

House Annual Report on Forward Engagement  
Washington, DC 20515

December 12, 2006

House Annual Commission  
On Forward Engagement  
United States Congress  
Washington, DC 20515

Dear Commission Chair:

We are pleased to submit to you the attached "House Annual Report on Forward Engagement." This report explores the concept of "forward engagement" and the complexity that the future presents to lawmakers. Upon appointment of the committee in September 2006, we began a thorough review of the findings of past forward engagement panels. We built upon the work of our predecessors and incorporated a variety of forecasting techniques to critically examine and classify potential future trends and events through the prism of Public Law 6414. We analyzed a broad set of these Future Contingencies of Interest (FCIs), which we strongly believe warrant further examination pursuant to the procedures outlined in that law.

Our assessment prompted an effort to thematically categorize FCIs in order to present a more holistic picture of the developments poised to impact our future. We also sought to identify and examine some of the major issues that governance faces upon tackling these FCIs, an approach we believe to be particularly applicable for policy making. Moreover, we explored techniques that Members of Congress could use to better orient themselves to deal with these issues. We subsequently composed a list of amendments to PL-6414 based on our findings. Should the House of Representatives pursue the recommendations of this commission, we believe the US government can succeed in taking the necessary steps toward improving its ability to identify and plan for events and trends that seem far off today, but may suddenly emerge as urgent issues in the future. We therefore contend that contained within this report are the tools necessary to provide the House of Representatives with a Forward Agenda for the Congress.

While this panel was given a mandate to focus exclusively on the Legislative Branch, its work is part of a broader effort to impart forward thinking on the entire US government and on the broader American public. For that reason, we have also included a series of recommendations regarding parallel changes to the Executive Branch.

This document should be read as a work in progress. Feedback is not only welcome, but requested. Please forward all comments and questions to the undersigned. We thank you in advance for your feedback.

Sincerely,

Evan M. H. Faber  
Staff Director

Enclosure

[SIMULATION: For Classroom Purposes Only]



House Annual Commission on Forward Engagement

Annual Report

Congressional Forward Engagement Session

December 2006

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### **Forward Engagement:**

*“A process of thinking systematically about the longer-range future, and about ways in which public policy might engage the future sooner, rather than later. Forward Engagement conveys a three-part thought: (1) we are facing an acceleration of major historical events, some of them carrying the potential for major societal and international consequences; (2) society in general and government in particular, need to address such possibilities as far in advance as possible, in terms of policies and resources; and (3) there needs to be a system to help government visualize more consistently what may be approaching from the longer-range future, and to deliberate in a more timely way about possible responses. Forward Engagement seeks to comprehend major future developments in the broad categories of defense, economics, science and technology, and governance and to strive to understand how these developments interact and influence each other.”*

*--Leon Fuerth*

## **Executive Summary**

Society stands on the precipice of great change unprecedented in both scale and velocity. From the peak of oil production to the potential to end energy scarcity, from global pandemics to converging technologies yielding new cures, challenges and opportunities promise to arrive rapidly and alter every aspect of human life. The rate of change shows no signs of slowing down; in fact it is poised to continue to accelerate. In this era of complexity and uncertainty, the US government has the ultimate responsibility to its citizens to identify, assess, and plan for the critical changes that we will have to face in the decades to come. No other institution in the country has the resources or responsibility to contend with the coming challenges as does the federal government. However, the government today still has few structures that are prepared to deal with fast-moving, far-reaching changes. As such, the US government must transcend a short-term view of governance and adopt a long-term, forward-thinking posture in order to keep pace with rapid external change. It must go forward to operate within our increasingly complex and accelerated world by discerning new issues quickly in increasingly interconnected fields. All of this is essential to preserve the sovereign power and representation of the American people.

The Legislative Branch of government has been branded as an 18<sup>th</sup> century organization struggling to keep pace with 21<sup>st</sup> century technology and change. However, last year's passage of Public Law 6414 was the Congress' important first step toward preparing the US government and the American people for the challenges of the future. The law formed two parallel commissions: the House Annual Committee on Forward Engagement (HACFE) and the Senate Annual Committee on Forward Engagement (SACFE). The function of these institutions is to provide members of Congress with an institutional awareness of Forward Engagement and direct Congress to systematically incorporate foresight into the governing practices of the United States. Drawing upon expertise from both the public and private sectors, HACFE and SACFE seek to provide the Congress with constant assessment of future threats and opportunities. Their primary purpose is to enable Congress to create legislation preemptively and authoritatively to address future developments in technology as well as rapid social, environmental, economic and political change. Their ultimate purpose is to empower Congress to push the broader federal government to evolve a national strategy for addressing an accelerating onrush of Future Contingencies of Interest (FCIs).

