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Responsive Government Report

Guidance for Anticipatory & Adaptive Leadership

A Product of the Fall 2013 Graduate Seminar on Forward Engagement

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Executive Summary

Americans live in an information age. Technological innovation, population growth and increasingly decentralized private institutions have changed our world. To serve the American public, the U.S. federal government has also grown, becoming one of the largest repositories of human knowledge that the world has ever known. Government agencies are staffed by Nobel Prize winning scientists and skilled intelligence professionals, epidemiologists and software engineers. They provide census reports, climate measurements and countless other detailed observations that inform public policy. Despite this, the Federal Government's policymaking institutions have largely failed to adapt to the changing times. In confronting complex policy challenges, the White House and the Congress have had difficulty recognizing the long-term consequences of policies designed to address problems of the moment. Current executive branch institutions (outside of the national security cluster) fail to inform senior leaders about faint signals of approaching policy trends.

We believe that the Executive Branch needs a navigation system- institutions dedicated to forecasting and policy analysis - that can guide Presidents as they prepare Americans for the most likely future scenarios, even as their main focus remains on day to day governance. As with any navigation system, the one we propose would play an advisory role; the President and other elected leaders could decide to ignore its observations and set policies they deem in the national interest. The advantage of creating an executive branch futures analysis structure would be to provide information and analysis from a long-term perspective that is largely absent from current policy debates.

To illustrate some of the trends that an executive branch futures analysis structure would help prepare for, we have described five of the most significant megatrends expected to impact the lives of everyday people during the next 15-20 years. *Trends such as shifting demographics, increased individual empowerment, mastery of matter, diffusion of power in the international system and food/energy/water developments can present both danger and opportunity.* If elected officials are informed on a regular basis of new developments in these areas, they can invest in development of new technologies that will permit America to become a leader in infant industries like renewable energy. They can also use futures analysis to ensure that the government's own institutions are focused on growing trends. Futures analysis would also help to illustrate the degree to which major trends are connected, which is critical to preparing for them in a manner that incorporates the full capabilities of all federal agencies.

To create an advocate for long-term thinking in Executive Branch policymaking, we recommend the establishment of a Futures Analysis & Review Structure for Policy Implementation (FARSITE) within the Executive Office of the President. FARSITE would be a standing committee of experts empowered to make recommendations on national policies and evaluate the progress of their implementation. Housed within the Office of Management and Budget, FARSITE would use existing resources and legal authorities, including a 14-member staff, only four of whom would be newly hired. This staff would contain a core group of four political appointees drawn from offices within the Executive Office of the President: National Security Staff, Domestic Policy Council, Office of Science and Technology Policy, and the National Economic Council. A new position, at the level equivalent to that of a Director in the National Security Staff, will be created in each of the four offices. The positions will be established at this level to give each official access to senior policymakers, give the new platform credibility and visibility, and help FARSITE stay apprised of current policy discussions. Ten Senior Executive Service (SES) detailees drawn from across the federal government-- two each from the functional groups that are typically defined by the Presidential Personnel Office (National Security, Energy & Environment, Economic, Domestic, and Boards & Commissions)--will complete the platform staff. These ten will be chosen by the Core members.

The FARSITE platform will produce a National Intelligence Council-style report on complex policy trends facing the United States once during every odd-numbered year. This report will outline the megatrends that they believe will present the greatest challenges in the future, contain recommendations on what policies could be implemented to best address the trends through Component Level Implementation Processes (CLIP), and will include updates and review of any CLIP-derived policies currently in place.[1] Save for sensitive or classified information, the report will be publicly published, and timed during political campaign season to maximize opportunities for public debate. This will allow citizens to decide whether elected officials acted correctly in accepting or rejecting FARSITE's perspective on any given issue. FARSITE will also confidentially offer its expertise on issues of concern to the President, opining on the future impact of current and proposed executive and legislative policies, and judicial rulings. Similarly, FARSITE will also have latitude to provide self-initiated policy reports to the public, or to "score" the long-term (i.e., 20 years or more) ramifications of legislative proposals, proposed executive branch rules, and U.S. Supreme Court decisions at the request of the President.

In short, FARSITE and its rotating staff of senior civil servants will help encourage a culture of anticipatory government in the Executive Branch. Its members will utilize

[1] The Component Level Implementation Process (CLIP) was first developed and introduced by the Spring 2006 Graduate Seminar on Forward Engagement; full text of the Spring 2006 report can be found at http://forwardengagement.org/index.php?option=com_content&view=article&id=5&Itemid=5

both the policy vision of senior White House staff and the institutional knowledge of experienced civil servants to present recommendations on the best path for our country's future. Acting together, they can promote a culture of forward engagement and put the full depth of the federal government's knowledge to use. With vision and careful planning our leaders can turn tomorrow's potential crises into today's opportunities.

Glossary of Terms

Future Contingency of Interest (FCI): An event or trend that could seriously shift the course of everyday life and disrupt global society by altering previously anticipated events.

STEEPS Analysis: A method of categorizing changes that could result from a momentous trend or event according to their **S**ocial, **T**echnological, **E**conomic, **E**nvironmental, **P**olitical, and **S**ecurity impacts.

Megatrend: Trends that are certainly in existence today but which, during the next 15-20 years, will gain enough momentum to reshape our world.

Complexity: A state of a system where all parts influence and are influenced by all other parts in non-linear and unpredictable ways; a change of behavior in any part of the system will cause change throughout the system, amplified by instances of unpredictability.

Forward Engagement: A hypothetical method of systematically evaluating critical contingencies in the medium to long term in order to obtain actionable knowledge of critical future contingencies before the culmination of a world- changing occurrence and bring this knowledge to bear on policy.

Anticipatory Government: A hypothetical system of institutions, rules and norms that provide a way to use foresight for the purpose of reducing risk, and to increase capacity to respond to complex priorities at early rather than later stages of their development.

CLIP: The **C**omponent-**L**evel **I**mplementation **P**rocess is a method to break complex problems into manageable pieces, turn those pieces into short-term objectives, and then translate the objectives into timelines for implementation of policy.

Feedback System: A system of communication whereby policymakers receive information that guides their future actions by measuring actual outcomes against desired outcomes of a given policy. Desirable outcomes can be comprised of benchmarks, which serve as indicators of success or failure along a predetermined timeline and which should be evaluated continuously to check for unexpected or unwanted changes that require a reassessment of the initial policy.

Connectivity: The extent and magnitude of interactions among and between megatrends and FCIs within a complex system.

Complex Priority: An important policy dynamic that arises from the interface of a number of FCIs interacting in a systemic, simultaneous manner. As complex, interacting systems, it is impossible to manage Complex Priorities by engaging their FCIs individually. Complex Priorities are characterized by non-linear changes and often give off faint signals that may alert policymakers to the onset of significant change.

Introduction

The world today is more complex and more interconnected than ever before. Beyond the problems that lie directly in front of policymakers are second and third order consequences that are difficult to anticipate. Furthermore, the pace of change is accelerating, making it hard to describe oncoming trends or events before they've taken new shapes. Such difficulties are often used as an excuse for inaction, leaving government leaders clinging to existing linear and increasingly outdated ways of thinking and planning. As our nations, peoples, and economies become increasingly involved with one another, our leaders must instead understand that their decisions today have lasting and far-reaching implications beyond the immediate future. Moreover, they should embrace the concept of forward engagement – a combination of forecasting methods with mechanisms for policymaking to encourage early awareness of potentially major trends or events – in order to shape those trends toward more desirable outcomes.

One tool currently in existence to provide leaders with improved foresight is the National Intelligence Council (NIC)'s "Global Trends 2030" report.[2] While this report is an excellent source of broad information regarding the longer-term future, we believe that certain enhancements in depth could make it even more useful to U.S. policymakers. These include the addition of a megatrend – "mastery of matter" – that represents a trend in existence today but which, over the course of the next 15 to 20 years, will gain sufficient momentum to reshape our world. The accelerating development and spread of technology has already had significant impacts on the everyday lives of millions of individuals. The rapid spread of telecommunications in the 21st century, for instance, accelerated globalization by allowing easier live communications worldwide.

Such trends are likely to accelerate and expand in scope over the next 20 years. Better knowledge of material science, for example, could enable the creation of more sophisticated drones and robots, which could then serve as highly efficient substitutes for manpower, particularly in countries with shrinking workforces. Likewise, the development of advanced and highly customizable production techniques, such as 3D printing, could radically alter the way corporations approach product design, production, and marketing, with potentially deep economic ramifications. For all of these reasons, "mastery of matter" was added to the list of megatrends accounted for in our report.

Additionally, we expanded the current NIC methodology to include a deeper discussion of faint signals and future contingencies of interest (FCIs) underlying the megatrends

[2] "Global Trends 2030: Alternative Worlds" is a publication of the National Intelligence Council and is cited frequently throughout this report; the full text of this report can be found at http://www.dni.gov/files/documents/GlobalTrends_2030.pdf

and potential futures already described. Faint signals in this case are daily news and events that serve as data points for foresight practitioners. Using such signals, such practitioners can extrapolate out to develop FCIs, events or trends that could seriously shift the course of everyday life and disrupt global society by altering previously anticipated events. Common characteristics shared by several FCIs can then be used to describe a megatrend, such as those discussed in the NIC report, and once described; such megatrends can interact in a variety of ways to form potential futures. This expanded descriptive hierarchy was adopted to form a bridge between the higher-level trends and futures laid out by the NIC report and the more granular issues confronted by average policymakers.

Finally, our proposed descriptive methodology also emphasizes the interactions between and among megatrends, by introducing the concept of connectivity. Connectivity is defined as the extent and magnitude of interactions among and between megatrends within a complex system, consisting of multiple parts interacting with each other in a non-linear way. A megatrend such as the food/water/energy nexus, for instance, is be strongly influenced by demographics; if the population increases, there will be increased needs for food, water, and energy. Technology will also have an impact, as new, more technologically-intensive, production techniques could help ease the pressure on existing resources. Understanding the links between various megatrends is critical for decision-makers attempting to understand and anticipate the potential outcomes of longer-term policy, as it allows them to identify synergies between megatrends: addressing one via policymaking will positively or negatively affect others. Policymakers need to understand those links to develop policies that are targeted to have the biggest impact possible with limited resources.

In addition to developing the ability to describe longer-term trends and potential futures, government actors must attain the capacity to translate this enhanced understanding into actionable policy. All levels of the U.S. government currently possess structures that aim to do this. The Planning, Performance, and Budgeting System (PPBS), for instance, is based on measurements of the magnitude of policy output relative to policy input. Alternately, the Government Performance and Results Act of 1993 (GPRA) and the Government Modernization Act of 2010 (together known as GPRA-MA) as well as numerous performance budgeting programs at the state and local levels were put in place to focus on foresight and long-term issues. However, we believe that current federal government planning structures are inadequate to fully address the complex issues facing America. They lack an explicit mandate for long-term planning and are unable to provide adequate evaluation and feedback to policymakers. For this reason, existing planning structures cannot draw enough public attention to their conclusions to pressure elected officials against decisions that fail to consider a long-term policy environment that may look little like the present.

Our proposal responds to these shortcomings by integrating foresight into both the legislative scoring process and into policy analyses relevant to both the executive and legislative branches. The Futures Analysis & Review Structure for Policy Implementation (FARSITE) we have developed would carry out independent and objective foresight-driven analyses of legislative and policy issues within the Executive Branch, providing evaluations and feedback regarding the long term impact of legislative efforts as well as providing objective information to the President. By its composition, FARSITE is aimed at leveraging the expertise of members of the Federal Government's national security, economic, research, and domestic policy spheres. By gathering such experts within FARSITE, we are aiming at accounting for connectivity among the megatrends previously listed, as national security practitioners might not readily perceive FCIs related to economic trends, while domestic policy experts may not readily become aware of foreign policy ramifications of some national security-related FCIs.

Incorporating senior level civil servants with diverse backgrounds and expertise would create synergies that would not only allow the detection of a larger number of FCIs, but also the potential links between them. This would enable the development of holistic and apolitical approaches, and encourage better, more comprehensive recommendations for long term policy planning. Both the executive and legislative branches would benefit from FARSITE analysis of their proposals. FARSITE's analysis would offer elected officials a unique source of independent, forward looking advice as they decide how to best approach the challenges of the future.

