put through rigorous evaluation. These nine possible courses of action include:

- Policy 1: The Promotion of Decentralization
  - Government actively seeks to reorganize itself in a non-hierarchical and decentralized fashion.
  - Government encourages the decentralized and non-hierarchical organization of domestic society.
  - Government organizes a decentralized and non-hierarchical international governmental organization (IGO) with other governments.
- Policy 2: The Active Rejection of Decentralization
  - Government works to jam or disrupt technologies that could be used to organize potentially subversive decentralized, non-hierarchical organizations.
  - Government improves and promotes the hierarchically structured elements in government and society.

- Government limits the development of new, advanced information technology products through increased regulation.
- Policy 3: No Activity For or Against Decentralization
  - Government denies that anything is actually occurring.
  - Government encourages people to consider the ethical and philosophical implications of information technology developments.
  - Government acknowledges the FCI exists, but sees it as not affecting government and effectively handled by non-governmental actors (MNCs, NGOs, etc.)

To weigh these and any other possible course of action that might be overlooked will take a significant amount of time, research, and patience – qualities a government institution could be built to handle. Just the same, second order effects, with their precision defined by their very nature, will make it more difficult to develop clear, fully considered policy options.

### **The Second Order Effect: Hyper-Proliferation**

There are three general policy responses available in anticipation of a potential FCI of hyper-proliferation. The first is to intensify current efforts. The second set of policy responses assumes resignation to a world of more and better-armed nuclear states and tries to shape the regimes in which countries will operate. The last set of policy options focus on how the United States can posture to be better prepared to face the consequences of a hyper-proliferated world.

#### Increase Non-Proliferation Efforts

- Strengthen export control systems; increase legislation with extraterritorial authorities; practice stronger enforcement of sanctions; and deny of markets to violators. Develop and execute comprehensive and highly intrusive international inspections and collective enforcement regimes. Pre-empt new nuclear programs where feasible. Focus on Eurasia’s stability, as a key bulwark against proliferation.
- Avoid sending message that even modest nuclear programs will reap wholly disproportionate rewards.
- Establish a virtual abolition of nuclear arsenals, leaving a handful of weapons as a “lid on the jar” with the UNSC P-5 members, underwritten by comprehensive and highly intrusive international inspections, strengthening of IAEA and UN, and backed by better and more robust sensors and surveillance technology.

#### Shape the Transition

- End “avoidance” and shift to declaratory policies that foster improved transparency and strategic clarity. This may require major shifts in U.S. policy to end states’ political and/or economic isolation.
- Make safety protocols and technology available to any emerging nuclear power, ideally in exchange for responsible participation in regimes with other declared powers. Work with others in the international environment to better understand the potential cascading effects (environmental, economic, etc.) of the use of nuclear weapons; maximize sharing of this data with other countries.

- Develop an international regime that establishes accountability for leakage outside the framework (i.e., to terrorists).

#### Posture to Counter Consequences of Hyper-Proliferation

- Raise importance of regional nuclear planning on military's agenda. Conduct systematic planning for the nuclear environment in the military.
- Establish effective ballistic missile defense; consult with others (especially Russia and China) to limit negative effects in terms of arms race. Integrate allies (e.g., Taiwan, Japan, and India) into theater missile defense. Emphasize stand-off, pre-emptive, and precision attack capabilities. Maintain superiority in limited conflict so that an aggressor can no longer calculate that the United States will hesitate to act.
- Implement more active border controls and inspection regimes (customs, etc.). Emphasize NBC response teams for civil response. Focus intelligence on understanding nuclear doctrine of other countries, even if they do not have a declared program. Forge closer links with friends and allies to include frank, detailed consultations on nuclear weapons doctrine and sharing of intelligence on neutrals and hostile nations.
- Seek ways to reduce the number of states hostile to and able to threaten the United States with nuclear weapons

The costs (political and resource) of shoring up our non-proliferation approach are high and offer no guarantee of success. Many countries do not share our concern about proliferation and their sacrifice for the cause cannot be assured. The United States does not seem to have the available political capital or inclination to motivate the international community to work closely together sufficiently towards these counter-proliferation interests to ensure an effective policy. Also, despite our best intentions and execution, we will not be able to stop cheaters or determined aspiring nuclear states. There is a real risk that we only prevent our friends from advancing their programs, while other hostile states move forward covertly.

The second set of policy prescriptions offers one way to determine the nature of a hyper-proliferated world. These are not a simple extension of other U.S. policies, and will demand a level of international cooperation that normally makes the United States uncomfortable. Even more it requires the US not only acknowledge, but actually engage as nuclear partners, unsavory regimes that heretofore have been the target of isolationist policies. The risk is that these policies would enable programs by helping them go the "last tactical mile" in terms of command and control and safety. But the alternative may be worse.

The final set of policy responses requires major resource and political capital to be spent, this time mostly domestically—both within the interagency and with the American public. Missile defense, force posture changes, border control, and civil defense and consequence management measures are all expensive and will be funded at the cost of other security or domestic programs. However, these types of homeland security and strong defense capacity programs are consistent with current trends so they may resonate better. More education would be needed to create a sense of urgency about accelerating these programs now.



In the end, it is possible to tackle policy response sets 1 and 3, 2 and 3, or even all approaches simultaneously, but a decision needs to be made where the effort is best concentrated. It is probably too late to shore up counter-proliferation efforts with enough impact to reverse the trend towards hyper-proliferation. Continuing with what is in place will delay, but not deny, ultimate proliferation. The proposal for shaping a more stable and secure hyper-proliferated world is the least comfortable for the United States, more prone to go it alone and dictate strategic terms. We do not want to preemptively declare defeat. It is possible that policy sets 1 (rollback) or 2 (transformation) can cause or coincide with fundamental shifts that counter trends towards hyper-proliferation. However, this is not a safe bet so the set of policies to prepare for the consequences of proliferation is probably the most feasible and likely to succeed, but would still require a major shift in mindset. It is time now to begin the debate that will allow our leaders to set our course and avoid stumbling blindly into a hyper-proliferated world unaware and unprepared.

### **The Lever: Nanotechnology**

Nanotechnology is a lever because it has the capacity to impact all of the other FCIs by potentially providing the means for humanity, or individuals, to modify their environment quickly and cheaply. The FCIs were forecasted based on assumptions of the standard means and methods available to societies for affecting change, which nanotechnology would radically alter. In order to deal with nanotechnology, governments around the world have three sets of policies: attempt to stop its development, encourage its development by the market, or direct and control its development. Each of these faces major obstacles in implementation due to the borderless nature of nanotechnology development.

#### Oppose Nanotechnology Development

- Criminalize nanotechnology, the use of products already on the market, and all research into molecular manipulation.
- Provide incentives to stop research and prevent future developments.
- Announce the U.S. government's opposition to nanotechnology and attempt to stem its use via moral suasion.
- Develop international conventions and enforcement consistent with U.S. government goals.

#### Encourage Market Development

- Provide tax breaks and other economic incentives to firms and research institutions to develop any sort of nanotechnology.
- Announce U.S. support for nanotechnology and "task" American industry with increasing leadership in this field.

#### Direct and Control Nanotechnology

- Federalize all research of nanotechnology to guarantee strict control over the direction its development takes.
- Give grants to organizations to conduct the research the federal government desires, presumably at the preclusion of other research.

- Regulate nanotechnology research via an executive agency or Congressional legislation.
- Integrate U.S. goals into international regimes.

Opposing nanotechnology development seems unlikely to be a successful policy for several reasons. Enforcing a research or development ban would be almost impossible and extremely expensive to implement given the number of facilities that exist in the United States. It would also not stop development of nanotech worldwide, as other countries would be likely to exploit this advantage over the U.S. market and U.S. scientists would work in this lucrative field overseas. As a lever, nanotechnology also faces some of the problems of drivers, which is that it is already loaded into the system, and even stringent governmental opposition is unlikely to halt its momentum.

Given the inevitability of some level of nanotechnology being viable, encouraging market development seems hardly necessary. The huge potential profits guarantee that companies will invest in and pursue nanotechnology and the scientific challenge of altering life will continue to attract sufficient scientists. Proclaiming American superiority in this field will only seek to encourage other countries to attempt to catch up.

Offering minimal direction and control to the nanotech industry would best suit U.S. interests. Legislation and/or regulation, especially when tied to grant money, can set effective limits on methods or procedures that the United States does not want used within its borders. Federalizing all nanotechnology research would be a bad course of action, as it would raise legal and precedent questions, impossible to prevent future research sites from developing, and would be prohibitively expensive. Channeling research via grants and regulations would provide a modicum of predictability in the direction and potential developments that could arise from nanotechnology research.

Because nanotechnology research is an ongoing process and not a discrete event, it is impossible to prepare for all of the possible scenarios that could arise from its development. The immensity of the change it could bring on society, however, makes it paramount to at least attempt to predict the most likely paths it could take and the attendant transformations to society. Directing and limiting nanotechnology is the only potentially effective method for foreseeing or preventing radical, destabilizing change to society.

## **Implications and Challenges**

Drivers call for policies that deal with the consequences and offer some steps that can be taken in the near-term for immediate impact as well as more far-reaching policies. Policy proposals to deal with drivers enjoy a certain amount of traction simply from the fact that the FCIs in question have already begun to manifest themselves as problems and created a constituency for addressing the problems. Moreover, they contain a relative sense of urgency because we are already experiencing the impact of the FCI in question.