As the current staff of HACFE, we have operated under the direction of PL-6414 over the past five months. By statute, it is our duty here in December to convene this inaugural Congressional Forward Engagement Session (CFES). In preparation for this session, our assignment was three-fold:

- 1) Develop a new methodology for analyzing FCIs, one which makes “systematic use of nodal analysis to catch important interactions”
- 2) Comprehensively assess structural recommendations suggested by the previous panel, and provide further recommendations accordingly
- 3) Demonstrate the Component-Level Implementation Process (CLIP), and assess its effectiveness as a tool for policy making

We contend that our staff not only completed these tasks, but transcended our assignment. The staff has generated a new, holistic approach to addressing FCIs that we believe is functionally tailored toward policy making. Furthermore, the staff has produced a comprehensive assessment of the current Forward Engagement process in Congress, and in turn suggested detailed structural reforms for both the Legislative and Executive branch. In addition, we have demonstrated the ability of CLIP to systematically assess a government-backed conversion to a hydrogen economy. We also incorporated a new software tool called The Future Map to aid our CLIP analysis. The following paragraph outlines the methodology we employed for each of these components:

#### **Future Contingencies of Interest (FCIs) – *Thematic and Issues-Based Methodology***

Previous HACFE staffs directed their FCI analysis toward assessing, in detail, the specific trends or events that they believed warranted substantial and immediate government response (or consideration at the very least). As per the recommendation of the Spring 2006 staff, our approach to FCIs seeks to employ “systematic use of nodal analysis to catch important interactions.” Instead of focusing on specific FCIs, our team concentrated on assessing the overarching *themes* and *issue-nodes* that emerge when holistically approaching a wide set of FCIs. The FCI section of our report therefore employs this broader methodology in hopes that it will be more readily employed by policy makers to generate effective policy that will help promote desired outcomes and curtail unwanted circumstances long into the future.

#### **Organizational Process and Structural Proposals**

The nature of FCIs requires a proactive policy approach, a process that looks at alternative futures with common threads, avoids the limitations of a most likely future, and develops a forward-looking, robust and iterative decision process. Accordingly we have developed an institutional framework to reorient both the legislative and executive branches of the US government such that it will be better able to actively engage FCIs in a holistic manner.

In the legislative branch: separate, permanent, Select Committees on Forward Engagement should be established in the House and the Senate. These committees would be empowered

to develop and enact legislation that would impact strategic planning in the long term across a range of issue areas and government activities. These select committees would replace the existing Commissions on Forward Engagement.

In the executive branch: an Inter-Agency Working Group on Forward Engagement should be established. Forward Engagement is a topic that spans most sectors of government; the working group would be empowered to coordinate forward engagement across various policy areas.

In addition we recommend that a research-oriented Center for Future Studies be established. This Center would serve as a center of gravity for FCI related research and expert advice, and would interface with both the executive and legislative forward engagement structures. Establishment of this research center would allow the Select Committees and the Working Group to focus on policy work.

We contend that the structure we have developed offers a more robust approach to Forward Engagement than under previous and current arrangement. Through adopting this institutional structure we believe that both the executive and legislative branches will be effectively positioned to address the policy implications of FCIs.

### **Component-Level Implementation Process (CLIP)**

CLIP is a tool that enables policy makers to mitigate the political risk inherent in introducing programs with long-term objectives whose final results may not be seen for decades. The CLIP process:

- Describes a desired long-term objective
- Develops a series of short-term steps or components needed to achieve the objective
- Frames components in legislative language and timed to match political cycles

\*\*The stand-alone benefits of each component must be important enough to win congressional support even if the other components fail and the long-term objective is not achieved

We use a case study — **Kick-Starting the Transition to a Hydrogen Economy** — to illustrate the merits of this approach.

# Future Contingencies of Interest (FCIs)

## *Thematic and Issues-Based Methodology*

**Future Contingencies of Interest (FCIs)** are the most fundamental unit of analysis used in futuring. FCIs are potential future developments that serve to have a profound effect in all realms of the human experience, including society, technology, environment, economics, governance and security.<sup>1</sup> FCIs essentially fall into two conceptual categories:

- **Trends:** FCIs can be projections and extrapolations of current **trends**, often concentrating on a tipping point at which these trends cascade through various aspects of society and result in transformative change.
- **Events:** FCIs can also be single breakthrough **events**, in which developments that are largely unanticipated result in transformative change pervading the human experience.

### **Forecasting Methodology – From Specific to Holistic**

Since FCIs encompass an almost limitless range and variety of trends and events, our ambitious goal was to discover and employ a framework that would serve as a systematic and effective tool for policy makers. In doing so, this staff diverged from the traditional methodology employed by our predecessors, which targeted a limited and specific set of FCIs for exhaustive analysis.<sup>2</sup> Because FCIs do not exist in a vacuum or independent from one another, we contend that a viable grouping method would provide the foundation for a more holistic understanding of the interconnectedness and relationships that tie various FCIs together.

When discussing interconnectedness, it is essential to acknowledge the growing influence of network theory for analyzing large, dynamic systems. Networks are organizational structures consisting of interactive patterns linking interdependent elements within such a system. The elements that are thus connected are referenced in network theory as ‘nodes.’ To a large extent, FCIs can be understood in this framework. They are, by nature, dynamic and interactive parts within a greater system. Consequently, by attempting to sort FCIs and analyze them relative to the chosen classification, our approach reflects one of the primary recommendations made by the Spring 2006 staff: to employ *nodal analysis*. Although this terminology is not predominant in the following explanation, our methodology is essentially a type of nodal analysis.

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<sup>1</sup> Appendix C provides a complete list of FCIs that have been compiled and analyzed by current and previous staff personnel. However, any such list of FCIs is, by nature, an organic, living document. It therefore necessitates regular revision in order to update and refine the issues and themes that demand attention from policymakers at the present time.

<sup>2</sup> Appendix D provides an assessment of alternative futuring techniques, which we believe to be extremely useful for assessing individual FCIs. These techniques were omitted from this report as a result of the broader methodology we employed.