By enhancing both the descriptive methodology and the planning structures available to U.S. policymakers we hope to imbue our nation's leaders with the ability to recognize oncoming patterns of change and provide the tools necessary to prepare for them.

Describing the Longer Term Future

Current Methodology

The National Intelligence Council's Global Trends report series is currently one of the premier sources of information about the longer-term future. Drawing from a variety of sources, including both domestic and international universities, businesses, and governments, these reports seek to stimulate strategic thinking by identifying critical trends and potential discontinuities poised to take effect in the next 15 to 20 years. The most recent of these reports, "Global Trends 2030: Alternative Worlds", this is attempted via discussion of four "megatrends", six "game-changers", and four "potential worlds".

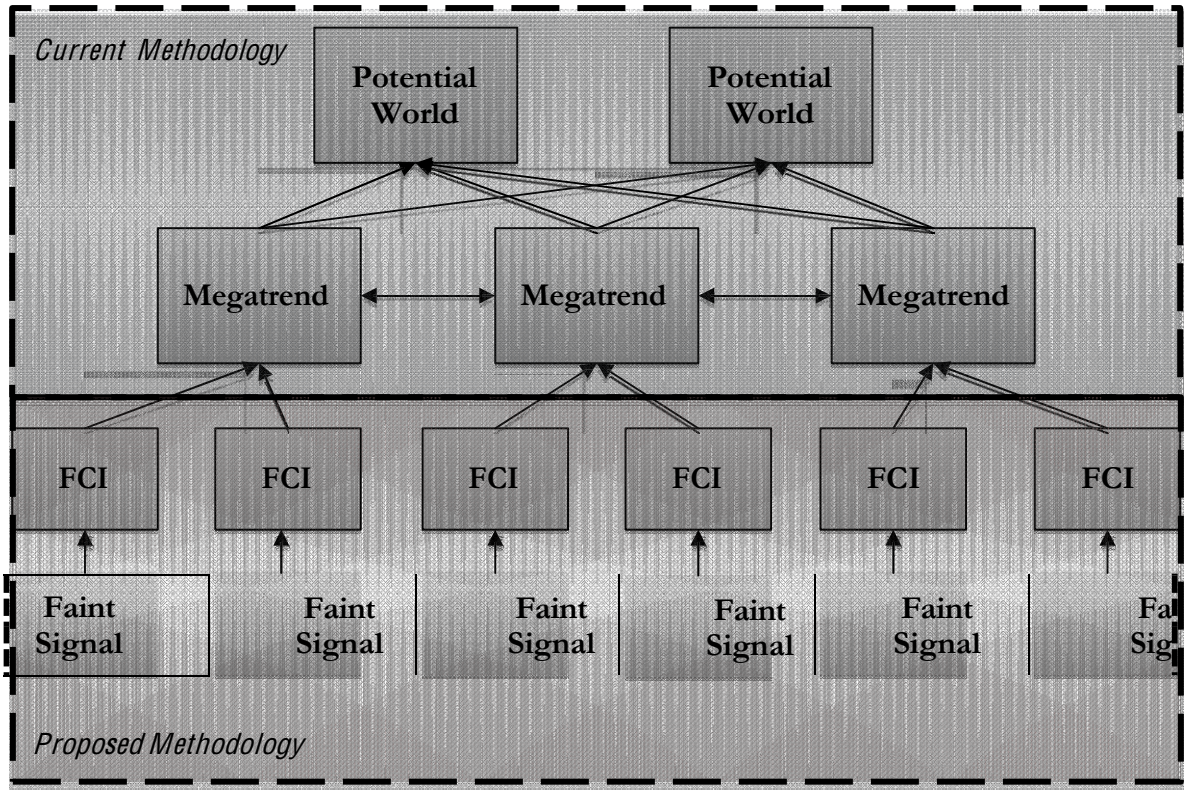
Megatrends are defined as trends which exist today that, over the course of the next 15 to 20 years, will gain much greater momentum. While the report explains that such megatrends would alone be sufficient to radically alter the world by 2030, it also points out the potential for **game-changers** – questions regarding global governance, economics, conflict, regional instability, technology, and the role of the U.S. – to influence the ways in which these trends impact the make-up of our future world. Indeed, depending on how such questions are answered there could be an endless variety of **potential worlds**, or possible futures resulting from the interactions between megatrends and game-changers; the report selects the four that it believes to be most likely for detailed discussion.

While the "Global Trends 2030" report is a very useful platform for high-level discussions of longer-term trends and potential outcomes, we believe that it is ultimately too reductive to serve as the basis for actionable policy. The everyday reality for most politicians and civil servants is far more granular than the megatrends and potential worlds presented in the NIC report, and without a bridge between this more immediate input and the larger-scale trends and futures of the NIC report its findings about the longer-term future, however interesting, will remain difficult for policy and decision-makers to act on.

Proposal for Improved Methodology

Recognizing the limitations of the existing NIC approach to describing the longer-term future, we have attempted to expand on the foundations provided by the "Global Trends 2030" report. Beginning at the level of daily news and events, which serve as data points or **faint signals** of larger trends and events to come, we determine **future contingencies of interest (FCIs)**, which are essentially extrapolations of the faint signals. Such FCIs, however, are themselves sub-components of the megatrends described in the NIC report. That is, by tracing out common characteristics among FCIs we can describe the aforementioned megatrends, thereby creating the necessary link between more granular faint signals and FCIs and the broader-scope trajectories outlined in "Global Trends 2030". Furthermore, a thorough discussion of how these megatrends can connect in various ways to create myriad potential worlds rounds out the descriptive process illustrated in the figure below.

Figure 1: Current & Proposed Methodologies



Ultimately our hope is that this enhanced approach to describing the longer-term future will attune government actors to the interactions both within and among current trends and events, as well as prepare it to influence and adapt to a wide variety of potential futures.

Faint Signals & FCIs

Each day billions of people around the globe have access to live information about the world around them. Whether delivered as a Twitter feed, a newspaper clipping, or a morning briefing, such "news" is in actuality a compilation of numerous data points gathered by a variety of mediums from an even more numerous range of sources. While some of these data points are mundane (e.g., "Lady Gaga and Elton John Bury Hatchet for Thanksgiving Performance"[3]) or purely ridiculous (e.g., "Nation has to sell lake house"[4]), others can serve as faint signals of what is to come.

To the trained eye, for example, the headline "Tongue pierce lets the paralyzed drive wheel chairs" is more than just another human-interest piece.[5] Instead, it is the starting point for both several potential FCIs and their second and third order consequences. A brief scan of the article reveals that a magnetic stud, when inserted into the tongues of spinal cord-injured patients, acts as a wireless joystick that can allow them to navigate complex obstacle courses in their wheel chairs as well as operate computers. Such a synthesis of technology and biology could, in turn, point to an FCI such as continued rapid advances in medical technology, culminating in the widespread use of medical nanotechnology. This FCI, which is simply an extrapolation of a current event into a future trend and consequent event, has a variety of potential second and third order consequences. These potential outcomes can perhaps best be viewed through a **STEEPS** matrix (shown below in Figure 2) that clearly delineates the potential **S**ocial, **T**echnological, **E**conomic, **E**nvironmental, **P**olitical, and **S**ecurity-related consequences of this FCI.

[3] For full article text visit http://www.torontosun.com/2013/11/29/lady-gaga-and-elton-john-bury-hatchet-for-thanksgiving-performance
[4] For full article text visit http://www.theonion.com/articles/nation-has-to-sell-lake-house,34686/
[5] For full article text visit http://seattletimes.com/html/health/2022360786_apxmedtonguecontrolledwheelchairs.html

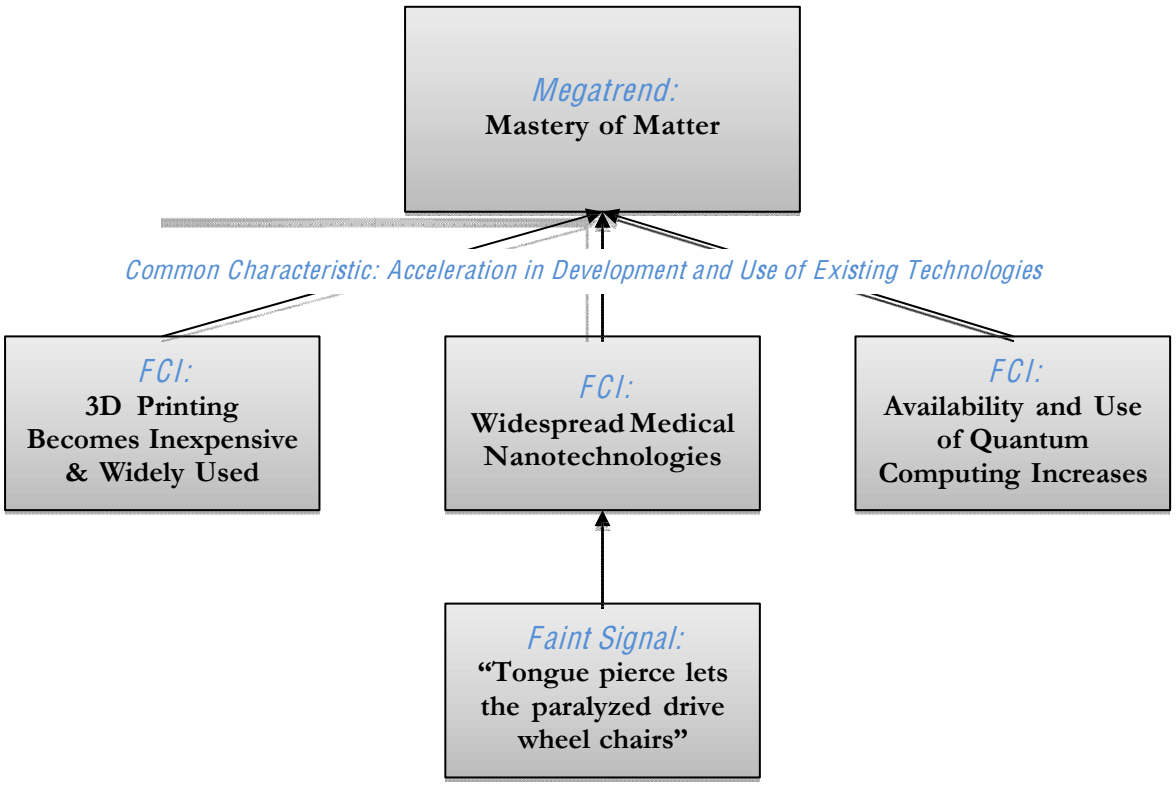
Figure 2: STEEPS Analysis of Widespread Medical Nanotechnology FCI

FCI	Social Impacts	Technological Impacts	Economic Impacts	Environmental Impacts	Political Impacts	Security Impacts
Widespread Medical Nano-technology	Growing and aging population and a shrinking workforce with decreasing productivity put enormous pressure on social welfare programs Facilitation of disease detection and diagnosis increases life expectancies beyond 100 years	Increased focus on developing nanotechnologies to end water and energy scarcity Continuing advances in medical technology reduce medical equipment and treatment costs for individual	Increasing life expectancies in all countries strains private health care systems The minimum retirement age increases and older, experienced employees work longer	Medical advances sustain burgeoning populations which puts pressure on dwindling natural resources Spin-off nanotechnologies may be used to clean ecosystems and reduce carbon emissions		Increased population density resulting from growing and longer living populations creates conflicts over limited, shared resources Nano-technology is used to create advanced and untraceable weapons

The possible outcomes of an FCI, shown through the lens of a STEEPS matrix, can be useful to policy-makers as signposts to gauge policy effectiveness. Imagine, for instance, that a policy was enacted to support the research and development of medical nanotechnology as a means of improving quality of life. If instead life expectancies increase but social welfare programs began to collapse, health care systems become strained, and natural resources become even scarcer, then arguably the policy goal is not being achieved. By tracing out the potential outcomes of an FCI, therefore, we can gain valuable input for policy feedback mechanisms, a concept which will be developed later in this report.