The first-order effect FCIs pose a different challenge. These are conditions that are a logical consequence of forces already in motion, but the transformative impact is not readily apparent. Indeed, the alarming consequences envisioned in the FCI are the result of factors that also create positive impacts. So policy actions must try to assert policy discipline and foresight in areas that may seem unnecessary—at least today. However, neglecting to deal with these issues today will only be at great future cost.

The second-order effect FCIs, like the hyper-proliferation example, pose a third set of policy challenges. Although plausible scenarios with very significant consequences, it is hard to reach sufficient confidence in their eventuality to motivate policy attention. There are numerous alternate versions that can be envisioned, most requiring a significant political and monetary investment, but they do not generate a sense of urgency or generally capture the interest of significant constituencies. Often policy approaches to deal with such FCIs lack one-size-fits-all robust options, but require choosing among often mutually exclusive approaches in an environment of great uncertainty. The nature of second-order effects creates self-induced paralysis because evidence can only show uncertainty and other scenarios can appear just as likely. Often this type of FCIs is considered pure speculation. In the face of this, fear of unintended consequences or the costs of addressing this speculative scenario prevail. The challenge is to rise above the threshold of uncertainty to overcome self-induced paralysis and take policy actions that hedge against disastrous or cascading outcomes.

Leverage poses yet another set of challenges to policy because they do not fit into any specific niche, so no one really “owns the portfolio.” As a result, levers demand significant coordination across the policy community as they are likely to have wide-ranging advocates embedded in government. Not many experts understand the implications across the spectrum on these issues, so developing effective policies would require a truly collaborative effort. These are also different because they have the very real potential for sudden discontinuous change; they seem to be “moving faster” in history. Not only do they impact FCIs, but they are likely to have tremendous cascading impact on the sociological and philosophical realms, which will have important consequences for democracy. Levers represent the intersection of complexity, technological change, and networking. It is these levers that demand a new institutional response to blend forecasting and policy response. The networked, complex nature of these levers requires institutional innovations that are designed to deal with complexity. The test of the OFA is how well it responds to this challenge.

## Part III: Institutionalization

### The Office of Future Assessments

The breadth and complexity of issues that could significantly impact the future necessitate the creation of an entity to forecast and develop policies to cope with the inevitably changing horizon. In designing the Office of Future Assessments (OFA), two previous models, the Office of Technological and Strategic Assessments (OTSA) and the Center for the Integration of Forecasting and Policy (CIFP), were considered. It was concluded that neither was entirely appropriate for the envisioned goals of the institution. OTSA was deemed to be too bureaucratic and rooted in the government organization of the past. CIFP was too rooted in the world of think tanks and it could quickly become an ivory tower. OFA attempts to balance the benefits of each structure into a single organization that will more effectively address the challenges of future assessments. The structures that currently exist focus too narrowly on specific topics, failing to appreciate intersections among seemingly disparate areas (see Appendix II). Additionally, no structure currently exists that can cope with the implications and policy options presented by the different classification of FCIs, especially the levers. To remedy this situation, OFA should be established to serve as an in-house government think tank, research network and policy center. Its sole focus will be on understanding the issues of the future and shaping them to mitigate negative effects or serve our needs for the optimum outcome and it will be located in the Executive Branch to ensure that its output is heard by figures with influence in policy creation.

OFA will contain three main divisions and outsource actual research to Federally Funded Research and Development Centers (FFRDCs), similar to the way in which the RAND Corporation originally worked for the Air Force. The efforts of FFRDCs will be directed by the *Project Planning Division (PPD)* of OFA, which will integrate and identify the areas of research that the think tanks should focus on most closely. Project Planning will then give information to the *Policy Creation Division (PCD)*, which will develop policy options to present to the Congress and the Executive Branch. Central to all efforts of OFA is the *External Relations Liaison Office (ERLO)*, whose task will be to engage the public in a discussion of FCIs and OFA's resulting policies, which will also motivate Congress to notice these issues and address the future.

OFA will be overseen by a director serving a five year term, with statutory authority to serve as an advisor to the National Security Council (NSC). Such a rotation aims to reduce the potential for OFA's politicization and allow the office to remain independent of any particular administration's agenda, while ensuring that OFA's recommendations are duly considered.

## **Project Planning Division**

The Project Planning Division of OFA would generate FCIs, which would then be distributed to FFRDCs that deal with the particular areas. The relevant think tanks would then create models and scenarios of how these FCIs could affect various areas (economics, security, etc.) and how they could affect the country and world as a whole. Once the think tanks have completed their work, the information they generated would then be passed back to the PPD for synthesis with output from ERLO and then given to the Policy Creation Division.

As with RAND and the Air Force, involving the FFRDCs would provide the OFA with an independent source of analysis. OFA would gain an invaluable service by having the FCIs modeled, as it would allow the PCD to better formulate options. By outsourcing the labor intensive research and analysis necessary for forecasting, OFA would remain a slim, dynamic group focused on helping the U.S. government form policy to deal with the future, rather than an overstaffed bureaucracy.

## **Policy Creation Division**

While the think tank community will be the focal point for much of the forecasting, the formation of policy will take place within the Policy Creation Division (PCD) of OFA. Once the policymakers are given the necessary analysis to proceed, they would begin to draft proposals for new policies that address and mitigate possible future security threats.

The PCD would need to work in concert with State Department and Pentagon officials and the officials from other appropriate U.S. agencies to utilize existing institutions to work on issues such as nuclear proliferation, the spread of international terrorist networks, the ramifications of networking after the advancement of the internet and other new technologies, consequences of global environmental change, state stability and the strengthening of societal institutions. The PCD would seek to preempt security threats within these areas by utilizing the scenarios presented by the forecasters. Officials in OFA would work with the Department of State on the long-range implications of governance and state stability, and with Pentagon officials on more traditional security issues such as terrorism and nuclear proliferation. Governance issues related to development could involve policy makers from agencies such as USAID. Officials in OFA, however, should make policy through a future-centered prism, perhaps forcing career employees of other agencies to adapt some departmental mindsets.

Interaction with security policy specialists for members of Congress would be very limited, as this new institution must have considerable independence if it is to be successful. Too much consultation with House or Senate staffers whose bosses are geared toward election cycles would risk politicizing this new policymaking body. In order to ensure that the FCIs and policy recommendations of OFA are properly evaluated, however, PCD would be responsible for annual reporting to Congress and the White House. Making forward engagement a part of the yearly cycle of Congressional discussion would ensure that future issues are institutionalized within the process. OFA would be placed under the jurisdiction of the House Permanent Select Committee on Intelligence and the Senate Select Committee on Intelligence,

and new subcommittees would be established for forward engagement. These actions will entrench it in the bureaucracy, which, given inertia and the government's proclivity for keeping power, this would favor OFA's continued existence.

OFA's director would be nominated by the president and confirmed by the Senate. The Director would also hold an advisory seat on the National Security Council, providing a vehicle for integrating the OFA within the existing policy-making institutions while maintaining some level of political independence.

### **External Relations Liaison Office**

The External Relations Liaison Office (ERLO) would be a decentralized, globally dispersed wing of OFA. Each of its locations would employ a small number (2-3) of full-time employees, with backgrounds in public relations, international affairs, and education, to serve as liaisons between OFA and the general U.S. public, foreign governments, and the international community at large. On average, two unpaid interns would also assist with these duties. To allow it to interact with the global public, ERLO must be established in at least ten locations around the United States; at United Nations offices in New York, Geneva, Vienna, and Nairobi; and in ten to fifteen capitals worldwide, housed within U.S. embassies. The internship program is integral to ERLO because interns will earn valuable experience about forward engagement on the ground level, gaining expertise in the methodology of long-term forecasting and policy implementation, as well as regional issues. In addition to saving money on personnel, the internship program would create a cadre of potential government employees with an appreciation of forward engagement.

ERLO would solicit input from different sectors of global society regarding data collection (to help ongoing forecasting) and issues that these members believe are becoming FCIs. In addition to the tasks of fielding inquiries and requests from other executive branch agencies and Congress, ERLO would also focus on the general public, including educational institutions (all levels), Non-Governmental Organizations (NGOs), and the private sector. Internationally, ERLO would maintain close contacts with foreign governments, international NGOs, multinational corporations, and UN offices focusing on long-term issues.

Additionally, ERLO would help implement OFA's policies. The office would work with grassroots organizations and corporations in areas related to a particular policy to help devise the most efficient and pragmatic tactic to address FCIs. Not only would the office maintain bilateral contact with local actors, it would also sponsor an online discussion forum and knowledge database to assist local organizations with collaborating and coordinating their implementation of OFA policy. (This database is modeled after that of the Center for the Study of the Presidency.<sup>1</sup>) The close contacts cultivated by these discussions create feedback loops to ensure that the policies are working properly.

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<sup>1</sup> *Bridging Homeland Security Expertise* [Website] (Center for the Study of the Presidency, 2003 [cited November 18 2003]); available from <https://www.thepresidency.org/pi/Homeland.htm>.

ERLO is an essential division of OFA. FCIs are not static and require ground-level monitoring; numerous, decentralized data sources help guard against experts' "pet rock" projects; forecasting should include input from different generations and introduce people to forward engagement from a young age; inclusion of the general public would enhance OFA's legitimacy and necessity—important tasks for ensuring funding and policy compliance; and ERLO's unclassified nature allows input from non-U.S. citizens and people not otherwise eligible for security clearances, therefore broadening the range of inputs.