Although there are a multitude of options for sorting FCIs, our analysis yielded two useful analytic frameworks:

- **Themes** are the currents that run through history, and therefore provide a useful ‘big picture’ framework in which to think about the future. Not only do themes emerge from a series of past events, their properties tend to have a meaningful impact upon future related events. Thus, categorizing FCIs by theme provides a useful framework for understanding the ‘big picture.’ It is worth noting that one FCI may be considered an element in the development of more than one theme.
- **Issues** are non-political questions that arise when considering FCIs and their wide variety of potential implications. When assessing a collection of FCIs, certain issues tend to arise again and again. The relationship that a given issue has with individual FCIs can vary: the same issue can promote one FCI and curb another. Tackling one issue could then affect a wide variety of FCIs, irregardless of the themes associated with them. Consequently, issues incredibly useful for policy makers in that they demonstrate the ways in which policy generated to address a particular issue can cascade through multiple FCIs across various themes.

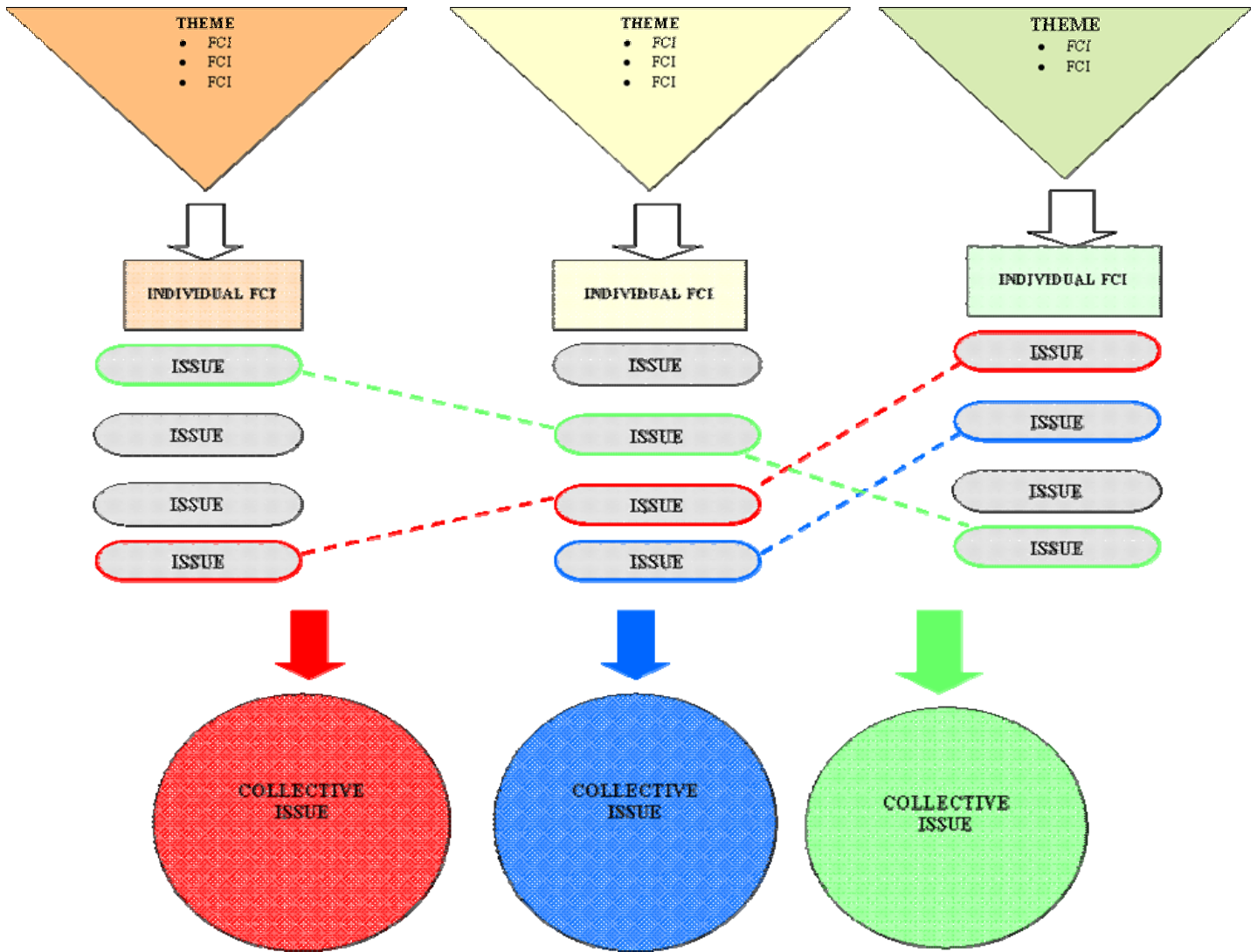
While these analytic distinctions are predominantly independent from one another, the methodology we employed utilized both of them. The goal was to generate an approach to FCIs that is as holistic as possible. We contend that policy makers should always bear in mind the relationship between issues and themes, as themes provide the historical context for understanding issues. Issues analysis became the focus of this process because of their cascading effect throughout FCIs. Disparate FCIs can be broken into similar component issues which give policymakers a metric to identify how best to deploy limited resources. The goal is to identify the issue with the greatest impact, and build capabilities that will address it and consequently address the widest variety of FCIs. Our technique is illustrated by Figure 1 on the following page and is outlined as follows:

- 1) Extract multiple FCIs from their various themes
- 2) Identify major non-political questions that arise when considering each FCI
- 3) Translate these questions into broader *issue-nodes*
- 4) Identify FCIs that would be impacted by a policy that addressed each issue
- 5) Analyze the FCIs in each issue by employing STEEP:

**STEPP** allows futurists to assess FCIs according to the impact and consequences they may have in each of the five categories that are incorporated in the acronym. As suggested by the previous panel, we have employed this method in our analysis in favor of the previous, narrower working-group structure. We contend that these categories allow for a holistic analysis of individual FCIs, and can be used independently or within the context of a broader framework.