More significantly for the current discussion, identifying and describing faint signals and their consequent FCIs in this way allows us to build up to a description of the megatrends discussed in the NIC report. As shown in the figure below, faint signals such as the example provided above are the genesis for FCIs, megatrends, and ultimately even potential worlds, and therefore must be incorporated into any description of the longer-term future.

Figure 3: The Base of the Proposed Descriptive Hierarchy



Once such data points and their extrapolated FCIs have been identified, their common characteristics can help to describe higher-level megatrends, as shown in the next section.

Megatrends

The following five megatrends represent what we believe to be the most significant trends observable today as well as the most impactful trends over our 15-20 year timeframe:

1. Shifting demographics
2. Food/water/energy nexus
3. Increased individual empowerment
4. Mastery of matter
5. Diffusion of power in the international system

Before any discussion of how these megatrends interact to form the potential worlds of the NIC report, it is important to present a snapshot of the characteristics of each trend independent of such external interactions. These characteristics not only serve to better define the megatrends, but also illuminate the FCIs that constitute each trend.

Megatrend #1: Shifting Demographics

Demographics are defined as "…of or relating to the study of changes that occur in large groups of people over a period of time."[6] Commonly examined demographics include gender, age, ethnicity, disability, mobility, home ownership, and employment status. Thus, there are numerous characteristics of the "shifting demographics" megatrend.

One of the most notable shifts in the developed world, for example, has been an overall aging of populations, caused in part by steady declines in fertility (measured by the Total Fertility Rate, or TFR) as well as decreasing or plateauing mortality rates (i.e., longer life expectancy). Some developed regions, such as Europe, will likely experience population decline in the relatively near future as a result of TFRs falling below mortality rates. Another demographic shift, closely related to the aging of developed populations, is the changing size and composition of workforces. As more workers near or reach retirement age, pressure on governmental social-support systems increases. Alongside this is concern that without higher TFRs and concomitant population growth, the workforce will not be sufficiently replenished, leading to reductions in economic output and subsequently in economic growth.

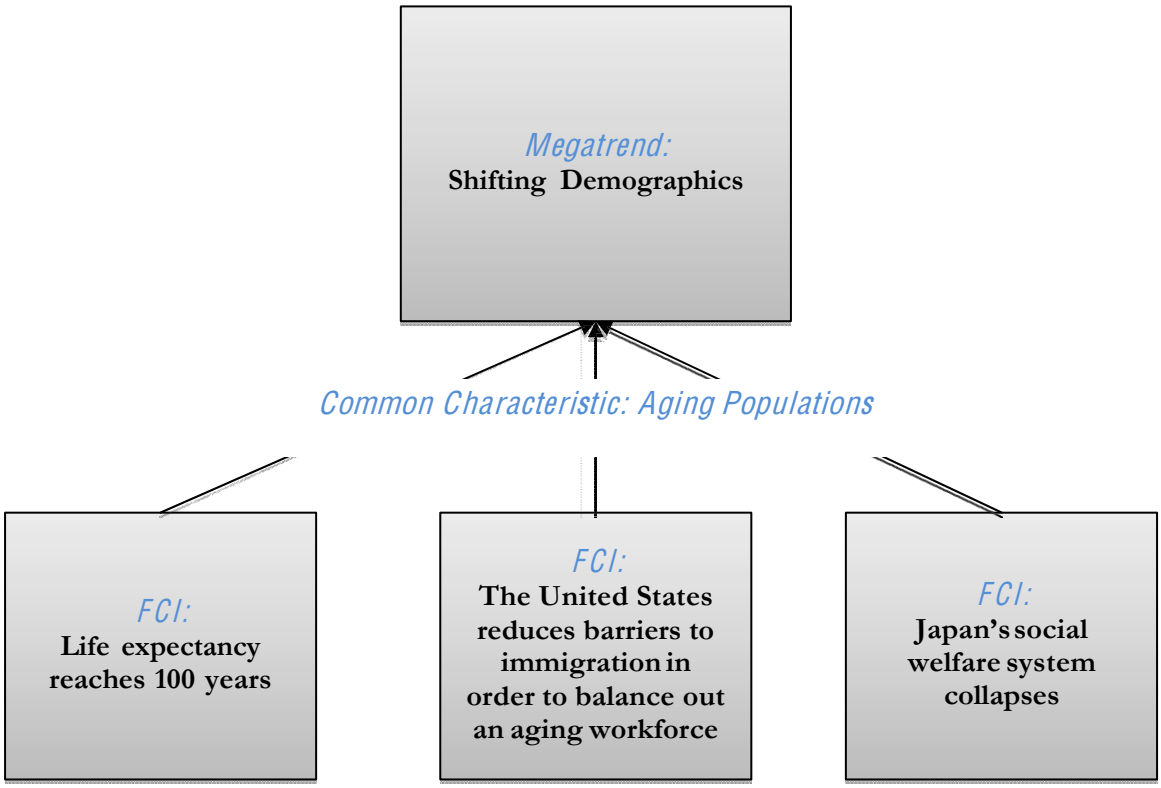
However, latent opportunities exist within these demographic shifts and result from the demographic megatrend more generally. For example, one way to counter population decline is to improve family-focused social services, such as 18-month long paid

[6] A full definition of "demographics" can be found at http://www.merriam-webster.com/dictionary/demographic

maternity leave, as some Scandinavian countries have done. Another is to embrace or encourage changes in the ethnic make-up of the population, as certain ethnic groups tend to have higher birth rates than others.[7] Alternately, developed nations could alter their view of retired citizens, viewing them not as a burden on social services but as an untapped resource for civic projects and activism; improvements could then be made to retiree-focused social services in order to encourage such activism. Economically, this ageing population represents a large market for consumer goods as well as health care and other non-public services.

A number of FCIs exhibit common characteristics that ultimately underlie this megatrend. Those shown in the graphic below, for instance, share a common feature – aging – that is consequently a key component of the shifting demographics megatrend. A STEEPS analysis of these FCIs can be found in Appendix 1.

Figure 4: Several Component FCIs of the Shifting Demographics Megatrend



[7] For more information on fertility and birth rates among ethnic groups visit http://www.pewsocialtrends.org/2012/05/17/explaining-why-minority-births-now-outnumber-white-births/

Megatrend #2: Food/Water/Energy Nexus

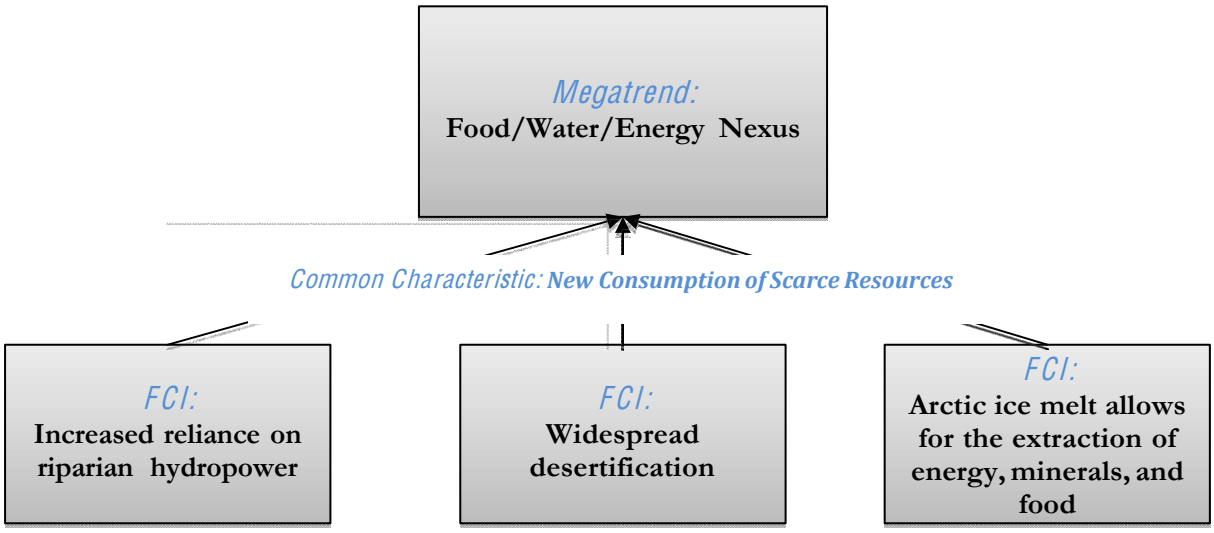
The food/water/energy nexus consists of multiple component parts and presents both challenges and opportunities for the modern state system. For our purposes, this megatrend is primarily defined as the increasing world population straining existing food, water, and energy resources and methods of production. Among the obvious challenges and potentially negative outcomes of such a megatrend are:

- Governments being forced to enact energy or water rationing
- Heightened energy and resource prices stunting the development of non-developed or developing nations, leading to economic stagnation or civil unrest
- The pursuit of cheaper fuel sources resulting in a greater reliance on coal exploitation, effectively exacerbating current climate deterioration absent technological advances that mitigate pollution.

As was the case with the previous megatrend, the food/water/energy nexus offers opportunities alongside its myriad pitfalls. For instance, the prospect of future shortages in energy or natural resources could lead to an expansion of funding for research and development to counter the threat. This may in turn result in greater international cooperation to find a viable solution if the timeline for the end of certain energy sources shortens. Alternately, the pursuit of advances in climatology and meteorology may be sought to more accurately gauge climate change and to forecast natural disasters. Breakthroughs in energy technology, water desalination, or agricultural genetics could result in higher standards of living worldwide, increasing the ability of many nations to sustain larger populations, fund social programs, and promote economic growth. Finally, water-sharing agreements could proliferate, preventing the outbreak of conflict between water insecure nations and ultimately strengthening ties between nations, reducing the chance of conflict resulting from other sources of tension because of this shared interest.

A number of FCIs exhibit common characteristics that ultimately underlie this megatrend. Those shown in the graphic below, for instance, share a common feature – new consumption of scarce resources – that is consequently a key component of the food/water/energy nexus megatrend. A STEEPS analysis of these FCIs can be found in Appendix 1.

Figure 5: Several Component FCIs of the Food/Water/Energy Nexus Megatrend



Megatrend #3: Increased Individual Empowerment

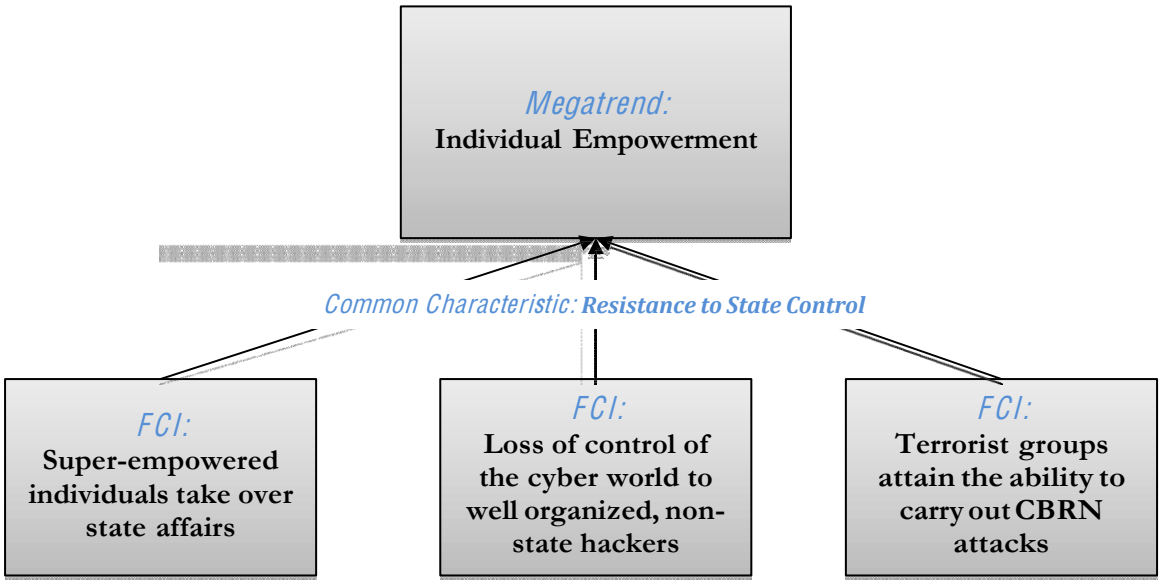
There are numerous characteristics and indicators of increased individual empowerment. In economic terms, the National Intelligence Council estimates that the global middle class will more than double in size by 2030, expanding the purchasing power of billions of consumers. They will demand better government services in education and healthcare. The ability for this new middle class to travel will allow them to "vote with their feet" if their demands are not met, leading to the migrations and urbanization described in Megatrend One. Countries with high or improving levels of social service provision likely will have the opportunity to attract immigrants in the growing global middle class. Politically, the growth of an empowered middle class in the developing world presents an opportunity for democratization, but also a mechanism for increased conflict, depending on the response of existing governments to their citizens' demands. Not all middle class populations will hold liberalist political views; some may utilize their new mobility and financial strength to support reactionary movements. Further, well-educated but chronically unemployed people are apt to radicalize or create instability, like former Soviet weapon scientists.