## Conclusion

This study has ventured into the challenging world of anticipating the future. It started with scanning the future for contingencies that might transform society and governance, the economy, science and technology, or security. The kinds of policies that might be needed to deal with such contingencies were evaluated, and an institutional framework to help the government blend forecasting with policy was developed. This study does not provide an all-inclusive survey of everything necessary to prepare for the future. It has, however, been able to derive some useful lessons to further research and thinking about this subject.

### Key Findings:

- Scanning the future for FCIs requires an ability to look across many issue-areas, breaking outside of typical bureaucratic stovepipes. FCI are found in not only foreign and national security dimensions, but also the domestic realm. Intelligence Community analysis and forecasting is necessary but not sufficient to the effort.
- To prioritize FCIs, it is useful to recognize the different categories of FCIs and understand the relations among them. Policy action responses will vary widely from FCI to FCI, but there is a general correlation between the category of FCI (driver, first-order effect, second-order effect, and lever) and the type of policy emphasis needed.
- Levers, which are emerging technologies that hold the potential to change or mitigate the character of other FCIs, present possibilities for drastic intentional change of the future. Therefore, considerable analysis, forecasting, and policy formulation concerning these emerging technologies should be emphasized by the government.
- The government needs to institute forward engagement in a way that provides policy relevance but shelters the process from partisan bias. The Office of Future Assessments as an advisory body to the NSC can perform this task.
- Existing federally-funded research entities already perform major elements of the forward engagement process, especially forecasting, but their efforts are not integrated into a coherent effort. Also, their findings do not have a consistent and influential advocate in the policy process.
- Education, training, and exposure must improve to ensure forward engagement is proliferated throughout the analytic and policy communities. As understanding of the process grows, policy will be better informed by long-term consequences.
- Successful forward engagement will need to integrate the public into forecasting, policy formulation, and monitoring of policy but no useful precedent for such a public-private-government partnership exists. It is necessary to intentionally build such a networked mechanism into the process.

In the end, a networked institution that will interact with the private, public, and government in more dynamic and flexible ways in order to anticipate and prepare for the future is the most desirable method for incorporating forward engagement into the government. If OFA succeeds, the United States (and, given the borderless nature of many of the challenges of and responses to the future, global) effectiveness of forward engagement will be greatly enhanced. Moreover, the very nature of the institution may help transform the nature of citizen-



government interaction to create a less hierarchical and more representative model with application in other aspects of governance. The obstacles and challenges are many, but the risks of inaction are great. It is hoped that this study can contribute to developing the dialogue and consensus needed for progress in institutionalizing forward engagement.

## Appendix I

Category of FCI	Timeline	Certainty	Degree outcome can be affected	Policy Implications	Example FCI
Driver	Already occurring	Very clear trend lines; may be altered, but general trajectory set	Limited	<ul style="list-style-type: none"> <li>• Cannot stop, but may be able to alter trajectory</li> <li>• Focus on dealing with consequences</li> <li>• Calls for options with immediate impact as well as more far-reaching proposals</li> <li>• Constituency supporting policy action and some urgency may exist</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental Change</li> <li>• Networked info systems</li> <li>• Globalization</li> <li>• Demographics</li> </ul>
First-order Effect	Future	Logical outcome if trends left unchecked, but policy intervention can prevent or ameliorate.	Large	<ul style="list-style-type: none"> <li>• Window of opportunity to manage/forestall outcome exists</li> <li>• No sense of urgency; undeveloped constituency for policy action</li> <li>• Requires robust policy for range of scenarios</li> </ul>	<ul style="list-style-type: none"> <li>• Resource scarcity</li> <li>• Pervasive Computing</li> <li>• Collapse of Hierarchy</li> <li>• State instability</li> <li>• Economic inequality</li> </ul>
Second-order Effect	Future	Plausible but great uncertainty as to likelihood or timing; hard to prioritize among alternative scenarios.	Limited	<ul style="list-style-type: none"> <li>• Subject to self-induced paralysis; challenge is to rise above threshold of uncertainty to select hedge policy action</li> <li>• Less prone to policy action due to complexity, wild cards, and exogenous factors</li> <li>• Requires iterative reviews and adjustments</li> </ul>	<ul style="list-style-type: none"> <li>• Global financial breakdown</li> <li>• Domestic civil unrest</li> <li>• China's economic rise</li> <li>• Islamic civil war</li> <li>• Hyper-proliferation</li> <li>• Use of WMD</li> <li>• Middle East peace</li> <li>• Rise of peer rival</li> <li>• Alliance shifts</li> </ul>
Lever	Developing; subject to rapid, dynamic, or discontinuous change	Confident that these will develop but great uncertainty as to trajectory of technological development and impact.	Large	<ul style="list-style-type: none"> <li>• Possible to shape utility, especially to mitigate outcomes of other FCI</li> <li>• Requires cross-issue coordination</li> <li>• Hard to stay ahead of rapidly changing context</li> </ul>	<ul style="list-style-type: none"> <li>• Biotechnology</li> <li>• Nanotechnology</li> <li>• AI</li> <li>• Alternate fuel sources</li> <li>• Medical breakthroughs</li> </ul>

## **Appendix II: Existing Institutional Mechanisms for Blending Forecasting & Policy**

**IAFF 202.12  
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Professor Leon Fuerth  
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**Compiled & Edited By:  
Jillian Hayes  
Jennifer Park  
Kristopher Klaich**

Group B - Paper #1

Outline:

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*Introduction*

I. *Survey of past & current U.S. government forecasting entities*

**U.S. Congress**

*Office of Technology Assessment (OTA)*

**State Department**

*Policy Planning Staff*

**Defense Department**

*Office of Net Assessment (ONA)*

*Defense Advance Research Projects Agency (DARPA)*

*Center for Naval Analyses (CNA)*

**Intelligence Community**

*National Intelligence Council (NIC)*

*President's Foreign Intelligence Advisory Board (PFIAB)*

*CIA's Strategic Assessments Group (SAG)*

**Others**

*National Security Council (NSC)*

*Government Accounting Office (GAO)*

*Centers for Disease Control (CDC)*

*U.S. Department of Agriculture (USDA)*

II. *Survey of U.S. & International Non-government forecasting entities*

**Research & Think-Tanks**

*The Institute for Alternative Futures*

*Institute for the Future*

*WWC's Project on Foresight & Governance*

*RAND' Pardee Center*

*CSIS' Seven Revolutions Project*

*The Foresight Institute*

*The American Enterprise Institute*

*The Population Council*

**Academic**

*Boston University's Pardee Center*

**Business & Consulting**

*Toffler Associates*

*Eurasia Group*

*Appendices*

- (a) Internet Links to Forecasting Entities Surveyed in this Report
- (b) Forecasting Entities for Possible Future Research

## ***Introduction***

Forecasting is a topic often regarded with controversy and skepticism. Nonetheless, elements of forecasting have been present in the formation of humankind's individual and collective decision-making since the beginning of time. On the collective level, forecasting has been key factor in the development of government policy since the advent of the state-based international system.

Within the U.S. government, however, there are currently few entities that attempt - in a systematized fashion - to blend elements of forecasting into the formation of policy. Many U.S. government agencies contain smaller elements, which focus on the task of forecasting, but only in the short- to medium-term. This indicates that not only is the ability to think about the future in the longer-term largely absent, but that mechanisms to push both people and government entities in this direction are likewise lacking.

Below, is a survey of the forecasting entities that currently exist within the U.S. government, as well as a survey of existing U.S. and international non-government forecasting entities. This survey provides a brief history of each of these entities, as well an overview of their mission, organization and forecasting scope and methodology. When possible, the role that these organizations have in the formation of policy is detailed. Unless otherwise noted, the information provided below was gathered directly from the websites of the organizations described. Where possible, additional information from other sources was used to supplement the material provided by the websites.

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## **I. U.S. GOVERNMENT FORECASTING ENTITIES**

### **The U.S. Congress**

#### ***Office of Technology Assessment***

Congress established the Office of Technology Assessment (OTA) in 1972, and in this effectively created a support agency dedicated to providing Congress with objective and authoritative analysis of complex scientific and technical issues to aid in policymaking. OTA's creation facilitated congressional access to scientific and technical expertise and permitted legislators to objectively consider information presented by the executive branch, interest groups, and other stakeholders to controversial technological policy questions.

From 1973 to 1995, OTA conducted technology assessments that were requested by: committee chairmen for themselves; ranking minority members, or a majority of the committee; the Technology Assessment Board (a body which was composed of equal numbers of House and Senate members and of members from both parties), or by the Director of the

OTA in consultation with the Board. OTA produced in-depth, often long-range reports that assessed the consequences of science and technology applications and identified the pros and cons of policy options to deal with science and technology issues.

OTA was effectively eliminated in 1995 when Congress failed to appropriate funds for its continued operation and instead appropriated funds to close it down. Several reasons were given for terminating OTA's funding and numerous studies have been conducted about the rise and fall of the agency. Critics of OTA attributed its demise to problems including the Office's difficulty in completing reports in time to meet congressional schedules; the lack of utility in OTA's products to congressional decision-making; and the Office's alleged bias toward "liberal" solutions, or partisan politics.

These same critics argue that in OTA's absence, Congress can turn to and fund studies by The National Academies (composed of the National Academy of Sciences (NAS), the National Academy of Engineering, the Institute of Medicine, and the National Research Council, NRC), or utilize the services of the General Accounting Office (GAO) and the Congressional Research Service (CRS) for information and analysis on science and technology issues. Others disagree, however, and cite the utility of OTA studies to congressional decision-making and the need for Congress to maintain its own support agency devoted to assessing science and technology issues.