Societal  
Technological  
Economic  
Environmental  
Political\*  
\* (including *Governance  
and Security*)

**Figure 1: Theme and Issue Nodal Analysis Methodology**



### **Analysis by Themes:**

We contend that decisions about building capabilities to address issues should strongly take into consideration the relevant historical themes that we have identified. These themes will help to refine decisions about capabilities and possibly provide better insight about the specifics of what needs to be addressed by policy. Our research yielded three major themes that can encompass a wide range of FCIs. While themes are generic by nature, they are useful for providing a ‘big-picture’ framework for FCIs. The themes we identified are:

- 1) Scientific and/or Technological Development preempts government response
- 2) Non-state actors diminish the primacy of the sovereign state
- 3) State actions upset the status quo.

*What follows is a description of these thematic distinctions. The analysis by issue-nodes section afterward demonstrates how we extracted FCIs from these themes and analyzed by issues that are most relevant to policy makers.*

#### **1) Scientific and/or Technological Development preempts government response**

This theme addresses the transformative impact of science and technology. It is primarily concerned with trend and event FCIs that are initiated or highlighted by scientific or technological innovations. The evolution of this theme is directly impacted by the *funding* and *policy guidelines* (or lack thereof) provided for scientific research. Appropriate funding can keep governments on pace with technological achievements and effective oversight would allow high impact discoveries to be preempted by government response.

*Examples of FCIs that can fall under this theme include:*

1. Converging technologies (Nano-Info-Bio-Cogno)
2. Global pandemics intensified by multi-drug resistance
3. Molecular biology advances and viable human cloning
4. Widespread availability of the Internet and mobile phones
5. Adoption of alternative energy
6. Biological/Chemical attack/outbreak
7. Weaponization of space
8. Drastic climate change

## **2) Non-state actors diminish the primacy of the sovereign state**

This theme focuses on the abilities of non-state actors to directly and significantly impact the governing abilities and decisions of traditional states. As the number, magnitude and influence of NGOs, Multi-National Corporations (MNCs), sub-state actors, regional organizations and international organizations continues to grow, the traditional state's ability to govern may soon reach a competitive tipping point. For this reason, it is essential to understand the abilities and intentions of non-state actors in order to assess the effects they can have on traditional governance.

*Examples of FCIs that can fall under this theme include:*

1. Multiculturalism and integration of minorities
2. Proliferation of WMDs
3. Rise of Multi-National Corporations
4. Global pandemics intensified by multi-drug resistance
5. Disruption of maritime commons
6. End of NATO
7. Widespread availability of the Internet and mobile phones
8. Drastic climate change (influenced by non-state actors)

## **3) State actions upset the status quo**

This theme is a reflection on states' ability to make foreign policy choices based on traditional rationales that nonetheless may end up altering the way the game is played. To use an historical FCI, if the Cold War states had partaken of Mutual Assured Destruction (MAD), the way international affairs are conducted, and the very state of the globe would have been unrecognizably distorted.

*Examples of FCIs that can fall under this theme include:*

1. End of NATO
2. Disruption of the maritime commons
3. Nuclear Proliferation
4. Traditional war becomes obsolete
5. Alternative energy
6. Biological/Chemical attack/outbreak
7. Increased government surveillance
8. Weaponization of space
9. Economic power-shift to Asia
10. Drastic climate change (influenced by state actors)

Our analysis yielded the following benefits of this approach:

- 1) Thematic analysis produces a 'big picture' framework for understanding FCIs. Using this framework, policy makers can understand the direction in which certain trends are headed. By viewing FCIs from this bird's-eye perspective, policy makers can more easily see the points of interaction among various themes. This is most clear when the same FCI can be categorized in multiple themes.
- 2) By viewing FCIs from this thematic perspective, policy makers can extract the component issues of FCIs that should be addressed to prevent deleterious development of themes or to take advantage of trends within themes that may benefit the national interest. Identifying the array of themes that frame FCIs is imperative for policy advice, since the policy tools employed (such as incentives or disincentives) may have a wide variety of impacts on various thematic trends

This approach also yielded the following limitations:

- 1) There is no perfect, clear-cut way of categorizing FCIs by theme. An FCI may represent a potential scientific breakthrough and simultaneously have enormous security implications depending upon the initiator and the level of government preparedness. In addition, the direction of a thematic trend can be significantly altered by the fruition of any given FCI. The future is beholden to the law of unintended consequences. Thus, the incredibly dynamic nature of themes curtails a wholly systematic method for grouping FCIs by theme.
- 2) Themes are of limited immediate applicability to policy makers. Because they provide a 'big picture' framework, themes do not specify the particular issues to which policy makers ought to pay attention. Instead, themes are a phenomenal trend of potentially limitless duration that cannot be remedied or nullified by policy. Policy merely defines a government's attitude and approach toward these dealing with these themes.
- 3) Policy makers should be primarily concerned with issues when creating policy. Themes have the potential to distract. In order to remedy this problem, thematic analysis should only be employed as a way of stepping back to see the 'big picture.'