An important distinction must be made, however, between such widespread individual empowerment and the rise of a small but increasing number of so-called super-empowered individuals. Super-empowered individuals have the capacity to exert disproportionate power and influence in their chosen sphere, often at the expense of traditionally powerful organizations such as governments, large corporations, and religious movements. Examples of super-empowered individuals include Microsoft founder Bill Gates, U2 Lead Singer Bono, George Soros, Wiki-Leaks founder Julian Assange, and Ross Ulbricht, a 29 year old San Francisco resident and former physics

student who built the multi-million dollar Silk Road illicit commerce website. New technologies have allowed all members of these increasingly empowered classes of individuals to subvert traditional communications and currency controls.

Numerous FCIs exhibit common characteristics that underlie this megatrend. Those shown in the graphic below, for example, share a common feature – resistance to state control – that is consequently a key component of the individual empowerment megatrend. A STEEPS analysis of these FCIs can be found in Appendix 1.

Figure 6: Several Component FCIs of the Individual Empowerment Megatrend



Megatrend #4: Mastery of Matter

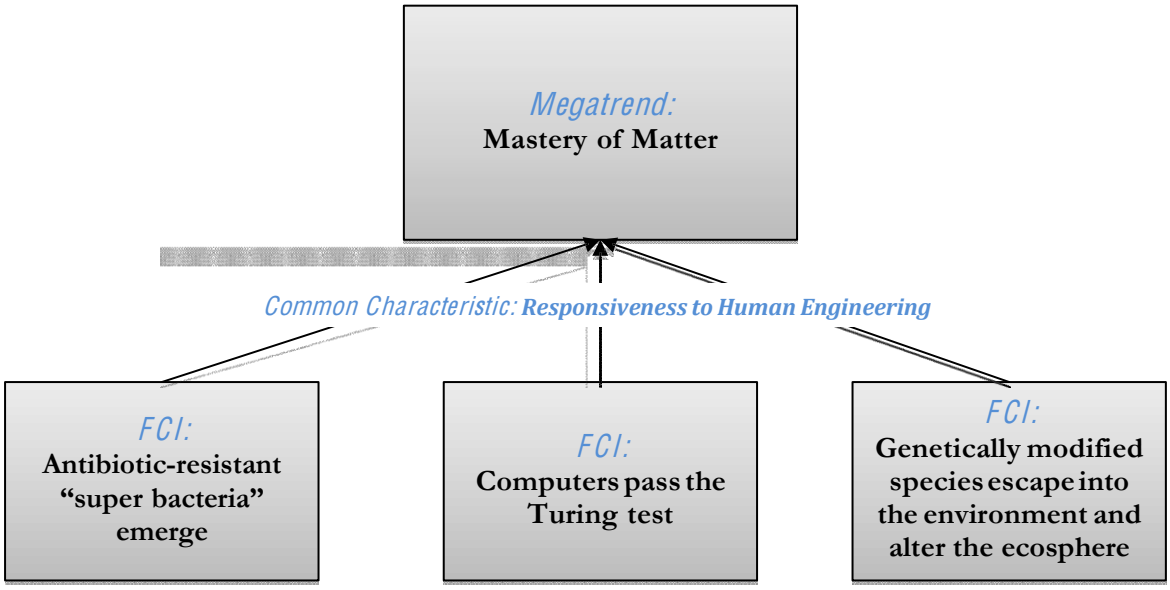
What we term "mastery of matter" often arises within the aforementioned super-empowered group. Modern technologies, such as 3D printing, make available to the public items that were previously highly controlled by states, corporations, or both. The classic example is weaponry, yet perhaps the most serious implications of 3D printing specifically might be for the manufacturing industry; in other words, the increased availability of highly advanced and customizable tools rapidly increases the standard of living in terms of material goods, while single-handedly eliminating many aspects of the contemporary manufacturing sector.

Similarly, advances in mankind's mastery of biology, such as in the fields of genetic engineering and pharmaceutical development, will likely begin in the "super-empowered" realm but become more affordable and available to average consumers. Such "mastery" of previously uncontrollable biological systems has many potential advantages, such as the elimination of long-term problems with disease and the dawn of a "golden age of identity" in which communities historically defined by oppression or isolation are able to

reform into new communities of shared genetic interests and leanings. It also, however, raises a number of concerns, such as increased resistance of pathogens to antibiotics, as well as questions for future leaders like how to handle anyone left behind by such technological revolutions.

Several FCIs exhibit common characteristics that, taken together, help to describe this megatrend. Those shown in the graphic below, for instance, share a common feature – responsiveness to human manipulation – that is a key component of the mastery of matter megatrend. A STEEPS analysis of these FCIs can be found in Appendix 1.

Figure 7: Several Component FCIs of the Mastery of Matter Megatrend



Megatrend #5: Diffusion of Power in the International System

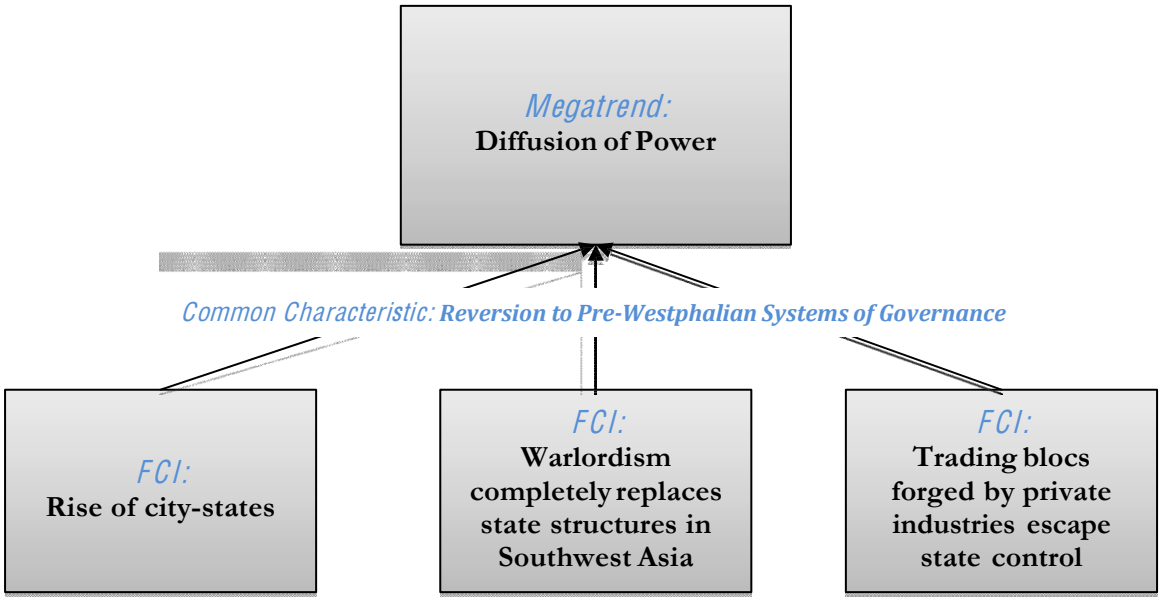
Finally, the diffusion of power in the international system can best be defined as movement toward a state of multipolarity. Multipolarity in this case is defined as a world in which power is not centered in any one particular state. The power among nations themselves, large blocs and alliances is relatively equal, with different entities jostling among themselves for influence. It is not expected that non-state actors will match the power of states in this multipolar world; rather, they will have a disproportionate influence on world affairs through the diffuseness of their networks, enabling them threaten the stability of some states. As such, multipolarity is potentially destabilizing, making the world in many ways more prone to conflict.

This is far from the only outcome, however, as world leaders can harness multipolarity in ways that encourage positive outcomes. Indeed, such a diffusion of power could encourage otherwise belligerent states, who may traditionally have been able to wield GDP, population size, etc. to get their way in the current international system, to engage in a more cooperative way. Alternately, leaders can choose to engage more fully

with newly empowered and more efficiently networked NGOs to attain policy goals, such as improved public health, standards of living, etc.

A number of FCIs exhibit common characteristics that ultimately underlie this megatrend. Those shown in the graphic below, for instance, share a common feature – reversion to pre-Westphalian systems of governance – that is consequently a key component of the diffusion of power megatrend. A STEEPS analysis of these FCIs can be found in Appendix 1.

Figure 8: Several Component FCIs of the Diffusion of Power Megatrend



Connectivity

Now that each megatrend has been characterized independently, its connectivity with the other megatrends can be better analyzed. **Connectivity** in this case refers to the extent to which megatrends interact as well as the magnitude of these interactions. An illustrative example is the food/water/energy nexus. The prospects of food, water, and energy scarcity are heavily dependent on the rate of demographic change as well as impacted by advances in technology driven by individual empowerment and how these advances are managed by the increasingly diffuse international system. Thus, these megatrends could determine how quickly remaining petrol reserves will need to be used, what alternatives sources or methods of obtaining energy, food, and water are viable, if resource scarcity will become a driver of conflict, and what level of population growth will be sustainable. Advances in genetics, for example, spurred by individual empowerment and properly managed by either state or international systems could play a positive role in reducing resource scarcity and help sustain population growth and current demographic trends.

Conversely, food, water, and/or energy scarcity could impact these megatrends in a variety of ways. If resource scarcity were to occur, for instance, demographic features such as population mobility could be directly impacted by access to increasingly scarce resources. Furthermore, populations with inadequate access to basic human needs (e.g., food and water) could be susceptible to outbreaks of antibiotic resistant diseases, leading to additional changes in population structures as well as heightening the likelihood of interstate and/or intrastate conflict. Alternatively, higher energy prices or a continued reliance on oil resources could enrich some countries while preventing the development of others, leading to even more distinct shift in the international order. Finally, if coal use increased in the continued absence of other cheap energy alternatives, then further damage could be done to the environment and climate change expedited, a clear example of the increasingly negative consequences of man's "mastery of materials".

The connectivity matrix below helps to trace out some of the aforementioned interactions between the five megatrends. It is important to note, however, that in reality these interactions are far more complex, with each megatrend interacting at various times with multiple other megatrends. In this way megatrends are representative of a **complex system** in which all parts influence and are influenced by all other parts in non-linear and unpredictable ways.