### **Structure of the Agency**

The Office of Technology Assessment was reorganized periodically as it grew and as the types of technology expertise relevant to public policy evolved. By 1995, OTA was organized into two main analytical divisions: The Industry, Commerce, and International Security Division and The Health, Education, and Environment Division - each comprised of three research programs. In addition to the two divisions, OTA also contained an Office of Congressional and Public Affairs.

Within the *Industry, Commerce, and International Security Division*, the *Energy, Transportation, and Infrastructure Program* was responsible for examining the role of technology in extracting, producing, and using energy resources; in designing, operating, and improving transportation systems; and in planning, constructing, and maintaining infrastructure. It addressed the impacts of these technologies and the factors that affect their ability to support commerce and other societal goals. Its work also included applications of materials to energy, transportation, and infrastructure systems, including the development of natural and manufactured material resources through extraction, processing, use, and recycling or waste management.

The *Industry, Telecommunications, and Commerce Program* analyzed the relationships between technology and international industrial competitiveness, telecommunications and computing technologies, international trade and economic development, industrial productivity, and related topics. It considered the effects of technological change on jobs and training, and analyzed the changing role of electronic technologies in the nation's industrial, commercial, and governmental institutions and the influence of related regulations and policies.

The *International Security and Space Program* focused on implications of technology and technological change on national defense issues and on issues of international stability, arms control, arms proliferation, terrorism, and alliance relations. It addressed a broad range of issues including space transportation, earth observation, and international cooperation and competition in the exploration, use, and commercialization of space.

Within the *Health, Education, and Environment Division*, the *Education and Human Resources Program* critically examined a wide variety of technologies for learning. It also analyzed science-grounded human resource topics, including the costs, availability, effectiveness, and impacts of technologies in areas such as long-term care; services and housing for people with disabilities; prevention of drug abuse; and issues of crime and violence.

The *Environment Program* addressed issues including the use and conservation of renewable resources; pollution prevention, control, and remediation; and environmental health and risk management. Its assessments included topics such as agriculture, management of public lands, biological diversity, risk assessment methods and policy, air and water pollution, management of solid, hazardous, and nuclear wastes, and the effects of weather and climate change.

The *Health Program* assessed specific clinical and general health care technologies as well as broader issues of health policy related to or with implications for technology. It also analyzed applications of the biological and behavioral sciences, including biotechnology, human molecular genetics, neurological sciences, and health-related behaviors. The Health Program was also responsible for OTA's statutory methodology oversight responsibilities regarding Vietnam veterans health studies.

## **Current Congressional Technology Assessments**

OTA's elimination in 1995 left Congress with a vacuum for detailed analysis of complex issues and long-term forecasting of public policy issues. However, for the last three successive years, starting with fiscal year 2002, Congress has included language in the Legislative Branch Appropriations bill for a pilot program directing the General Accounting Office (GAO) to conduct technology assessment studies. This initiative, while on a smaller scale than OTA, includes the goal of producing two to three reports per year. The first such report was issued by GAO in November 2002, in conjunction with the National Academy of Sciences, and was entitled "Technology Assessment: Using Biometrics for Border Security." Currently, GAO is conducting a technology assessment entitled, "Cybersecurity Technologies for Critical Infrastructure Protection."

There have been several efforts in the House of Representatives to re-establish funding for OTA, all of which have been unsuccessful. The following issues could be considered when evaluating expanding legislative technology assessment capability: the need for more technology assessment information and advice; evidence of political support for technology assessment in a separate support agency; the utility and timing of GAO pilot technology assessments in relation to congressional decision-making needs; the harmony between GAO's



conduct of technology assessment and the agency's auditing and evaluation activities; and the potential benefits or costs of establishing more independent legislative technology assessment activities, such as in a separate OTA-like support activity or organization.<sup>2 3</sup>

## **The Department of State**

### ***Policy Planning Staff***

The Policy Planning Staff was created in 1947 by George Kennan at the request of Secretary of State George C. Marshall. The Policy Planning Staff serves as a source of independent policy analysis and advice for the Secretary of State. Its mission is to take a longer-term, strategic view of global trends and frame recommendations for the Secretary of State to advance U.S. interests and American values. In doing this, the Policy Planning Staff seeks to strike a balance between the day-to-day requirements of diplomacy and the development of longer-term, strategic plans.

Former Secretary of State Dean Acheson characterized the role of Policy Planning:

"To anticipate the emerging form of things to come, to reappraise policies which had acquired their own momentum and went on after the reasons for them had ceased, and to stimulate and, when necessary, to devise basic policies crucial to the conduct of our foreign affairs."<sup>4</sup>

The Policy Planning Staff is typically a mix of career government officials and outside experts. The staff is responsible for covering the full range of foreign policy issues facing the United States, although staff members exercise discretion and judgment in identifying the areas they focus on. Policy Planning acts as the State Department's liaison to the think tank community, and attempts to incorporate think tank analysis into policy considerations.

The daily work of the Policy Planning Staff is divided into six areas: Analysis; Special Projects; Policy Coordination; Policy Articulation; Liaison; and Planning Talks.

#### *Analysis*

- Serve as an internal think tank for the Department of State - undertaking broad analytical studies of regional and functional issues, identifying gaps in policy, and initiating policy planning and formulation to fill these gaps
- Serve as an institutionalized "second opinion" on policy matters - providing recommendations and alternative courses of action to the Secretary of State.

#### *Special Projects*

- Assume special projects or take the lead on certain issues as tasked by the Secretary of State

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<sup>2</sup> Knezo, Genevieve. "Technology Assessment in Congress: History and Legislative Options." Congressional Research Service. September 9, 2003.22

<sup>3</sup> See Princeton University's "The OTA Legacy" Website: <http://www.wws.princeton.edu/~ota/>

<sup>4</sup> Policy Planning Staff Website: <http://www.state.gov/s/p/>

(recent examples include work on assembling the international coalition against terrorism & coordinating the reconstruction of Afghanistan through February 2002)

#### *Policy Coordination*

-- Engage functional and regional bureaus within the State Department and relevant government agencies to ensure coordination and integration of policy with longer-term objectives.

#### *Policy Articulation*

-- The speechwriters for the Secretary are members of the Policy Planning Staff and work together with the whole Staff and all bureaus to draft the Secretary's speeches, public remarks, testimony before Congress, and contributions to print media.

#### *Liaison*

-- Act as a liaison with nongovernmental organizations, the academic community, think tanks, and others to exchange expert views on matters relevant to U.S. policy and to ensure that broad public opinion informs the policy formulation process.

#### *Planning Talks*

-- Hold a series of dialogues - known as planning talks - with counterparts from other countries, including our key European allies, Japan, South Korea, Australia, China, and Russia. These talks provide an opportunity to discuss broad strategic issues that go beyond crisis management or the day-to-day concerns of diplomacy.

The role of the Policy Planning staff varies depending on the preferences of the Secretary and the head of Policy Planning. The work of the staff ranges from longer-term forecasting and policy analysis to focusing on special projects such as the war in Afghanistan. A recent interview conducted with a member of the Policy Planning Staff suggested that at present it is a mix of the two, but that Secretary Powell is impatient with 'big theories' and as such, the staff rarely deals with longer-term issues or problems. Instead, the focus of the Policy Planning Staff is mostly on what are considered to be medium-term issues, or those 6-12 months into the future. Not surprisingly, urgent issues that consume the 'here and now' crowd out longer-term potential problems. In the aforementioned interview, the Policy Planning Staff member further asserted that within State, there also exists the problem of combining the efforts of different offices to unify policy planning efforts.

## **The Department of Defense**

### ***Office of Net Assessment***

The Office of Net Assessment was created in 1973 and Andrew Marshall was named its first director. Marshall has been re-appointed by every Secretary of Defense since, and as Director of Net Assessment he serves as the principal staff assistant and advisor to the Secretary and Deputy Secretary of Defense on net assessment matters. For Marshall, this entails developing

and coordinating net assessments of the standing, trends, and future prospects of U.S. military capabilities and military potential in comparison with those of other countries or groups of countries so as to identify emerging or future threats or opportunities for the United States.<sup>5</sup>

ONA is credited with producing the analyses of U.S. and Soviet military investment in the 1970s that compelled the Carter administration to reverse the decline in American military spending. It also produced the analysis that moved the U.S. nuclear posture away from massive retaliation towards a strategy that would better deter Soviet nuclear aggression. ONA is also credited with persistently calling attention to the vast overestimates of the Soviet GNP that were put out by the CIA during the Cold War, as well as being amongst the very first entities to develop the idea that the American military could be transformed by the revolution in information technology.

Despite ONA's achievements, there has been controversy over some of Marshall's credits for the office. This includes one claim that ONA had been the first to sound the national security alarm about AIDS in the 1980s, going so far as to alert the Centers for Disease Control to take the problem seriously.

## **The Department of Defense**

### ***Defense Advanced Research Projects Agency (DARPA)***

The Defense Advanced Research Projects Agency (DARPA) was established in 1958 as the first U.S. response to the Soviet launching of Sputnik. Since that time DARPA's mission has been to assure that the U.S. maintains a lead in applying state-of-the-art technology for military capabilities and to prevent technological surprise from U.S. adversaries. DARPA seeks to maintain the technological superiority of the U.S. military and to prevent surprise from harming our U.S. national security by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their military use.

DARPA serves as the central research and development organization for the Department of Defense (DoD). It manages and directs selected basic and applied research and development projects for DoD, and pursues research and technology where risk and payoff are both very high and where success may provide dramatic advances for traditional military roles and missions.