### **Analysis by Issue-Nodes:**

In order to analyze FCIs in a manner that is more directly applicable and useful to policy makers, we have synthesized a nodal analysis by key *issues* that emerge from FCIs that cut across various themes. By grouping FCIs by issue-node, policy makers can more clearly understand how a policy decision that addresses a particular set of issues can produce effects that cascade through multiple FCIs, even when these FCIs may appear thematically unrelated. Our research yielded three such policy issues:

- 1) Definition of Human Life
- 2) State Sovereignty
- 3) Privacy vs. Security

What follows is a thorough analysis of each issue-node. Included are both a general description of the dominant issue and a list of FCIs that would be directly impacted by a policy aimed at addressing it. In addition, we have also stated the key issue questions in order to elaborate further on the scope of each issue. Finally, we have employed the STEEP method to fully assess each FCI within the context of its parent issue.

It should be noted that, as in the case of thematic categorization, analysis by issue-nodes has the tendency to produce repetition with regard to FCIs. The fact that the same FCI emerges in the context of diverse issues may be taken as a hint of its significance. Despite repetition, FCIs are analyzed by STEEP only in the context of their parent issue.

## **Issue-Node #1 - Definition of Human Life**

In recent decades, the definition of human life has come under immense public scrutiny. This is primarily a result of modern advances in science and technology that offer both (1) heightened understanding of, and (2) significant ability to *influence and control the structure, functions and capabilities of the human body and brain*. Current examples of technologies that relate to this theme include (1) routine use of prescription drugs to alter brain functions, (2) the ability to safely and easily abort pregnancy, and (3) new techniques that allow for the cultivation and manipulation of human stem cells. These developments have already sparked a fierce national debate regarding the definition of human life as well as the authority and responsibility of the US government to take a stance on the issue.

It is our opinion that this issue will become further complicated as science and technology progresses in the coming decades. Our research indicates that the aforementioned advances are only the tip of an iceberg that may serve to shock our understanding of humanity as we now know it. Current trends project rapid acceleration of developments in the near future that could dramatically increase our ability to understand and manipulate the human body, brain, and perhaps even the human mind.<sup>3</sup> As such, this commission urges the US government to strongly consider the following future contingencies of interest that are related in a significant manner to this issue:

### **Definition of Human life – FCIs:**

1. Molecular Manipulation of Human Biology
2. Viable Human Clones
3. Power shift to Asia

What follows is a description and detailed analysis of these FCIs, have potential to further compound this issue. In order to address these FCIs, the US government should consider the following key questions:

### **Definition of Human life – Key Issues / Questions:**

- Should the US government attempt to define human life, its boundaries and/or its purpose?
- Can human life, its boundaries and/or its purpose be defined without generating a political storm that would upset the process of forwardly engaging these FCIs?
- What role do privacy and ownership play in the definition of human life?
- Should ethical boundaries be set to promote or curb FCIs?
- Whose ethics should define these boundaries?
- Should/can the US Government enact legislation to define these boundaries?

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<sup>3</sup> See: Mihail Roco and William Sims Bainbridge, *Converging Technologies for Improving Human Performance*, WETC, Inc. 2002.

Definition of Human life – FCI Description and STEEP Analysis:

**1) Molecular Manipulation of Human Biology**

This FCI describes the developing capabilities of molecular biology to manipulate human biology. Greater understanding of the central dogma underpinning molecular biology will lead to manipulation, testing and treatment abilities. This technology and its applications can lead to a variety of opportunities and problems that will face governance as a whole.

Based upon the use of recombinant technology we can foresee the use of one person’s DNA to cure a disease or remove an imperfection in another. Many surgeries and treatments, instead of being exercised at the macro level, could be converted to micro-scale molecular treatments. What price will be placed on these new treatments? And, more significantly for our analysis, how will this technology affect the definition of a person?

If a person were to be entirely defined by their individual genome, at what point does inserting a DNA code into someone’s genome alter “who they are”? Can a person use a part of their identity (i.e. their genetic code) as part of testing? Perhaps genetic predisposition to certain illnesses could be used to disqualify a person from acquiring health insurance. A US definition of human life could either greatly *diminish* or *liberalize* the services available to those that exist within its borders. It would also affect those that travel outside the US to get treatment and return to the country, as the definition would affect what rights they are entitled once they return.

<b>S</b>	<ul style="list-style-type: none"> <li>• Could lead to double standardization of people; those with genetic “weaknesses” and those genetically “superior”. Genetics becomes the class determination.</li> <li>• People could be paid for access to their genetic code, prostituting their DNA.</li> <li>• Someone’s molecular biology could become part of standardized testing for a variety of services</li> </ul>	
	<b>T</b>	<ul style="list-style-type: none"> <li>• Genetic engineering becomes common place.</li> <li>• Wide variety of new “natural” compounds available.</li> <li>• Medicine becomes molecular based instead of macro level.</li> </ul>
		<ul style="list-style-type: none"> <li>• Insurance industry is transformed. Centrality of risk is neutralized.</li> <li>• Pension and old age benefits are transformed to serve those that would be expected to live longer.</li> <li>• Work force would be overhauled to “properly” appropriate people based on genetic code.</li> </ul>
	<b>E</b>	<ul style="list-style-type: none"> <li>• New age of discovery as missions try to obtain genome/proteomes of various organisms.</li> <li>• Huge increase in production of clinical grade chemicals leads to increased pollution.</li> </ul>
		<ul style="list-style-type: none"> <li>• Governments and Society must decide if public goods and centralization of cost are still viable options. The premise of equality is challenged.</li> </ul>
<b>P</b>	Government	<ul style="list-style-type: none"> <li>• Governments and Society must decide if public goods and centralization of cost are still viable options. The premise of equality is challenged.</li> </ul>
	Security	<ul style="list-style-type: none"> <li>• Increased internal security risks with the polarization of society.</li> </ul>



## 2) Viable Human Clones

This FCI is concerned with the generation and establishment of viable human clones. It presumes that the technological and moral questions over the production of clones have been overcome, and looks at the issues which might then ensue.