Figure 9: Connectivity Matrix

Megatrends	Mastery of Matter	Food/Water/ Energy Nexus	Shifting Demographics	Individual Empowerment	Diffusion of Power
Mastery of Matter		Mastery of hydropower and GMO biomass fuels increases food prices Leads to new energy sources not dependent on water or biomass	Mastery of matter leads to ability to provide for larger populations in megacities, which then become the dominant form of governance as city-states	More concentrated wealth resources devoted to specific technological advances, like genetics and computing Citizens have greater autonomy to produce goods for themselves, reducing reliance on and responsiveness to corporations and governments	City-states become viable entities due to technological advances
Food/Water/ Energy Nexus	Food, water and energy scarcity drives the desire to master materials to reduce scarcity		Food and water used for energy and fuel raises prices – driving populations to other regions. Climate change drives populations into more habitable regions with more resources	Super-empowered individuals could act as powerful advocates and benefactors for mitigation of environmental damage	Diffused international power system could find global solutions to mitigate negative consequences such as super-bacteria
Shifting Demographics	Increased urbanization more practical and efficient due to increases in technology	Population mobility directly caused or affected by reduced resources, increased food and energy prices, water insecurity – increases in disease with rise in urbanization		Super-empowered individuals influence relaxed border regimes to benefit from cheap labor	Shifting populations into cities create sovereign city-states
Individual Empowerment	Movement of people leads to spread of super-bacteria	People start becoming 'energy independent', increasingly off the grid in a form of energy regression	Individual empowerment allows for even greater personal mobility, creating large movements within nations		Movement into cities, reduction of notions of nation-state sovereignty lead to diffusion
Diffusion of Power	Globalization increases due to technological increases, diffusing global power and influence		International borders begin to erode, allowing for more international movement of people	Lessened notions of national identity allows for 'global citizens' and super-empowered individuals with influence over many world regions	

Potential Worlds

In addition to tracing out how megatrends interact with one another, it is important to draw attention to how their combined interactions can result in a wide spectrum of potential futures. After all, it is through the interactions of these trends that future scenarios, such as the four "Potential Worlds" of the NIC report listed below, are formed.

1. Stalled Engines
2. Fusion
3. Gini-Out-Of-The-Bottle
4. Non-State World

Each of these NIC alternate futures is described in more detail below, and each represents trade-offs between ideal outcomes, such as improved international cooperation and resource security, and "non-ideal" consequences, like increased instability and stalled globalization.

NIC Scenario #1: Stalled Engines

In the stalled engine scenario, globalization stalls, leading to a sinking global economy. The emergence of a pandemic in the developing world exacerbates these trends, causing rich countries to raise barriers to protect themselves. As a result of these higher trade barriers, overall prices, particularly food prices, increase and technology diffuses more slowly. Global governance systems are non-functioning due to the stoppage of globalization and isolationist behavior of most developed countries, exacerbating the stall and causing increased instability, especially in the developing world. This situation, alongside competition for resources and influence (i.e., Brazil taking advantage of its massive food exports and rising food prices to fill the vacuum left by the withdrawal of the U.S. and Europe) results in strong resentments between North and South as well as East and West, making it difficult to restart globalization.

NIC Scenario #2: Fusion

The fusion scenario is characterized by cooperation. The U.S. and China find common ground to cooperate on security matters in response to the potential for conflict in South Asia and subsequently expand this cooperation to other fields, such as environmental protection and intellectual property. As a result, the global economy enjoys healthy, sustainable growth. The Eurozone takes advantage of the Euro crisis to enact deep political and economic reforms and restart economic growth. As a result, the diffusion of technology increases, leading to a more liberal and cooperative international system as well as allowing the world to stay ahead of resource constraints.

NIC Scenario #3: Gini-Out-Of-The-Bottle

In the Gini-Out-Of-The-Bottle scenario, the world becomes wealthier, but inequalities become more distinct. As a result, political and social tensions increase, increasing the likelihood of conflict. Despite the fact that it remains the dominant world power, due primarily to strong economic growth brought about by the energy revolution, the US refuses to maintain its role as the "global policeman". Meanwhile, the energy revolution in the US has disastrous consequences in African and Middle-Eastern countries that rely on oil exports, causing increased instability. Ethnicity-based restructuring and tensions between social classes are on the rise in these regions. Moreover, this lack of societal cohesion is reflected at the international level, where countries do not cooperate.

NIC Scenario #4: Non-State World

In a Non-State World, wealthy individuals, NGOs, multinational corporations and academic institutions become central actors and sub-national entities, such as cities, take center stage in global affairs. Widespread availability of modern technologies increases individual empowerment, with transnational elite, educated in the same academic institutions, leading key global non-state actors. Countries remain, but their importance in the international system declines as non-state actors foster consensus within the global public opinion on major challenges, such as the environment, inequalities, peace, rule of law and anti-corruption. Such leadership by multinational corporations and NGOs, however, comes at the expense of existing international institutions. Terrorist and criminal networks take advantage of the new international structure to thrive. Developed countries fare better in this world by forming coalitions of state and non-state actors to solve national challenges. The success or failure of developing countries depends primarily on urbanization levels, with more urbanized countries enjoying better economic and political prospects.

A "Worst Case" Scenario

While none of the NIC's scenarios feature a complete collapse of modern state systems, the fact is that events over the last decade and a half have demonstrated the state's increasing inability to manage today's complex challenges. Critically, the United States' government has exhibited an increasingly clear pattern of failure to adequately anticipate oncoming crises, such as the 9/11 attacks and recent financial crisis. One major consequence of this has been the realization that our understanding of the world is based on a false assumption of stability. In reality, a multitude of finite events and longer term trends interact in a variety of complex and unpredictable ways that make linear assumptions of the future, and consequent policies, obsolete.

Recognizing this, one of the most concerning potential worlds for our generation is one that features a complete collapse of the state system. In such a scenario one might expect wealthy individuals, NGOs, multinational corporations and academic institutions to become central actors and sub-national entities, such as cities take center stage in global affairs. Depending on the ability of such non-state actors to foster consensus within the global public opinion on major challenges, such as the environment, inequalities, peace, rule of law and anti-corruption, such challenges could grow in size and scope. Terrorist and criminal networks, for example, could take advantage of the new international structure and lack of efficient policing mechanisms to thrive.

Alternately, inequalities could become steeper in the absence of more coherent, state-led efforts to maintain or improve standards of living. As a result, political and social tensions could increase, increasing the odds for conflict. Domestic conflicts within developing countries might then result in lower food production and place more stress on food supplies. Additionally, any public health crisis, such as a global pandemic, could result in a stalling of globalization in the absence of effective international mechanisms (e.g., the WHO) to manage the crisis. Such a stalling of globalization might cause wealthier or more powerful regions to raise barriers to protect themselves, effectively isolating themselves from the rest of the world. This, in turn, could raise global food prices, slow or halt the diffusion of technology, cause a downturn in the global economy, and increase instability.

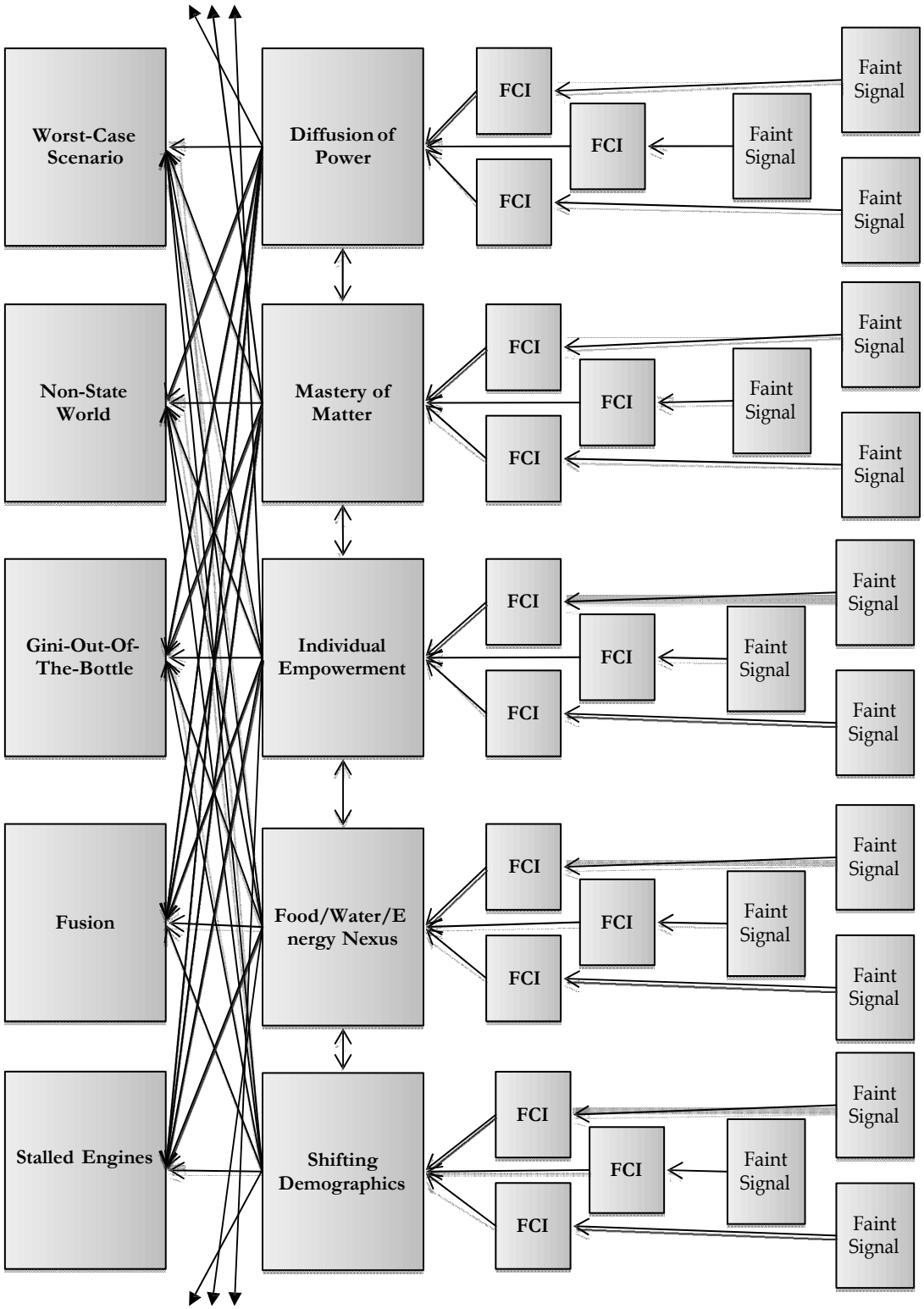
This rough outline of a future worst-case scenario is not implausible. In fact, it represents a synthesis of the current trends and systems presented in the NIC report as well as events and trajectories that we have witnessed as policy interns in our nation's capitol. Given the feasibility yet utter undesirability of this possible future, it is important for our leaders to undertake a more systematic analysis of the trends underlying such potential worlds in order to better anticipate and adapt to their potential outcomes. Such anticipatory government we think will allow the United States' government to not only persist, but to be better suited to recognize and respond to the challenges and opportunities of future complex issues.

Conclusions

Through the use of an enhanced descriptive methodology we have arrived at a description of the longer-term future that is both broad enough to encompass megatrends and future worlds and deep enough to include more immediate data points and FCIs.

While the five scenarios highlighted in the figure below are by no means an exhaustive list of the potential outcomes of interactions between and among the megatrends and FCIs discussed, they are illustrative of a central point of this analysis – in order to respond effectively to complex priorities, governments must be attuned to the interactions both within and among current trends and events as well as prepared to adapt to a wide variety of potential outcomes. This is especially true as the rate at which relatively minor, seemingly unrelated trends and events develop into major global incidents that outpace our ability to govern. We can no longer address complex problems through reactive analysis, or resolve them with narrow solutions, nor can we afford to wait until negative developments reach fruition to act. The scenarios above highlight the potential consequences of ignoring this central tenet. The second half of this report will focus on recommended improvements to ensure that the United States harnesses its governmental resources to shape its collective future in order to avoid pitfalls and embrace opportunities.

Figure 10: Populated Proposed Methodology



Longer Term Government

Current Planning Structures

Foresight and strategic planning as they currently exist in the federal, state, and local governments of the United States are inexorably linked with policy and program evaluation, particularly in the context of budgeting. These efforts began most intensively at the federal level in the 1960s, with Lyndon Johnson's Planning, Performance, and Budgeting System (PPBS). PPBS is an output-based budgeting scheme, where the costs of inputs such as raw materials are compared to the magnitude of outputs, such as number of people served at a soup kitchen.