The DARPA organization has been as unique as its role, reporting directly to the Secretary of Defense and operating in coordination with, but completely independent of, the military research and development (R&D) establishment. Strong support from the senior DoD management has always been essential since DARPA was designed to be an anathema to the conventional military and R&D structure and, in fact, to be a deliberate counterpoint to traditional thinking and approaches.

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<sup>5</sup> See [DoD Directive 5111.11](#), which outlines office and responsibilities.

In this, it seeks to develop imaginative, innovative and often high-risk research ideas offering a significant technological impact that will go beyond normal evolutionary developmental approaches; and, to pursue these ideas by demonstrating their technical feasibility by developing of prototype systems. DARPA's mission implies one imperative for the Agency: radical innovation for national security. DARPA's management philosophy reflects this in a straightforward way: bring in expert, entrepreneurial program managers; empower them; protect them from red tape; and make decisions quickly about what projects need to be started and which should cease.

This unique role is needed because imminent requirements generally force the operational components to focus on nearer-term needs at the expense of major change and innovation. DARPA seeks to look beyond today's known needs and requirements. Its approach is to imagine what a military commander would want in the future, and then to accelerate that future into being – thereby changing people's minds about what is technologically possible today.

Today, DARPA is an organization of 240 personnel (approximately 140 of which are technical) directly managing a budget of about \$2 billion.

DARPA is a member of the Institute for the Future.

## **The Department of Defense**

### ***Center for Naval Analyses (CNA)***

The Center for Naval Analyses Corporation (CNAC) is a think tank in the mold of RAND. The CNA Corporation operates the Center for Naval Analyses (CNA), a federally funded research and development center. Although government-funded, CNA is non-partisan and independent of government. Since 1942, CNA has provided "full-service" research and analysis to the U.S. Navy and U.S. Marine Corps, helping both to increase their effectiveness and efficiency.

One of CNA's recent projects was to help the U.S. Marine Corps assess the future of non-lethal weapons. Using scenario-planning methods, CNA helped the Marine Corps develop a vision for the future use of non-lethal weapons. In their words, CNA began with the broadest possible view, examining how key questions in economics, politics, technology, culture, environment, and security lead to alternative futures. For each alternative, they addressed global and regional security implications, identified the types of operations the Marine Corps would most often be involved in, and examined the applicability of different non-lethal capabilities.

### ***The Institute for Public Research***

The CNA Corporation also operates the Institute for Public Research (IPR) to assist its civil and international clients. Building on innovative skills and long-term experience with the military, CNAC expanded its business to help government agencies, non-profit organizations, and others in the fields of health care, education, air traffic transportation, domestic safety, and others. IPR's services include not only high-quality research and analysis but also technical

support in areas where CNAC has developed special expertise. IPR utilizes CNAC's scientific methodology to help clients translate their problems into opportunities that improve their businesses and communities.

## **Intelligence Community**

### ***National Intelligence Council (NIC)***

The National Intelligence Council (NIC) is the Intelligence Community's (IC) center for mid-term and long-term strategic thinking. Its primary functions are to: support the DCI in his role as head of the IC; provide a focal point for policymakers to task the IC to answer their questions; reach out to non-government experts in academia and the private sector to broaden the IC's perspective; contribute to the IC's effort to allocate its resources in response to policymakers' changing needs; and lead the IC's effort to produce National Intelligence Estimates (NIEs) and other NIC products.

NIEs are the DCI's most authoritative written judgments concerning national security issues. They contain the coordinated judgments of the Intelligence Community regarding the likely course of future events. The NIC's goal is to provide policymakers with the best, unvarnished, and unbiased information - regardless of whether analytic judgments conform to U.S. policy.

The NIC also conducts Strategic Estimates through its Strategic Analysis Program. This is a systematic research and development program on broad, cross-cutting issues for the new millennium. The first two years of the program culminated in the production of the much-referenced *Global Trends 2015* report, which identifies seven key drivers that will shape the world in 2015.<sup>6</sup> The Strategic Analysis Program will continue to examine broad features of the changing security environment, including: The Changing Nature and Sources of Military Power; The Expanding Revolution in Science and Technology; Global Economic Challenges and Globalization; and The Geopolitics of Energy.

## **Intelligence Community**

### ***The President's Foreign Intelligence Advisory Board (PFIAB)***

The President's Foreign Intelligence Advisory Board (PFIAB) was established in 1956 by President Eisenhower and was originally called the President's Board of Consultants on Foreign Intelligence Activities. For over four decades the PFIAB has acted as an independent, nonpartisan body offering the President advice on the effectiveness with which the intelligence community is meeting the nation's intelligence needs and the vigor and insight with which the community plans for the future. Specifically, the Board provides advice to the President concerning the quality and adequacy of intelligence collection, of analysis and estimates, of counterintelligence, and of other intelligence activities.

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<sup>6</sup> This report: *Global Trends 2015: A Dialogue About the Future with Nongovernment Experts*, is available on the NIC website: <http://www.cia.gov/nic>

Through meetings with intelligence principals, substantive briefings, and visits to intelligence installations, the PFIAB seeks to identify deficiencies in the collection, analysis, and reporting of intelligence; to eliminate unnecessary duplication and functional overlap; and to ensure that major programs are responsive to clearly perceived needs and that the technology employed represents the product of the best minds and technical capabilities available in the nation.

Independent of the intelligence community and free from any day-to-day management or operational responsibilities, the PFIAB is able to render advice which reflects an objective view of the kinds of intelligence that will best serve the country and the organizational structure most likely to achieve this goal. The effect of the Board's recommendations over the years has been to influence the composition and structure of the intelligence community, the development of major intelligence systems, and the degree of collection and analytic emphasis that is given to substantive areas.

In carrying out their mandate, the members of the PFIAB enjoy the confidence of the President and have access to all the information related to foreign intelligence that they need to fulfill their vital advisory role. The PFIAB currently has 16 members selected from among distinguished citizens outside the government who are qualified on the basis of achievement, experience, independence, and integrity.

## **Intelligence Community**

### ***Central Intelligence Agency (CIA)***

#### *CIA's Strategic Assessments Group (SAG)*

The Strategic Assessments Group (SAG) is housed within the Directorate of Intelligence, Office of Transnational Issues (OTI) at the CIA. SAG produces analytic assessments on critical intelligence-related issues that transcend regional and national boundaries. SAG specializes in conducting longer-range analysis of issues and trends spanning a broad array of disciplines, including economics, defense, science and technology, and governance and state stability. In addition to looking at issues within the confines of these disciplines, SAG also attempts to look at how developments within these disciplines cross-cut and affect each other to produce unique security challenges.

In pursuing its efforts to frame issues for government leaders and policymakers charged with formulating long-term national security policies, SAG's methodology ranges from the pooling of experts to the construction of scenarios. To gather the perspective of experts within and outside of the government, SAG often holds conferences focused on a specific issue or set of issues. For these conferences and other such events, SAG calls upon representatives from academia, think tanks, and the private sector, as well as former policymakers, military officers, and senior intelligence officials. Customers in the Executive Branch, DoD, and Congress rely on SAG for both quick-turnaround assessments and in-depth studies.

## **OTHERS....**

### **The National Security Council (NSC)** ***Office of Strategic Planning***

The Office of Strategic Planning at the National Security Council (NSC) was created in August 2003 and tasked with cooperating with government-wide policy planning operations to help develop and coordinate the mid- and long-term direction of American foreign policy.<sup>7</sup>

Robert D. Blackwill currently serves as the Deputy Assistant to the President and Coordinator for Strategic Planning to the National Security Adviser. Blackwill was appointed by President Bush in August 2003.

### **The General Accounting Office (GAO)**

As described in the above section on OTA, the Office's elimination in 1995 left Congress with a vacuum for detailed analysis of complex issues and long-term forecasting of public policy issues. For the last three successive years, however, Congress has included language in the Legislative Branch Appropriations bill for a pilot program directing the General Accounting Office (GAO) to conduct technology assessment studies. This program initiative, while much smaller than OTA, includes the goal of producing two to three reports per year. In conjunction with the National Academy of Science, GAO issued the first such report in November 2002: "Technology Assessment: Using Biometrics for Border Security."<sup>8</sup> Currently, GAO is conducting a technology assessment entitled, "Cybersecurity Technologies for Critical Infrastructure Protection."

### **Centers for Disease Control (CDC)** ***The Futures Initiative***

The Centers for Disease Control and Prevention (CDC) recently embarked on a dynamic, new initiative: *Creating the Future of CDC for the 21st Century*. With the Futures Initiative, CDC plans to examine its priorities, systems, and practices now to ensure that the Center remains an effective, proactive public health agency for protecting and improving the health of the American people.

The mission of CDC's Futures Initiative is to create a revitalized and focused agency that can meet the public health challenges of current and future generations. This initiative embodies a developing process to determine the future of the agency. To do this, CDC's strategic direction

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<sup>7</sup> White House Weekly, August 19, 2003.

<sup>8</sup> This report is available on the GAO website at: <http://www.gao.gov/new.items/d03174.pdf>

will be determined and then agency-wide goals and strategies to achieve these goals will be outlined.