Any effort by the US government to define human life would have to account for possible cascading consequences. If a policy were enacted to, say, ban human cloning, what affect would that have on a clone created in another country (or even within this country), were it to live within the borders of the US? If the point of origin of human life was described as the zygotic stage, all stem-cell creation and the building blocks of cloning would become illegal. It would also greatly affect the ability of the US to utilize this technology for a variety of other uses such as drug creation and production.

<b>S</b>	<ul style="list-style-type: none"> <li>• Could lead to a revised 'definition' of what it means to be human.</li> <li>• The society in which the first clone is produced will set the precedent for how clones are integrated into existing systems.</li> </ul>	
<b>T</b>	<ul style="list-style-type: none"> <li>• Many potential advances in the medical realm, especially when combined with other scientific advances.</li> <li>• Parents would have the ability to clone deceased children.</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Questions of affordability and access to medical advances arise, precipitated by cloning techniques.</li> <li>• Questions surrounding workforce and possible endless availability of labor greatly affect the productivity of a nation.</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Environmental strain due to dramatically increased population.</li> </ul>	
<b>P</b>	Government	<ul style="list-style-type: none"> <li>• Governments have to decide the legal status of clones. Should they have the same rights as 'traditional' people? Should they be treated as the property of the entity that produced them?</li> </ul>
	Security	<ul style="list-style-type: none"> <li>• It may be possible to replace traditional soldiers with clones. Combine cloning with genetic manipulation techniques and it becomes possible to field armies of soldiers with enhanced traits. The likelihood of this development depends on the perspective that societies and governments adopt toward cloning.</li> </ul>

### 3) Power Shift to Asia

This FCI describes the overall movement of power from the United States to Asia. This could lead to a balance of power in a multipolar world with the United States as merely one of many major actors. Alternatively, it could lead to the rise of a new global hegemon, perhaps in the form of China or Japan. The possible loss of dominance (or even crash) of the dollar would contribute to this. Innovation in science and technology could shift from the US with MNCs following the available technology.

A particular policy definition of human life could make certain types of research illegal in the United States. This would likely initiate a technological ‘brain drain,’ in which a number of highly trained intellects would leave the US for Asia where capital and looser definitions of a human life could lead to greater research opportunities. A more inclusive definition, on the other hand, could lead to the cementing of the place of science in the US economy and another advantage to tempt academics and industries to the US. However, this could also intensify the political debate that currently surrounds abortion and stem-cell research.

<b>S</b>	<ul style="list-style-type: none"> <li>• Large swathes of society would take on an Asian influence. Cultural norms would become more Asian, following common precepts held in a new Asian hegemon.</li> <li>• Asian language and media becomes more pervasive, with a variety of services offered in Cantonese, Mandarin and Japanese.</li> </ul>
<b>T</b>	<ul style="list-style-type: none"> <li>• Massive reductions in government and private financing for R&amp;D programs in the US.</li> <li>• Business failures reduce S&amp;T research in the US</li> <li>• Reductions in US R&amp;D lead to loss of comparative advantage and possible shift of S&amp;T supremacy to other countries.</li> <li>• Brain drain as US scientists and researches move overseas to more affluent countries.</li> <li>• Loss of foreign students who no longer come to the US to attend college reduces R&amp;D occurring at universities</li> </ul>
<b>E</b>	<ul style="list-style-type: none"> <li>• Massive devaluation of the dollar as people look to sell off all US valued assets.</li> <li>• Major recession in the US. Widespread bankruptcies of businesses and individuals. Enormous job losses due to bankruptcies.</li> <li>• Stock market crash due to the loss of faith in the dollar.</li> <li>• Housing market failures as credit is no longer available and dollar devaluations increase the risk associated with buying a house.</li> <li>• Increasing interest rates as lenders cope with dollar devaluation.</li> <li>• Loss of purchasing power of US citizens because of dollar devaluation.</li> <li>• Increased relative costs of foreign goods because of dollar devaluation.</li> <li>• Loss of US economic dominance.</li> <li>• Foreign companies and governments buy up strategic resource reserves around the world.</li> <li>• Potential run on banks if people loose faith in the banking industry.</li> <li>• Possible growth of black markets.</li> <li>• There is capital flight as investors look to other markets and opportunities.</li> <li>• US exports increase because the fall in the dollar’s value makes them more competitive</li> </ul>
<b>E</b>	<ul style="list-style-type: none"> <li>• Loss of government resources directed at protecting the environment.</li> <li>• Possible easing of environmental standards and enforcement to spur business</li> </ul>

<b>P</b>	<b>Government</b>	<ul style="list-style-type: none"> <li>• Loss of borrowing ability forces the government to increase taxes to pay for government spending</li> <li>• Massive budget cuts for US programs would have to occur to balance the budget.</li> <li>• Foreign aid programs would have to be cut as the government focuses its attention inward on its core responsibilities.</li> <li>• Reduced ability for the US government to influence worldwide events and issues due to loss of funding for foreign interventions.</li> <li>• Possible reduction in government emergency reaction time because budget shortfalls preclude quick responses.</li> <li>• Balanced budgets would be necessary since there would be no chance for government borrowing to cover any budgetary shortfalls.</li> <li>• End of pork-barrel politics and catering to special interests because unnecessary or non-critical programs would have to be cut.</li> <li>• Increased government accountability with respect to budgetary and spending decisions since all expenditures would have to be properly justified</li> </ul>
	<b>Security</b>	<ul style="list-style-type: none"> <li>• Massive reductions in military and security spending because of budgetary problems.</li> <li>• Decline in US military power over time because of a lack of funding.</li> <li>• Reduction in spending on new military technologies due to resource shortages.</li> <li>• Possible crime sprees due to the loss of wealth and increases in poverty by US citizens.</li> </ul>