Output and input metrics have the distinct advantage of being easily quantifiable, which makes systems like PPBS easy to use. The disadvantage of output-based metrics and systems is they can easily measure quantities that have little influence on the overall success of a particular policy. Thus, evaluators often rely on outcome-based metrics, which can be more difficult to directly quantify, but are often better at capturing the essence of a program's performance over a specified time period. Such schemes are represented by parts of the Government Performance and Results Act of 1993 (GPRA) and the Government Modernization Act of 2010 (together known as GPRA-MA) at the federal level, and numerous performance budgeting programs at the state and local levels.

Most relevant for issues of foresight, GPRA-MA, like GPRA before it, institutes requirements for agency strategic plans, regular consultations with Congress, budgetary planning aligned with the President's budget request, and regular evaluation of agency policies and programs. While these requirements do not address long-term planning specifically, they demonstrate the administrative experience of agencies such as the Office of Management and Budget (OMB) with program and performance evaluations, upon which foresight processes build. The demands of GPRA-MA also illustrate the difficulties of implementing strong evaluative measures across the legislative-executive branch divide. Executive-level strategic plans are useful tools for legislative oversight of federal agencies, but they do nothing to prevent myopic or ill-considered actions on the part of the legislative branch.

Our proposal answers this challenge by integrating foresight with both legislative scoring in response to Congressional actions, and policy analyses relevant to both the executive and legislative branches. As with current budget evaluation processes, a committee housed in OMB would handle foresight-driven analyses of legislation and policy issues. As the Executive Office of the President’s fiscal foresight mechanism,

OMB is an organization already comfortable with forecasting. Its leaders work closely with senior White House staff and its employees occupy an unusual space at the intersection of agency budgeting and high-level policy making. For these reasons we believe that our Futures Analysis & Review Structure for Policy Implementation (FARSITE) would operate best as an independent structure housed at OMB. Although an executive branch approach to strategic plans like the one we propose is not without its limitations, we believe this approach offers the best possibility for independent planning and eventual implementation.

It is worthwhile to note that impartial analysis requires the freedom to contradict administration policy statements, making placement of a foresight office within OMB potentially problematic. The goal of our foresight system, however, is to create a national institution integrated with the ordinary policy process that accounts for future uncertainties and unintended consequences. Such a system is distinct from the top-down performance management and program evaluation systems of the past. The foresight system we propose will engage both political appointees and civil servants at all levels are in an effort to prepare the United States for megatrends and significant contingencies. Where traditional summative evaluations often yield rigid results, foresight-driven regimes use feedback from regular, formative assessments to achieve complex policy goals.

Thus, the reforms proposed in this report represent a significant departure from those implemented under GPRA-MA and related measures. By taking a dynamic approach to strategic planning and policy development, we aim to address future challenges and opportunities, while recognizing the inherent structural barriers to building an anticipatory policy system in government.

Proposal for Improved Planning

American self-government is predicated upon power sharing between a strong deliberative branch and a weaker, but more centralized executive branch, both checked by the judiciary. As the policy challenges faced by the Federal Government have grown in complexity, the Congress has developed methods of "scoring" the financial and legal ramifications of its strategies to address them. It also has an independent watchdog agency that monitors executive branch compliance with the policies set by lawmakers. The Congressional Budget Office is authorized to provide a non-partisan, forward-looking analysis of pending legislation in such a way as to inform the debate without choosing sides. Congress' Government Accountability Office follows up after legislation is enacted, providing regular and de-politicized reports on policy implementation. As a theoretically unified entity reporting to the President, the Executive Branch assesses the future through the lens of the political realities it *would like to see, with major gaps in its ability for independent futures analysis*.

We believe that the Executive Branch needs its own internal system capable of providing an unvarnished assessment of large-scale trends that the nation is likely to face, with the capacity to make policy recommendations. The executive branch needs its own system for evaluating the long-term actions of its legislative and judicial counterparts, be they pending legislation or precedent setting court rulings. This system will be given the resources, flexibility, and insulation from current crises to identify Future Contingencies of Interest and Megatrends from today's weak signals. Having done so, it will propose actionable policy solutions for the consideration of elected leaders.

Our proposed forward engagement structure, which we will call the Futures Analysis & Review Structure for Policy Implementation (FARSITE), can be thought of as a navigation system. Just like the navigation systems used in cars and aircraft, FARSITE is designed to offer data to the individual driving them. In a transportation context, these indicators take measurements such as speed, direction, altitude, GPS coordinates, or warnings of structural malfunctions and present them to the operator. Some indicators simply state current observations, while others, like turn by turn GPS systems, adapt to operator decisions and synthesize many information streams to provide independent analysis of the options available to the operator. Operators know that their instruments are generally trustworthy but are free to ignore warning systems if the mission demands it or if they make an informed judgment that the instruments are reporting flawed information.

In the same way, FARSITE will provide trusted and generally reliable information to the President. The President and his staff are free to ignore it. FARSITE reports can

become part of the policy making process in the same way that intelligence analysis, budgetary scoring and advance legal advice currently are. We have noted that the National Intelligence Council already produces a report on long-term global trends. We find this process to be a useful foresight indicator and have incorporated several of its methods into the FARSITE platform. However, FARSITE will differ from the National Intelligence Council in several respects. As a function of the EOP and not of the intelligence community, FARSITE will have a mandate to address trends that are not primarily related to external security and do so from a whole of government viewpoint. Secondly, it will have a mandate to make policy recommendations. Finally, FARSITE will have the authority to unilaterally release redacted versions of its analysis to inform public debate. Thus, voters will be empowered with the knowledge of what future opportunities and challenges the world may face, from a third party specifically designed to consider these issues.

Structure of FARSITE

The Futures Analysis & Review Structure for Policy Implementation (FARSITE) would be a standing committee housed in the Office of Management and Budget and has purposefully been designed to have a small footprint. It will have only 14 members, and require the creation of only four new positions. The platform will make up for its small organizational size by having the ability to task other federal agencies in a process similar to how the National Security Staff currently tasks agencies in the Intelligence Community for information on their area of responsibility. Not only will this expand the knowledge base of the FARSITE platform, but it will have the added effect of giving analysts in the various agencies of the federal government a customer interested in the longer term and pushing them to consider issues that could appear in their portfolio in the long term. Continuing contact with a long term (20 years or more) forward engagement committee could begin to change the culture of the federal government, from an organization that jumps from present crisis to present crisis to one that has a strong cadre of analysts that incorporate near and long term thinking in their daily research. While this structure has been designed to have a minimal impact on existing agencies, we recognize these recommendations will likely add to the workload of existing agencies. Additional resources, including personnel, should overtime be considered to offset the additional requirements for these agencies.

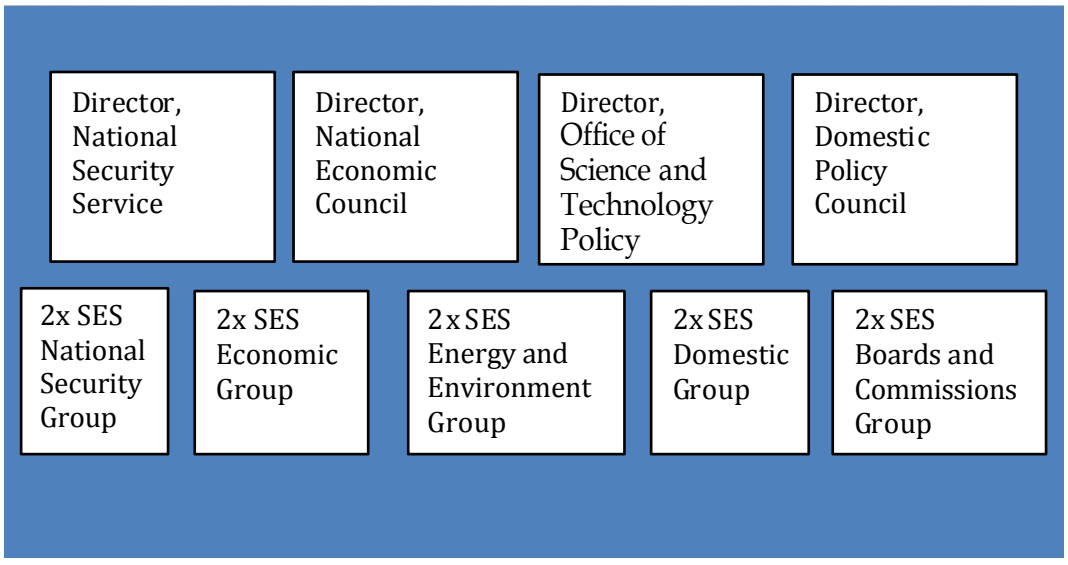
Leading the platform will be four forward engagement principals (the Core), drawn from offices within the Executive Office of the President: National Security Staff, Domestic Policy Council, Office of Science and Technology Policy, and the National Economic Council. A new position, at the level equivalent to that of a Director in the National Security Staff, will be created in each of the four offices. These positions will be established at this level because it would give each person access to senior policymakers, helping FARSITE stay apprised of current policy discussions and grant the platform a

certain degree of credibility and importance. The forward engagement directors will be political appointees, appointed as presidential advisors without congressional approval, and will serve for 18-month terms.

Rounding out the FARSITE platform will be ten Senior Executive Service (SES) detailees drawn from across the federal government-- two each from the functional groups that are typically defined by the Presidential Personnel Office (National Security, Energy & Environment, Economic, Domestic, and Boards & Commissions). These ten will be chosen by the Core, who will put together a list of 100 potential SES --20 from each issue group. Out of the proposed 100, ten will be chosen at random in order to ensure that the FARSITE platform is staffed as impartially as possible and the Core has not had the opportunity to fill the slots with like-minded individuals. Like the Core, the SES will serve for 18 months tours.

SES employees were chosen to fill the remaining positions on the platform because they are government executives with significant experience in their policy areas. Career SES employees are also protected from political termination by federal law which grants them the ability to give recommendations without fear of political reprisal, which will be an important asset even though the committee's reports will be unsigned corporate products and members will not be under any obligation to take their home agency's policy viewpoint on issues under review. Relative anonymity and statutory protection should ensure unbiased reporting by career SES detailees, while the presence of the four senior political appointees should ensure that subjects considered are relevant to the administration. The White House contingent on the panel will also be in a position to explain its findings to the President and senior staff. The FARSITE Platform will have a small secretariat of about a dozen researchers and support staff on the OMB payroll.

Figure 11: FARSITE Platform



FARSITE Responsibilities

The FARSITE platform will produce a National Intelligence Council-style report on complex policy trends facing the United States once during every odd-numbered year. This report will outline the megatrends that they believe will present the greatest challenges in the future, contain recommendations on what policies could be implemented to best address the trends through Component Level Integration Plans (CLIP), and will include updates for any CLIP-derived policies currently in place. In addition, the platform will be available to answer taskings from the President on the impact that current policies, legislature, and judicial rulings will have on the future. They will also the latitude to provide self-initiated reports on these same matters that will be available to the public in redacted versions.

Megatrend Report

The megatrends that the FARSITE Platform identifies will be based on their analysis of current weak signals that they have extrapolated into Future Contingencies of Interest (FCI). After producing lists of FCIs, the platform will group them by commonalities in order to identify overarching megatrends. The platform will draw upon their own experiences in their field to identify these weak signals, as well as have access to the rest of the federal government to solicit input or receive recommendations. As mentioned before, the platform will have a direct link to the rest of the federal government that allows them to expand their manpower in order to answer taskings concerning the future consequences of judicial ruling or legislature. This link will work both ways, and give other federal employees an outlet for passing recommendations of weak signals that they have identified to an organization specifically tailored to analyzing future trends.

Component Level Integration Plan (CLIP) Recommendations

These policy recommendations, known as CLIP, provide an initial roadmap for policy decisions and are meant to incentivize congressional action on these complex issues by breaking the long-term policy into short-term objectives. The belief is that taking early action can have a tangible benefit on the long-term issue even if the recommended program is halted or adapted. The recommendations will be broken down into incremental steps, that will include time frames, details on implementation, costs, and metrics for how to rate progress. Should Congress choose to fund a recommended CLIP, the platform will include in its subsequent reports a snapshot update of the policy's progress. This will be in addition to structured updates on the policy's implementation as previously determined in the CLIP.