In seeking to develop and shape the direction of the CDC's future, the Center has outlined a number of strategic themes to set priorities. These include: Championing both public and private sector efforts to improve the health system; Expanding CDC's public health research capacity; Shifting communication and information to become CDC's core business; Assessing CDC's resources and allocations to determine future needs; Defining CDC's relationships with other government partners, especially with HHS; Increasing effectiveness in measuring results and impact CDC programs; Balancing integration and coordination across the various units of CDC, particularly on *cross-cutting* issues; Enhancing the diversity of CDC programs and grants; and Expanding CDC's impact in global health issues.

### **U.S. Department of Agriculture (USDA)**

The U.S. Department of Agriculture (USDA) conducts various long-term commodity projections (through the ten-year mark), as well as projections of foreign country supply, and demand and trade for major field crops to better understand global conditions facing U.S. producers. These projects are estimates only and not incorporated with potential major long-term developments that would be integrated into policy planning. One specific USDA program - the USDA Procurement Forecast - is a web-based interactive system that provides points of contact, product descriptions and other information for specific procurement opportunities.

## **II. U.S. & INTERNATIONAL NON-GOVERNMENTAL FORECASTING ENTITIES**

### **RESEARCH & THINK-TANKS:**

#### ***The Institute for Alternative Futures (IAF)***

The Institute for Alternative Futures (IAF) is a nonprofit research and educational organization founded in 1977 by Clement Bezold, James Dator and Alvin Toffler. IAF specializes in aiding organizations and individuals to more wisely choose and create their preferred futures. Through its many projects and programs, IAF has developed unique forms of facilitation that encourage an openness to exploring the future and assist in rapid learning. Operating from an abundant base of futures research, IAF meetings have stimulated policy discussions and facilitated strategic planning efforts for a number of organizations. The goal of these meetings is to continue to provide greater insight into current practices, as well as supply foresight about the impact that trends and emerging issues might have.



IAF recently assisted the Department of Defense's Office of Health Affairs in developing scenarios out to the year 2020 for a variety of future circumstances ranging from a world full of crisis and conflict to a world filled with less conflict and more effective global cooperation. The study, Operations Other Than War (OOTW) in the 21st Century, focuses on the task of reinventing one of our nation's largest health systems, the Military Health System (MHS). Because U.S. armed forces will play a critical role in meeting diverse future security challenges in situations that involve threats of conflict or other substantial risks of personal harm, they will find themselves engaged in a wide variety of Operations Other Than War. In this, OOTW is a predominant mission in all plausible scenarios of how the future might unfold between now and 2020.

### ***The Institute for the Future***

The Institute for the Future is an independent non-profit research firm founded in 1968 by a group of former RAND Corporation researchers with a grant from the Ford Foundation. Based in Menlo Park, CA, the Institute for the Future seeks to take RAND's methodologies and content and apply them to the public world: the world of business, government, and the nonprofit sector.

In providing strategic insights into these areas, most especially business, the Institute focuses on emerging trends and discontinuities that will transform the global marketplace. Research focuses on key areas including: Consumers; Technology; Health and health care; Workplace; and Global business trends.

The Institute's research generates the foresight needed to create informed perceptions about the future business environment for business leaders considering a variety of possible action options. The Institute combines guidance with facilitation processes and offers the following services: Research programs (Business Horizons, Technology Horizons, Health Horizons, and New Consumer, New Genetics) and Custom Private Work (Custom Forecast Memo; Custom Emerging Technology Roadmap; Strategic Opportunity Process; Strategic Decision Readiness Process; Immersive Learning Experiences).

The Institute's research team includes individuals who are able to combine their background and expertise with an eye for the future consequences that flow from their research results. To broaden and deepen this knowledge, the Institute works with a large network of affiliates. Staff members use a range of methodologies to uncover new trends and develop forecasts including: Surveys and quantitative analysis; Ethnographic techniques; Expert workshops and interviews; Scenario development; Modeling; Decision analysis; and Mapping.

The Institute's primary clients are CEOs and leaders of strategy, new business development groups, and product design groups. Clients also include emerging technology groups and marketing and consumer insights groups.

Howard Rheingold, author of *Smart Mobs* is an affiliate of the Institute for the Future. The Institute's diverse set of members include the American Medical Association, DARPA, France Telecom, and the General Electric Corporation.

**The Woodrow Wilson Center**  
***Project on Foresight & Governance***

Funded by the Goals for Americans Foundation, the Woodrow Wilson Center for International Scholars established the Foresight and Governance Project to facilitate better foresight and long-term thinking in the public sector. Through both internal and collaborative research, as well as meetings and workshops, the Project is able to identify critical future issues and to explore the extent to which long-range thinking and goal-setting have affected federal policy decisions. For this process, the Project brings together experts, policymakers, advocates, and activists in both the public and private sectors. The objective of the Project is to use its findings to design and implement new initiatives that incorporate foresight techniques and planning guidelines into the policy development process. Key findings are made easily accessible to policymakers and other interested parties.

The Project focuses on four main research areas:

*Governance:* Through a series of meetings and workshops, the Project is exploring the extent to which long-range thinking and goal setting has impacted public policy decisions. This information will be used to design and implement new initiatives that incorporate foresight techniques in the policy development process.

*Strategic Studies:* Through both internal and collaborative research, the Project is working to identify critical future issues and make key findings easily accessible to policy makers and other interested parties.

*Dialogues on the Future:* The Project is conducting a series of talks, radio dialogues, and T.V. interviews with leading thinkers on future topics of national and international concern.

*Outreach/Networks:* The Project is working to support public sector foresight efforts through the building of networks of scholars and practitioners, the provision of information resources (including a Web portal on public sector foresight), and the development of award and recognition programs for outstanding public sector foresight

## **RAND Corporation**

### ***Frederick S. Pardee Center for Longer Range Global Policy & the Future Human Condition***

The RAND Frederick S. Pardee Center for Longer Range Global Policy and the Future Human Condition was established in 2001 thanks to a \$5 million pledge from RAND alumnus Frederick S. Pardee. The RAND Pardee Center pursues ambitious objectives: to improve our ability to think about the longer-range future--from 35 to as far as 200 years ahead--and to develop new methods of analyzing potential long-range, global effects of today's policy options in order to design sound policies that are sensitive to those effects. The pledge of the Pardee Center is consistent with Frederick Pardee's longtime belief that progress in this endeavor will come only with serious, sustained effort. There have been a both past and ongoing number of attempts to think globally about the human condition or the long-range future. In Pardee's view, however, what has been missing is a means of tying those efforts systematically and analytically to today's policy decisions. This is the gap that the RAND Pardee Center seeks to address.

The Pardee Center focuses on a number of different issues, including: global warming; genetic engineering; the Internet; nuclear waste disposal; potable water; population growth; and the sustainable use of natural resources. Although there exist several approaches (i.e. classical means such as historical analogies, as well as more recent means such as statistical inference) for thinking about these issues in the context of the longer-range future, RAND has created its own means entitled exploratory modeling. This continuously evolving technique uses ever-increasing computer power to impose computational discipline on speculation about the future.

Recent Pardee Center Studies include: Reasoning Our Way Toward Desirable Futures; Enhancing Visions of the Future Human Condition; Measuring Long-Term Human Progress; Technology and Governance in the 21st Century; Development of a Framework About Societal Evolution; and the RAND-Woodrow Wilson Center Seminar Series: Decision Making in Complex Systems.

## **Center for International & Strategic Studies (CSIS)**

### ***Seven Revolutions Project***

Seven Revolutions is a multimedia project created and operated by CSIS designed to challenge audiences to think about the world out to the year 2025. It seeks to answer the question, "What will the world look like in 2025?" The goal of the project is to promote strategic, forward-looking thinking by current and future leaders about how the world will change over the next 25 years and what that change will mean. It identifies and analyzes the issues that leaders will face by focusing on seven distinct drivers of revolutionary change: population, resource management, technological innovation and diffusion, the generation and distribution of knowledge and information, economic integration, global instability and conflict, and the challenge of governance. These seven drivers are presented in a dynamic multimedia production that seeks to stretch the minds of the audience and present them with the proposition that they have the capacity and the responsibility to shape the future.

Developments within these Seven Revolutions, analysis of links among those revolutions, and the Center's contingency thinking have been woven together into the presentation. It has been shown to leaders from government, the private sector, academia, and the NGO community across the world. As the Schreyer Chair on Global Analysis, as well as Senior Vice President and Director of Studies, Erik R. Peterson directs the ongoing Seven Revolutions Project.

### ***The Foresight Institute***

The Foresight Institute is a nonprofit educational organization formed in the 1980's to help prepare society for anticipated advanced technologies. The Institute's primary focus is on molecular nanotechnology: the coming ability to build materials and products with atomic precision. The development of this technology has broad implications for the future of human civilization and in this, the Foresight Institute's goal is to guide emerging technologies to improve the human condition. The Institute focuses its efforts upon nanotechnology and upon systems that will enhance knowledge exchange and critical discussion, thus improving public and private policy decisions.

Foresight Institute recognizes that nanotechnology - like all pivotal technologies - brings both potential perils and benefits. To help achieve the advantages and avoid the dangers, Foresight's policy is to prepare for nanotechnology by: promoting understanding of nanotechnology and its effects; informing the public and decision makers; developing an organizational base for addressing nanotechnology-related issues and- communicating openly about them; and actively pursuing beneficial outcomes of nanotechnology, including improved economic, social and environmental conditions.<sup>9</sup>

Since 1989, Foresight Institute has sponsored conferences on molecular nanotechnology and also publishes a quarterly newsletter, the *Foresight Update*, to inform a wide audience about both technical and non-technical developments in nanotechnology. Ray Kurzweil, author of *The Age of Spiritual Machines* is a member of the Foresight Institute Board of Advisors.