## **Issue-Node #2 – State Sovereignty**

The question of the “Westphalian system” of sovereign-nation states and the right to political self-determination have come under considerable debate in the new era of international relations instigated in the latter half of the 20<sup>th</sup> century under the UN Charter and the Geneva and Hague Conventions. While these developments were initially intended to address a new dimension of global warfare, their importance has re-emerged in the new millennium under the driving force of globalization. The following FCIs demonstrate how the choice between unilateral and multi-lateral action can have far-reaching implications and is crucial to the fundamental policy objective itself.

The US government’s position on sovereignty is somewhat ambiguous given its unique responsibility and commitment in the global context. It will be important therefore to gauge the degree of sovereignty, or sovereignty sacrifice that will best allow policy makers to respond to future events. As such, this commission urges the US government to strongly consider the following future contingencies of interest that serve to significantly impact the issue of state sovereignty.

### **State Sovereignty – FCIs:**

1. Multinational corporations threaten to usurp state sovereignty
2. Cybercrime
3. Global Warming

What follows is a description and detailed analysis of these FCIs, which have a range of potential for further compounding the issue of state sovereignty. In order to address these FCIs, the US government should consider the following key questions:

### **Definition of Human life – Key Issues / Questions:**

- What aspects of government services are seen to be the most important or essential to hold on to?
- What steps can governments take to retain these powers and roles?
- Will governments turn inward as a way to consolidate power?
- Conversely, will multilateralism and international engagement be required for states to maintain their relevance?

State Sovereignty – FCI Description and STEEP Analysis:

**1) Multinational corporations threaten to usurp state sovereignty**

With the colossal growth of multinational corporations (MNCs), spanning across international political, economic and cultural boundaries, the states’ ability to govern within their respective territorial jurisdiction declines. The rules of commerce as well as the traditionally government-determined realms of politics and social well-being will increasingly come under corporate domination. Human and capital mobility across dissipating borders will be determined by corporate need, potentially obviating official immigration and international trade regulations. Multinational corporations with vast budgets surpassing many state budgets may develop private militaries to safeguard their mounting interests and assets that rival national armed forces.

In drafting regulatory policy that affects multinational corporations’ behavior, the United States must consider the broad implications on the economy. With the advent of auspicious technologies, the production of goods as well as services is facilitated across borders, and governments may opt to relinquish their level of sovereign capacity to a great extent in order to attract lucrative investments.

The United States’ efforts to curb MNC behavior in order to maintain its own sovereignty may dispel certain industries, which find institutional regulations as far too intrusive. However, the transfer of the primary state function to ensure territorial integrity and security for its citizens to multinational corporations may prove precarious as the latter is driven by profit; general social, political and economic do not count among MNCs’ principal objectives.

<b>S</b>	<ul style="list-style-type: none"> <li>• People’s lives become more affected by decisions of corporations than by governments.</li> <li>• Societal norms and values become influenced by the dominant corporations not by the people.</li> <li>• Corporations are not directly accountable to the people</li> </ul>	
<b>T</b>	<ul style="list-style-type: none"> <li>• Communications and IT technology contribute to the ability of corporations to act on a global scale.</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Governments are forced to invest to create industries that will ensure greater self-sufficiency.</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• If corporations find that “going green” increases their profitability, then this trend might be beneficial to the environment.</li> <li>• However, without the presence of strong government regulatory bodies to encourage environmentally sustainable approaches, pollution may increase, as might demand on natural resources. This might in turn contribute to other FCIs such as climate change.</li> </ul>	
<b>P</b>	Government	<ul style="list-style-type: none"> <li>• Corporations operate their own foreign policy.</li> <li>• Influence of state governments declines as the significance of corporations rises.</li> <li>• Corporations exert influence over the decisions and operations of governments.</li> </ul>
	Security	<ul style="list-style-type: none"> <li>• As states and borders become less significant due to the international network of corporations and global economic integration increases, traditional war changes.</li> <li>• Security-relevant decisions are increasingly made by corporations, not states.</li> </ul>

## 2) Cybercrime

Crime and terrorism in cyberspace pose a significant threat to state sovereignty through increased interconnectivity of key networks that facilitates the potential of cyber attacks against national security. The diverse nature of cybercrime, ranging from credit card fraud to communication between terrorist groups and attacks with the potential to devastate economic and political security of the United States, means that security mechanisms with the capacity to detect and prevent a deleterious cyberploy, locate sources of an attack, identify the perpetrators, while providing effective protection for extant networks is imperative.

The nature of cybercrime presents important challenges for state sovereignty. The interconnectivity and dependencies of key sectors and infrastructures within and among countries necessitates collaboration and cooperation to produce effective countermeasures to the threats of cybercrime. The United States needs to consider legislation, potentially leading to the curtailing of state sovereignty in order to permit greater sharing of relevant information and more closely coordinate anti-cybercrime regulations and activities with other national authorities as well as the private sector.