Presidential Taskings and Self-Initiated Scoring

The platform will also be available to answer taskings from the President that "score" the long-term (20 years or more) ramifications of legislative proposals, proposed executive branch rules, and U.S. Supreme Court decisions. They will only be mandated to look at long-term consequences of federal actions, which will keep them from being constantly tasked with questions on world events. In addition to their responsibility to be responsive to the President, the platform will have the authorization to look at legislative proposals, executive branch proposals, and U.S. Supreme Court decisions on their own initiative. These reports will be releasable to the public in redacted versions, in order to inform public debate and provide additional context for current federal proceedings.

Monitoring & Evaluating Feedback

Working with the relevant agencies impacted by the proposed CLIP, the FARSITE platform will present a report evaluating the legislation on:

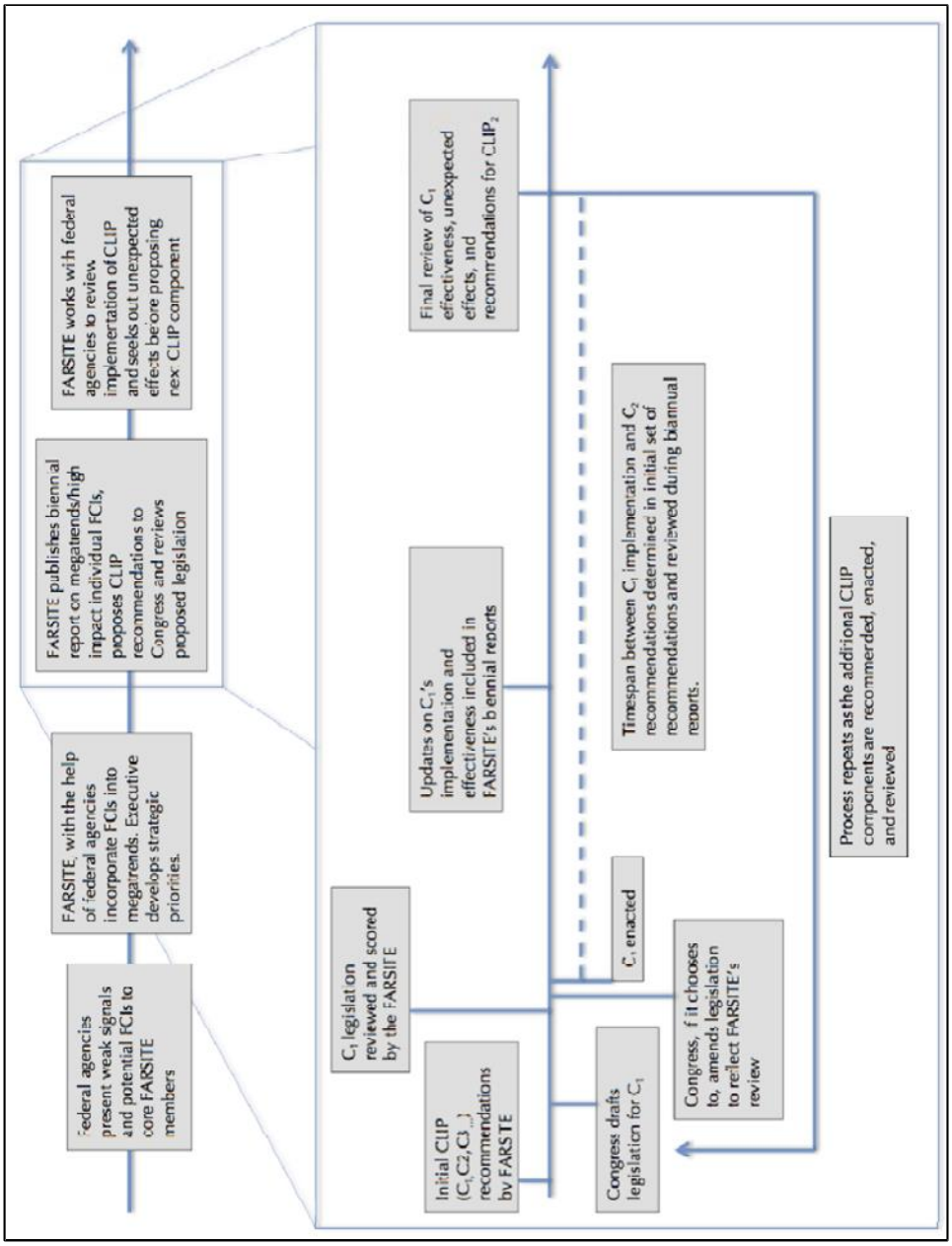
- Its ability to meet the stated strategic priority as written.
- Whether the resources allocated are likely to be sufficient to achieve the CLIP's goals.
- What secondary effects may occur as a result of the legislation.

In this sense, the respective agencies and departments of the federal government that will ultimately be implementing the policy (and thus presumed to be well informed of the complexity of the systems they interact with daily) have the opportunity to inform Congress. We assess that this communication between legislators and the public sector enacting legislation will assist in designing policies which are more likely to efficiently achieve their strategic goals. The legislative branch will not be bound by these recommendations and can choose to either amend legislation to reflect the scoring process or to ignore the recommendations entirely. However, the scoring reports will be made available to the public in order to inform debate among citizens.

The reports will include updates on enacted CLIPs to guide Congress and the executive branch on progress before it moves to the next packet of component level policy recommendations for a given subject area. We recognize that different strategic priorities will have different time horizons and in evaluating the effects of a CLIP it may be sufficient to note that the effects are not yet ripe for analysis. The intention of this process is to have a mechanism to continuously observe the effects from an implementation of a CLIP module.

A major challenge to implementing CLIPs is that when crafted in the present T_0 it does not fully account for the affects the first CLIP in a series C_1 will have before the next in the series C_2 prescribed. One C_1 is enacted, the system we were observing at T_0 will change likely in unexpected ways. By including frequent observation of the CLIPs through the biannual reports and frequent contact with the bodies implementing them, the committee can recommend adjustments to in the series or additional resources or legislation to obtain the desired effect of C_1.

Figure 12: FARSITE Platform



Challenges & Pitfalls

The greatest challenge in establishing an anticipatory policy process in the federal government is ensuring that the process and associated institutions have the legitimacy and authority needed to affect policy in practice. This challenge exists not least because the legislative branch is empowered to use or ignore any policy analysis or other information it is given, and is one that has hindered budget planning reforms in the past.

Our proposal answers this barrier to reform by integrating foresight with both legislative scoring in response to Congressional actions, and policy analyses relevant to both the executive and legislative branches. Taking this approach means the foresight process will have an executive branch bias, which could lead to perceptions that the institution is politicized. Nevertheless, we believe an executive branch approach to the Forward Engagement problem will be most likely to result in policy implementation.

Conversely, any emphasis on impartiality requires the freedom to issue analysis in opposition to administration policy statements. In some respects, this threat of a committee within OMB that can undermine the legitimacy of executive policies is politically untenable. The threat becomes more problematic when the roles of other OMB offices in evaluating executive policy, such as OIRA, are considered. The reality, however, is this conflict is unavoidable. The placement of a similar office in the legislative branch, such as within CRS or CBO, might ease this prospective tension. Yet ultimately, if the integration of foresight in policy making succeeds, the foresight committee will aid administration planning and become a permanent institution in the national government.

Finally, implementation of any foresight process in the executive branch will require employee training. Committee members will need to understand key foresight methods and their strengths and weaknesses. Federal employees at all levels should also understand how foresight and long-term planning are integrated with policymaking and administration, so they can engage with the process. This element is crucial to avoid rigid, top-down planning. At the same time, would-be trainers should be careful to distinguish the requirements of Forward Engagement with those of past performance-oriented initiatives. In the past, government agencies at all levels have been interested in coordination and planning primarily as means for increasing worker productivity. The goal of Forward Engagement is of a different magnitude, and must be properly identified.

Conclusions

The Executive Branch needs a navigation system - institutions dedicated to forecasting and policy analysis - that can guide Presidents as they prepare Americans for the most likely future scenarios, even as their main focus remains on day to day governance. To create such an advocate for long-term thinking in Executive Branch policymaking, we recommend the establishment of a Futures Analysis & Review Structure for Policy Implementation (FARSITE) within the Executive Office of the President. The FARSITE platform will produce a National Intelligence Council-style report on complex policy trends facing the United States once during every odd-numbered year. This report will outline the megatrends that they believe will present the greatest challenges in the future, contain recommendations on what policies could be implemented to best address the trends through Component Level Integration Plans (CLIP), and will include updates and review of any CLIP-derived policies currently in place. FARSITE will also confidentially offer its expertise on issues of concern to the President, as well as have latitude to provide self-initiated policy reports to the public, or to "score" the long-term (i.e., 20 years or more) ramifications of legislative proposals, proposed executive branch rules, and U.S. Supreme Court decisions at the request of the President. In this way, the dangers posed by trends such as shifting demographics, increased individual empowerment, mastery of matter, diffusion of power, and food/energy/water developments can be mitigated and the opportunities maximized.

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Appendix I

FCI	Social Impacts	Technological Impacts	Economic Impacts	Environmental Impacts	Political Impacts	Security Impacts
3D Printing Becomes Inexpensive & Widely Used	Availability and cost-effectiveness of 3D/4D printing could change relationship with / reduces reliance on corporations as common people 'print' everyday items at home. Corporate efforts to restrict manufacturing data for items drive underground trade of such data; like current networking allows for transfer of entertainment.	Every person essentially becomes an inventor, able to reconfigure and alter items for most efficient use. Rapid growth in rate of technological advancement; intellectual capital for invention and production spread over a large population and not retained in corporations or to those with the wherewithal to invent and patent innovative ideas.	Decreased reliance on manufacturers reduces corporate incomes, need for labor (including in outsourcing destinations); unemployment increases the burden on social safety networks. Personal income increases through self-employment; cottage-industries advance through 3D/4D printing allowing people to sell goods from their own homes.	Reduction of environmental impact of large factories, less waste material produced Energy input (water, electricity, etc.) needed for production on 3D/4D printers less than large factories Raw materials needed for 3D printing could be legislated or restricted	Regulatory environment unsuited to control product safety in a diverse production environment. More difficult to enforce Sales of goods conducted under the radar of sales tax regimes. Intrusive registration or monitoring regimes result from loss of tax revenue. Industry / Labor Unions lobby to constrain the availability of this technology.	Ability to 'print' working plastic/composite firearms. Greater use of invasive searches and stand-off detection techniques Sanctions on dual use or military technology exports is obsolete; nations produce goods easily/cheaply that currently require special manufacturing. U.S. military outposts make spare parts for equipment that once took weeks to send to theater.
Availability and Use of Quantum Computing Increases	Very secure private computing, radical reduction in size – radical increase in storage capacity; voice recognition or thought-recognition eliminates typing Increased speed and quantum graphics processing drives public deeper into digital realms; emergence of	Efficient code breaking systems erode privacy Highly advanced calculative properties lead to advances in mathematics, chemistry and physics Revolution in computing leads to enhanced robotics, space exploration, engineering advancements	Extremely fast and accurate forecasting for economic or financial outcomes; data-mining More efficient computing reduces time and money spent on many processes Computer manufacturers become most profitable. Mobile quantum computing	Rare earth elements and other raw materials needed to produce quantum computers become scarce Faster, more accurate modeling of climate data Faster modeling of effects of new chemicals or medicines on the environment/public	Government ability to encode and decode increased dramatically. Increased government ability to calculate and monitor citizens Better census and statistical population modeling. Faster, more accurate budget, security, policy implication forecasting	Very fast calculations increase tracking, targeting of satellites, extremely precise, hyper-fast weapons or lasers Net-centric operations become more efficient. Cyber operations more efficient, dangerous, practical