### ***The American Enterprise Institute (AEI)***

Founded in 1943, the American Enterprise Institute (AEI) for Public Policy Research is an independent, nonprofit, think tank organization dedicated to preserving and strengthening limited government, private enterprise, vital cultural and political institutions, and a strong foreign policy and national defense. AEI pursues these objectives through scholarly research, open debate, and publications. AEI sponsors research on a full range of U.S. domestic and foreign policies, with special emphasis on economic and trade policy, government regulation, international security, and social welfare issues.

AEI conducts some research into the future of demographics and biotechnology, but it does not focus on the long-term effects of these trends, or their interactions with trends in other fields.

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<sup>9</sup> Foresight Institute Website: <http://www.foresight.org>

## ***The Population Council***

Established in 1952 by John D. Rockefeller 3<sup>rd</sup>, the Population Council is an international, nonprofit organization that conducts research on three fronts: biomedical, social science, and public health. The work of the Council revolves around the search for a better understanding of problems relating to population.

The Council has three research divisions: the Center for Biomedical Research; an International Programs Division; and the Policy Research Division. The Council employs nearly 600 staff members from 38 countries and more than half are located in developing countries. The Council has four regional and 14 country offices, and does work in 70 countries.

The Policy Research Division's broad aims are to marshal social science expertise toward a better understanding of population issues and to promote positive applications of that knowledge. The division undertakes analyses of population policy, demographic behavior, and interrelationships between population and socioeconomic change, often in collaboration with colleagues in developing countries. Population policy is defined broadly as the full range of government actions with a potential population impact.

Although the Population Council looks at population trends and some of the divergent effects associated with these trends, as with the case with many other research institutes employing forecasting methods, it does not do so in a comprehensive fashion that incorporates those effects with the effects of accelerated progress in other related fields.

## **ACADEMIC:**

### **Boston University**

#### ***Pardee Center for the Study of the Longer-Range Future***

The Pardee Center for the Study of the Longer-Range Future was established in February 2000, funded by a gift of \$5 million from Frederick S. Pardee. Pardee, also a funder of RAND's Pardee Center, is a Boston University alumnus and successful real estate entrepreneur who began his career as an expert in policy research and economic/technology forecasting. The Pardee Center has been established to advance scholarly dialogue and investigation into the longer-term future, identified as 35 to 200 years hence. With such a time frame, the Pardee Center looks well beyond the periods traditionally studied by universities and private research organizations.

The overarching mission of the Center is to serve as a leading academic nucleus for the study of the future and to produce serious intellectual work that is interdisciplinary, international, non-ideological, and of practical applicability.

In July 2002, the Pardee Center received an additional \$250,000 gift from Frederick Pardee to seed two important new research projects: “Human Development Goals (HDG) and Transitions” and “Human Development and the Role of Government.”

The *Human Development Goals (HDG) and Transitions Project* will tackle a subset of the UN's goals, such as determining what will be required to halve the proportion of people globally who suffer from hunger, or what will be needed to double the proportion who have sustainable access to safe drinking water. Researchers will then focus on establishing a reasonable time frame for achieving each goal, what each will cost, financing options, and the specific institutions and policies needed to realize them.

The *Human Development and the Role of Government Project* proposes to track the role of governments in the longer-range future of human progress and well-being. It begins with the presumption that well-functioning political systems must be in place to promote and administer human development initiatives. An index of indicators of governmental performance will be developed to allow researchers to explain, track and predict patterns of governmental performance in human development.

Aside from these projects, activities of the Pardee Center include study groups, interviews, simulations, conferences, strategic gaming, and other means for exploring possible scenarios for the future. BU’s Pardee Center also strives to identify and establish relationships with universities and other institutions from around the world that are studying the future, and catalogue relevant archives and publications.

## **BUSINESS & CONSULTING:**

### ***Toffler Associates***

Toffler Associates is an executive advisory firm formed by celebrated futurists Alvin and Heidi Toffler. Toffler Associates seeks to help companies and governments create their future in the fast emerging "Third Wave" economy. The firm assists large, complex organizations as well as small start-ups. It targets clients who understand that successful growth in the future requires careful, strategic steps in the present.

Drawing on the Tofflers' study of change, the firm is experienced in grappling with the adjustments that organizations must make in dynamic environments, as well as the techniques and methods used in support of decision-making, transitions, and transformations.

Amongst its diverse client base, Toffler can count the U.S. government and a number of foreign governments. Toffler is called upon frequently to advise U.S. leaders on future strategy, technology and organizational policies. For the U.S. Food and Drug Administration, Toffler developed a comprehensive analysis of future scientific and technology requirements and skills. For the Comptroller General of the United States, Toffler defined how government policies and practices shape, and are shaped by, the transition to a knowledge-based economy.

For the Advanced Science and Technology Directorate of the National Reconnaissance Office, Toffler evaluated the future research and development portfolio. For the Australian federal government, Toffler created an unprecedented network of government, industry, infrastructure, citizen, and international partners that will provide technology, services, and other support to the Australian Defence Force.

Leading companies are also amongst Tofflers' client base. While protecting the identify of their clients, Toffler provides on its website a list of its successful work with major corporate clients. Amongst these accomplishments is Tofflers' provision of successful advice to a \$6 billion petrochemical company, which helped position them as a leader in their industry. For this company, Toffler assessed the role that new technologies like nano-technology and smart-technology could play in the industry. In this vein, Toffler also explored future technologies that have the potential to revolutionize the automotive industry for a leading advanced automotive concepts group. Toffler is also credited with assisting large global telecommunications and aerospace companies in developing future-oriented business planning.

In the area of economics, Toffler provides guidance on how to "transition into the Third Wave knowledge-based economy." Its accomplishments include: outlining for the President of one of the Four Dragons of East Asia, public programs that would make the country one of the most innovative economies in the world; counseling the Prime Minister of one of the top three economies in the world on creating a future vision of gain amidst current difficult reforms; and advising a Latin American President on competitive telecommunications policy and legislation.

In the area of technology, Toffler conducted a portfolio of one country's R&D investments in revolutionary space technologies and subsequently helped them determine the value of their portfolio to the nation. Toffler also came to the aid of another government client attempting to set industry standards for information technology. Toffler helped this client, a world leader in information technology with over \$60 billion in revenues, delineate the future market demand for advanced information mining.

Toffler also works with industry associations to develop results unattainable as individual organizations. One recent example is a policy forum led by Toffler Associates that allowed biotechnology executives to set an agenda for specific future issues in the industry. Toffler also recently held a number of commercial-defense forums for a consortium of defense agencies, including "The Future of Space," "The Changing Equities in Space," "Creating the Future of Spectrum Allocation," and "The Future of Science and Technology Investment."

### ***The Eurasia Group***

The Eurasia Group is a research and consulting firm that focuses on political-risk analysis and industry research for emerging markets around the world. The Eurasia Group has expertise on Africa, East and Southeast Europe, Former Soviet Union, Latin America, Middle East, and Southeast and East Asia. Eurasia Group offers clients analytical research publications and tailored consulting on political trends and their impact on business, financial markets and the foreign investment climate. Eurasia Group also provides programming services that enable

multinational companies to engage in direct dialogue with leaders from various emerging-market countries.

In October 2001, Eurasia Group and Lehman Brothers launched the Lehman Eurasia Group Stability Index (LEGSI), a comprehensive global risk assessment tool geared to emerging markets investors. The LEGSI is the first qualitative comparative political and economic stability index designed specifically to measure stability in emerging markets. Developed over a two-year period by experts in transitional politics and economics, the methodology enables in-country researchers to track new developments on a daily basis. Thus, the LEGSI provides an "early warning" system which helps anticipate critical trends and provides a measure for country capacity to withstand political, economic, security, and social shocks. The LEGSI currently covers 22 countries.



## APPENDIX A:

### Internet Links to Forecasting Entities Surveyed in this Report:

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#### U.S. GOVERNMENT FORECASTING ENTITIES:

##### U.S. Congress

*Office of Technology Assessment (OTA)*

<http://www.wws.princeton.edu/~ota/>

<http://www.access.gpo.gov/ota/>

##### Department of State:

*Policy Planning Staff*

<http://www.state.gov/s/p/>

##### Department of Defense:

*Office of Net Assessment*

<http://www.defenselink.mil/odam/omp/pubs/GuideBook/DNA.htm>

*Defense Advanced Research Projects Agency (DARPA)*

<http://www.darpa.mil>

*Center for Naval Analyses (CNA)*

<http://www.cna.org>

##### Intelligence Community:

*National Intelligence Council (NIC)*

<http://www.cia.gov/nic>

*The President's Foreign Intelligence Advisory Board (PFIAB)*

<http://www.whitehouse.gov/pfiab/>

*Central Intelligence Agency (CIA)*

Strategic Assessments Group

<http://www.cia.gov>

##### Others:

*National Security Council (NSC) - Office of Strategic Planning*

***Government Accounting Office***

<http://www.gao.gov>

***Centers for Disease Control (CDC)***

***The Futures Initiative***

<http://www.cdc.gov/futures/>

***U.S. Department of Agriculture (USDA)***

<http://www.usda.gov/agency/oce/waob/waob.htm>

<http://www.fas.usda.gov/>

## **U.S. & INTERNATIONAL NON-GOVERNMENTAL FORECASTING ENTITIES:**

### **Research and Think Tanks:**

***The Institute for Alternative Futures (IAF)***

<http://www.altfutures.com>

***Institute for the Future***

<http://www.iftf.org>

***Woodrow Wilson Center***

***Project on Foresight & Governance***

<http://wwics.si.edu/>

***RAND Corporation***

***Frederick S. Pardee Center for Longer Range Global Policy and the Future Human Condition***

<http://www.rand.org/pardee>

***Center for Strategic and International Studies (CSIS)***

***Seven Revolutions Project***

<http://www.csis.org/sevrevs/>

<http://www.7revs.org>

***The Foresight Institute***

<http://www.foresight.org>

***The American Enterprise Institute***

<http://www.aei.org>

*The Population Council*  
<http://www.popcouncil.org>

**Academic:**

*Boston University*  
*Pardee Center for the Study of the Longer-Range Future*  
<http://www.bu.edu/pardee/about/index.html>  
[http://www.thefuturescollection.org/boston\\_university\\_center\\_for\\_stu.htm](http://www.thefuturescollection.org/boston_university_center_for_stu.htm)