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Availability and Use of Quantum Computing Increases (Continued)	virtual reality Faster, more accurate ability to calculate and map genomes, protein chains, etc.		technology will drive consumer wave.			
Life Expectancy Reaches 100	Extension of retirement age or age at which benefits can be drawn Tension between elderly and youth as young have more difficulty entering work environment. Extended adolescence.	Technology with applications for the elderly (medical, etc) increase	Extended retirement decreases income tax base; fixed incomes reduce or upset traditional consumer patterns Burden on social services increases, debt increases	Population rise increases strain on raw materials, energy resources, medical raw materials	Political clout of elderly continues to rise. Reduction of military-age population Debates about ethics and euthanasia	Older society may be less apt to be violent; less conflict.
U.S. reduces barriers to immigration to balance out an aging workforce	Rise of linguistic and cultural subgroups with animus to host nation emerge, driving division between "Americans" and the immigrants. Ethnic tensions. English no longer dominant language Decrease of notions of sovereignty	Increasing automation and efficiency decreases need for immigration to supplement work force; results in increased social security burden or exodus back to home nations.	Influx of young labor helps to fund social security for elderly. Automation decreases need for labor, increasing social welfare payments. Debt increase. Remittances decrease amount of money spent in the U.S.	Increased population in the U.S. leads to areas of strained resources and water Population movements increase burden on eastern cities with ageing infrastructure	Rise of immigrant groups political influence Evolution of distinct non-U.S. legal or political system because of foreign influence Tension in public space leads to political fracturing	Ethnic tensions lead to more militia or gang activity Improved notions of America leads to less animosity worldwide
Japan's Social Welfare System Collapses	Impoverished elderly forced to rely on families Rise of euthanasia or	Technology increasingly focuses on elderly care (esp. medical).	Fixed or low income elderly forced to reenter job force or stop consuming.		Political tension about how to reenergize welfare system consumes all policy space	Other powerful Asian nations and Russia take advantage of Japan's turmoil to gain political, economic,

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Japan's Social Welfare System Collapses (Continued)	elderly suicides Tax burden on youth leads to poorer young population		Japan loses position as a leading economy Cost to restart welfare system exceeds govt. expectations		Political debates rage on how to care for elderly shortsighted and hamper nation's growth	military advantage
Increased reliance on riparian hydropower	Large quantities of reliable, cheap, renewable power increases quality of life Water allows subsistence farmers to regain lifestyle, provide food for selves	Technology harnessing large amounts of seawater leads to large-scale desalination Large pump designs advance, leading to better irrigation techniques	Cheaper energy frees income for other consumption sectors Decrease of coal and natural gas extraction leads to job losses Energy raw material export losses decrease government or corporate incomes	Awareness of ocean health increases (or conversely, care over ocean health decreases) Pump designs kill sea life in large quantities (like wind-farms kill birds today) Decrease in fossil fuel-derived electricity decreases CO2 emissions, oil spills Energy security for most coastal nations Extend oil 'peak' for gasoline powered vehicles Less desertification	Policy space to deal with issues in a non-energy critical environment Government drives innovation to develop desalination to prevent water scarcity Take advantage of technology to export to other countries as 'technology diplomacy'	Less chance of water-based conflict Water security decreases migration and famine Decrease in food insecurity-related conflict and 'food as a weapon'
Widespread Desertification	Mass population movements Large-scale urbanization As habitable area decreases, cities become primary formation of governance over the state	Advancement of technology to purify / desalinate water Cities develop better methods to house people, better infrastructure Increased reliance on GMOs and biospheres to produce food	High cost of resettlement and accommodation of environmental refugees Burden on food production increases food prices	Decrease in oxygen into the environment from loss of forest cover Dust storms block sunlight in some regions and erode soil cover, exacerbating problem Large scale remediation driven by international partnerships reverses trend	Decentralization of authority as city-states or states become dominant governance entity Further break-up of nations with poor federal traditions (especially in Africa)	Tension over land rights, water access and food drives conflict Population migrations cause conflict, civil wars, failed states Tensions lead to genocide in places like Africa, Middle East

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Arctic ice melt allows for the extraction of energy, minerals, and food	Additional resources increase quality of life, extend 'peak' extraction estimates Increase habitable areas in Northern latitudes	More environmentally friendly resource extraction methods Advanced ice and weather hardened equipment	Decrease in food and commodity prices due to shortened Northern Sea Route transit Decreased commodity prices drives consumption, production and employment High cost of mitigation / relocation due to higher sea levels depresses economies	Increased sea levels drive populations farther from coasts (at very high cost) Disruption of weather patterns Environmental damage in Arctic from spills, overfishing, etc.	Political conflict over access and rights to the seabed in the Arctic. Conflict over transit rights for shipping Political conflict over non-Arctic nation's access to Arctic energy and raw materials Possible race for Antarctic access despite conventions prohibiting national claims	Conflict over Arctic access and resources between Russia, China and U.S., Canada and European nations New zone for military operations open in the sea lanes of the Arctic
Super-empowered individuals overtake state affairs	Loss of individual citizens' ability to access or create wealth, petition govt. for redress of grievances, make govt. responsive to public Reduction of small business ownership due to massive retailers	More concentrated wealth resources devoted to specific technological advancement New technological means for these individuals to subvert government oversight of their activities	Concentration of wealth in monopolistic enterprises (i.e. new 'robber barons' that are international, connected, and influential in government Insulation of individuals from bubbles and more radical disruptions of the economy Large corporations create large amounts of jobs and decrease prices for consumers; increasing the middle class	Large corporations and super-empowered people less beholden to environmental regulations Can act as influential advocates for environmental action	Reduction of government independence over policy due to influence and lobbying efforts wielded by super-empowered Internationalizing of policy affecting super-empowered people, difficulty in restricting monopolistic practices due to international reach of these individuals	Possible increase in 'private armies' to enforce will of the corporation Co-opting of federal security architecture and bureaucracy for own purposes Involvement of these people at the sub-state level influencing relations between states, possibly driving conflict or even possibly mitigating conflict
Loss of control of the cyber world to well organized, non-state hackers	Population decides to become less-connected to cyber world; slowing advancement in	Rise of very secure computing technology and quantum technology to protect against	Loss of income and monetary stability due to cyber attacks on banks, federal reserve, stock markets.	Hackers take control of SCADA connected platforms to shut down dams or control mechanisms for oil platforms or	Governments struggle to maintain legitimacy and governing control Inability to secure	Cyber weapons become more practical, harder to detect and used more often

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Loss of control of the cyber world to well organized, non-state hackers (Continued)	these areas Erosion of privacy leads public to restrict self-publication of personal information on social networking	these hackers Use of the same quantum technology to break through government systems	Panics and shocks in these markets decreases market share and erases wealth quickly Runs on banks and hoarding of certain commodities, radical decrease in consumption causes job losses, slowed growth Increase in free downloadable content causes reduced corporate income and less revenue in taxes	power plants, causing environmental damage	networks and prosecute hackers drives dissatisfaction and distance from governments – leads to increase in reliance on corporations for this security Govt. overreaction to hackers causes overbearing security architecture, reducing privacy and other freedoms	
Terrorist groups attain the ability to carry out CBRN attacks	Public fear leads to distrust of foreigners or other identifiable groups that conducted attacks Public fear leads to vigilantism, insulation	More efficient detection techniques to monitor large areas for CBRN New investigative technologies to catch terrorists Improved CBR exposure mitigation techniques	Panic leads to decreased consumption and revenue loss Cash hoarding and runs on banks Economic shocks felt worldwide Direct cost due to damage of event and clean up of CBRN residue	Environmental damage caused by CBRN exposure take a long time to clean up CBRN residue has long term impact on regional environment, water table, livability of an area Medical pandemic due to pathogenic biological agents	Decrease in confidence of govt. to protect populace Security overreaction by authorities Increased policing and investigative technologies decrease levels of other crime	Terrorism attributable to state actor continues to cause conflict and war Security overreaction reduces personal freedoms Rise of factionalism in some nations due to ethnic tensions
Antibiotic-resistant "super bacteria" emerge	Rise of distrust in contact with other people Insulation and agoraphobia increase Increased home care, hospital avoidance	Increase of non-antibiotic technology to kill bacteria (nano-technology, UV light) Reduction of antibiotic use leads to	Large cost outlays to develop new technologies and new antibiotics Cost to isolate patients with very serious diseases	Super-bacteria in the environment infect wildlife, decreasing their numbers Water and food borne pathogens contaminate public water infrastructure	Decrease in confidence of govt. to protect populace Large-scale govt. efforts to isolate, quarantine and stop pandemic – forces govt. to work together to	Oppressive techniques to control borders, quarantine populations and patients Conflict over access to medical care, human rights abuses

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Antibiotic-resistant "super bacteria" emerge (Continued)		increased human health and natural resistance to pathogens New techniques to fight deadlier pathogens or destroy biological weapons	Pandemics decrease economic activity and increase fear, decreasing consumption and transportation Quarantines slow globalization		fix problem Governments isolate themselves from foreign countries to prevent spread of pandemics	against infected persons
Computers pass the Turing test	Redefinition or complication of what it means to be human and what is life Redefinition of sentience, cognizance and intelligent perception Rise of machines to human level requires ethical thought over treating it as a life-form, and if the machines should have human rights (a robot underclass?) Excessive reliance on an 'exocortex' in the form of computing technology degrades or atrophies human thought processes	Machines able to reason at speed of human thought Advanced computation allows machines to supplement human intellect for beneficial technology inventions – working in tandem Allows for fully autonomous robotics useful for exploration on earth and in space	Autonomous machines create less need for human employment Machine interfaces replace human supervisors More efficiency leads to less cost in manufacturing and other realms	Machines are less susceptible to pollution, assisting in clean-up operations Computers assist in evaluating clean-up efforts and evaluate impacts of new chemicals	Governments struggle with definition of human-intelligent machines as living things – do they require rights? Dignity and sanctity of life begins to be questioned	Fully autonomous, sentient machines on the battlefield

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Genetically modified species escape into the environment and alter the ecosphere		Technology able to track and reverse genetic modification	Costly remediation Food cost increases	Loss of natural species to genetically modified ones Decrease in biodiversity	Decrease in confidence of govt. to protect populace Government has opportunity to stop genetic modifications, push for natural products and environmental stewardship	Increase in food conflict
Rise of City States	Reorientation of public's national identity as a citizen of a city, instead of a nation Increased internal tensions between regions in formerly united nations		Loss of national prestige as economic power as smaller sovereign entities conduct own foreign policy Some regions more isolated from national and global shocks	No nationalized environmental policy could lead to environmental degradation	More responsive local government ability to react to public needs Less federal oversight of local institutions Break-up of federalized governments; multiple new 'countries'	Rise of conflict between cities or states within nations (essentially civil wars) due to lack of national control over and responsiveness to interstate affairs
Warlordism completely replaces state structures in Southwest Asia	Tribalism continues to degrade national identity	Loss of university and research organizations	Break-up of state economic structures, incomes based on crime and sub-national economies No taxation funding govt. coffers	Loss of govt. control over sanitation, power generation, etc. leads to environmental degradation and health crises	Overthrow of centralized governments creates human rights crises among periphery ethnic groups Intertribal strife, loss of logistical provision of goods to inner regions Breakdown of diplomacy with neighboring nations	Loose nuclear weapons in Pakistan Danger of increased conflict across region within tribes and across borders (India, into Central Asia, into China, etc). Spill over conflict and open borders allows terrorists and insurgents freedom of movement and action
Trading blocs made of private industries escape state control	Public becomes controlled by corporations and beholden to them for most	Industries share and jointly develop expensive and advanced	Bubbles created outside of govt. purview and investigative power lead to	Less government oversight over corporate impact on the environment	Government slowly loses governing power over citizenship, public loses	Conflicts between trading blocs could lead nations into conflict

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Trading blocs made of private industries escape state control (Continued)	needs	technology, cost and burden sharing Technology more controlled by monopolistic corporations, pace of advancement decreases	more market instability / burst bubbles, leading to lost personal wealth		confidence in govt., policy independence ceded to lobbying efforts	Mutual interests between trading blocs and resulting influence on government could mitigate interstate conflict (i.e. the "no two countries with McDonalds have ever gone to war" postulate)