**Business & Consulting:**

*Toffler Associates*  
<http://www.toffler.com>

*Eurasia Group*  
<http://www.eurasiagroup.net>

## APPENDIX B:

### Forecasting Entities for Possible Future Research:

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#### U.S. Government:

Air Force Research Laboratory - <http://www.rl.af.mil/>  
Air War College/CSAT - <http://www.au.af.mil/au/awc/awchome.htm>  
Army High Performance Computing Research Center - <http://www.ahperc.org/>  
Naval Surface Warfare Command – <http://www.nswcdc.navy.mil>  
Naval Undersea Warfare Ctr. Div Newport – <http://www.nuwc.navy.mil>  
U.S. Naval Research Laboratory - <http://www.nrl.navy.mil/>  
USSOCOM - <http://www.socom.mil>

#### Other Governments:

Australian Department of Finance & Administration -  
Canadian Department of National Defense – <http://www.dnd.ca>  
Center for Social & Economic Strategies, Czech Rep. - <http://ceses.cuni.cz/english/overview.php>  
Dev. Economique, Canada, Montreal, Quebec, Canada -  
Defense Science Technology Agency, Singapore - <http://www.dsta.gov.sg>  
Finnish National Road Administration, Helsinki, Finland -  
Housing and Development Board, Singapore -  
Infrastructure Canada, Ottawa, Ontario, Canada -  
Ministry of Education, Toronto, Ontario, Canada -  
NZ Foresight Project -  
OECD Information Base: <http://www.oecd.org/sge/au/9ifphigh.htm>  
Peel Regional Police, Brampton, Ontario, Canada -  
Queensland Department of Main Roads, Brisbane, Queensland, Australia -  
Strategic Futures Team/SU, London, United Kingdom, Suzy Walton -  
Toronto Reference Library, Toronto, Ontario, Canada -  
UK Foresight Program - <http://www.foresight.gov.uk>  
New UK Government Dept (Strategy Unit) - <http://www.cabinet-office.gov.uk/innovation/2001/futures/main.shtml>  
Visit Scotland, Edinburgh, Scotland -

#### Research/Think-Tanks Involved in Futures Studies:

Arlington Institute - <http://www.arlingtoninstitute.org>  
American Enterprise Council -  
Copenhagen Institute for Futures Studies - <http://www.cifs.dk>  
Foundation for the Future - <http://www.futurefoundation.org>  
Foresight & Innovation, Europe - <http://www.jrc.es/iptsreport/vol07/english/Inn5E076.htm>

Futures Research Center - [http://www.centroidcafe.com/Center\\_Home-N.htm](http://www.centroidcafe.com/Center_Home-N.htm)  
Innovation in Industry - <http://www.iiiglobal.com/defaultx.asp>  
Millennium Project (UN University) - <http://www.unmillenniumproject.org/html/about.shtm> &  
<http://www.acunu.org/>  
Rocky Mountain Institute - <http://www.rmi.org>  
Rosetta Project - <http://www.rosettaproject.org>  
Technology Futures - <http://www.tfi.com>  
Worldwatch Institute - <http://www.worldwatch.org>  
2100 Organisation - <http://2100.org/>

### **Futures Organizations:**

The Futures Foundation - <http://www.futurists.net.au/home.html>  
The Futures Foundation (Australia) - <http://www.futurefoundation.org>  
World Futures Studies Federation - <http://www.wfsf.org>  
Greater Boston Chapter of the WFS - <http://lucifer.com/~sasha/refs/wfsgbc.html>  
Association of Professional Futurists - <http://www.profuturists.com>  
Foundation for the Future - <http://www.futurefoundation.org>  
Foresight and Innovation, Europe -

### **Academic:**

Alberta Learning Library -  
Canberra Institute of Technology - <http://www.cit.act.edu.au/handbook/bit/businessdevelopment/630.php>  
Cornell Environmental Scanning -  
<http://www.cce.cornell.edu/admin/program/documents/scanintr.htm>  
Creating Preferred Futures - <http://www.planet-tech.com/futuresforum>  
Curtin Masters Program - <http://postgraduate.curtin.edu.au/pdf/pm-futurestudies.pdf>  
Finland Futures Academy - [http://www.tukki.fi/tutu/tva/main\\_uk.htm](http://www.tukki.fi/tutu/tva/main_uk.htm)  
Global Options (Cal State, Antioch) - [http://www.csudh.edu/global\\_options/](http://www.csudh.edu/global_options/)  
Hawaii Centre for Futures Studies - <http://www.futures.hawaii.edu>  
Leeds Metro University - [http://prospectus.lmu.ac.uk/olp-php3/detail.php3?course\\_id=1144&attendance=](http://prospectus.lmu.ac.uk/olp-php3/detail.php3?course_id=1144&attendance=)  
University of Houston, Clear Lake, USA - <http://www.cl.uh.edu/futureweb/ifr.html>  
Swinburne University of Technology, The Australian Foresight Institute - <http://www.swin.edu.au/afi>  
Wharton Forecasting - <http://www-marketing.wharton.upenn.edu/forecast>

### **Business & Consulting:**

Global Business Network - <http://www.gbn.org>  
GBN Australia - <http://www.gbnaustralia.com/index.cfm>  
Coates & Jarratt - <http://www.socialtechnologies.com/>  
Hames Group - <http://www.hamesgroup.net>  
Natural Capitalism - <http://www.naturalcapitalism.com>  
Rocky Mountain Institute - <http://www.rmi.org>  
Technology Futures - <http://www.tfi.com>

Strategic Forecasting (Stratfor) – <http://www.stratfor.com>

### **Methods:**

AIRweb Environmental Scanning - <http://airweb2.org/links/scanning.cfm>

Cornell Environmental Scanning - <http://www.cce.cornell.edu> (click on 'Admin' & 'Programs')

Future Tool Kit - <http://www.futuretoolkit.com/>

Futurecasts - <http://www.futurecasts.com>

Millennium Project - <http://www.millennium-project.org>

Rosetta Project - <http://www.rosettaproject.org>

Strategic Forecasting - <http://www.stratfor.com/>

Wharton Forecasting - <http://www-marketing.wharton.upenn.edu.au/forecast/welcome.html>

### **Practitioners:**

Richard Slaughter - <http://www.foresightinternational.com.au>

Michael Godet (CNAM, Paris) - <http://www.cnam.fr/deg/lips/contents.html>

Ted Fuller - <http://tbs.tees.ac.uk/tedfuller>

Johan Galtung - <http://www.transcend.org>

Richard Hames - <http://www.hamesgroup.net>

Hazel Henderson - <http://www.hazelhenderson.com/>

Sohail Inayatullah - <http://www.metafuture.org>

Faith Popcorn - <http://www.brainreserve.com/index.html>

### **Journals:**

Foresight Journal - <http://www.emeraldinsight.com/fs.htm>

Futurecasts - <http://www.futurecasts.com>

Futures - <http://www.elsevier.nl/inca/publications/store/3/0/4/2/2/index.htm>

Future Survey - <http://www.wfs.org/fsurv.htm>

Futures Research Quarterly - <http://www.wfs.org/frq.htm>

International Journal of Future Studies - <http://www.systems.org/HTML/fsj-room.htm>

Journal of Time and Society - <http://www.sagepub.co.uk/>

New Renaissance - <http://www.ru.org>

On The Horizon - <http://matilde.emeraldinsight.com/vl=11927292/cl=51/nw=1/rpsv/oth.htm>

### **Other:**

Database of World Problems/Issues - <http://www.uia.org/data.htm>

Disinformation - <http://www.disinfo.com/>

Interesting Sites - <http://www.ics.si.edu/lookingforward/links/interesting.htm>

Open Directory on the Future - <http://www.dmoz.org/Society/Future/>

Plausible Futures Newsletter - <http://www.plausiblefutures.com/>

Planet Tech - <http://www.planet-tech.com/community/>

The Singularity -

Wired News - <http://www.wired.com/>

Yahoo Futures Studies - [http://au.dir.yahoo.com/social\\_science/Futures\\_Studies/](http://au.dir.yahoo.com/social_science/Futures_Studies/)  
Global Options - [http://www.csudh.edu/global\\_options/introfstopics.html](http://www.csudh.edu/global_options/introfstopics.html)  
Global Uprising - <http://www.globaluprising.net/>  
Law Enforcement Intelligence - <http://www.ialeia.org/index.html>  
OECD Futures Info Base - <http://www1.oecd.org/sge/au/5ifpbase.htm>  
Open Directory on the Future - <http://www.dmoz.org/society/future/>