<b>S</b>	<ul style="list-style-type: none"> <li>• People become more vulnerable to crimes facilitated by internet usage, such as identity theft and credit card fraud.</li> </ul>	
<b>T</b>	<ul style="list-style-type: none"> <li>• Technology's capacity to detect and deter cybercrime may be limited; therefore, states and industries embark on a collaborative effort to accelerate R&amp;D for the development of equipment and infrastructure appropriate for the prevention and detection of cyberattacks.</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• As the frequency of cyberattacks increases, consumers may become more reluctant to shop online, damaging a multi-billion dollar industry.</li> <li>• Cyber-terrorism renders the economy vulnerable to attacks, which may immobilize vital economic networks, such as the financial systems, utility grids and information networks.</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Increased usage of computers and electronics with ever increasing speeds leads to e-waste that is difficult to dispose of efficiently and cleanly.</li> <li>• With less people using the internet and computers there is a return to paper based communications and business.</li> </ul>	
<b>P</b>	Government	<ul style="list-style-type: none"> <li>• Government engages in a multilevel response to cybercrime that involves bi- and multi-national cooperation, removing impediments to information sharing and coordinating regulations.</li> <li>• Government cooperation with industry is increased on the issue of counter-cybercrime.</li> <li>• Cross sector cooperation within US agencies is improved.</li> </ul>
	Security	<ul style="list-style-type: none"> <li>• Security becomes an ever more complex and intricate issue with the advent of cybercrime, thus making certain component of the existing system of security obsolete. Private individuals as well as government agencies- i.e. military and civilian- become more susceptible to attack.</li> <li>• Decisions regarding security are made not only on a domestic level, but internationally. Those involved include states as well as private entities.</li> </ul>

### 3) Global Warming

The contemporary environmental debate centers on global, rather than national, apprehensions regarding the changing climate trends collectively known by the scientific community as *global warming*. Industrial wastes, deforestation, and population growth are among the types of anthropogenic interference with the climate system. Anthropogenic changes in the atmosphere will influence future temperature, precipitation, storms and sea level. Any effort to combat global warming's detrimental consequences will necessarily entail a comprehensive and coordinated policy-making and implementation strategy on a grand scale. Governments must choose between international cooperative action, such as the Kyoto Protocol, to combat a deepening global problem or acting in isolation to mitigate internal effects.

<p><b>S</b></p>	<ul style="list-style-type: none"> <li>• Mass migration occurs due to resource and land availability pressures.</li> <li>• Resource scarcity causes societal unrest potentially leading to violence.</li> </ul>
<p><b>T</b></p>	<ul style="list-style-type: none"> <li>• A significant focus is placed on scientific and technical responses to mitigate climate change.</li> <li>• Science will lose important species of plants and animals that could have been used for medicinal purposes</li> <li>• Funding for Science and Technology may be transferred to emergency response funds, and thus loss of R&amp;D in S&amp;T will hamper future innovation and jeopardize the US' position as the world's scientific and technological leader</li> <li>• Rising sea levels and warming oceans will cause larger storms. Experts believe that global warming could increase the intensity of hurricanes by over 50 percent.</li> <li>• Water insecurity will increase with large storms. The tendency for rainfall to be more concentrated in large storms as temperatures rise will increase river flooding, without increasing the amount of freshwater available.</li> <li>• Water tables will fall below well depths causing millions to migrate or suffer and die from dehydration and starvation. Malnutrition and lack of potable water will increase the quantity, contagion, and severity of diseases.</li> <li>• Agriculture uses 70% of the world's freshwater, 1/3 of the world's food crops are produced by irrigated agriculture; it is possible that food scarcity will be a way of life for everyone, rich and poor.</li> <li>• Water wars may become common, as 45.3% of freshwater basins on Earth include political boundaries of 2 or more countries. These freshwater basins service 40% of the world's population, and account for 60% of global river flow.</li> </ul>
<p><b>E</b></p>	<ul style="list-style-type: none"> <li>• Income gap increases. The number of people in poverty increases.</li> <li>• Governments' financial resources become focused on responding to climate change. Other aspects of governmental services suffer as a result.</li> <li>• Globalization and economic development slow (especially in poorer nations)</li> <li>• Global warming models predict faster temperature increases at higher global latitudes. This will significantly affect the US because high temperatures throughout the US may reduce US agricultural productivity.</li> <li>• Global Warming may cause water scarcity in all regions of the world. According to global warming models, the inland areas of the northern hemisphere are expected to receive less moisture, meaning lake and river levels will be lower. Some reports predict the level of the Great Lakes will drop between 2 and 8 feet.</li> <li>• Increased Earth temperatures will directly and indirectly affect human health.</li> <li>• Higher temperatures increase the level of ozone at ground level. Even modest exposure to ozone can cause healthy individuals to experience chest pains, nausea, and pulmonary congestion.</li> <li>• Increased temperatures will increase the risk of some infectious diseases, especially those that</li> </ul>

	<p>typically thrive in warm areas. Diseases that are spread by mosquitoes and other insects could increase in the US as it warms.</p> <ul style="list-style-type: none"> <li>• The US has the possibility to invent and control an “Earth-Friendly” market that utilizes US comparative advantage in science and technology</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Some areas become uninhabitable. Other areas that were previously inhospitable become more habitable.</li> <li>• Global weather and precipitation patterns change. Number and severity of natural disasters may increase.</li> <li>• Resources, notably food and water, become increasingly scarce.</li> <li>• Loss of biodiversity. Significant upset to Earth’s ecological system.</li> <li>• Higher temperatures will cause evaporation to occur much quicker; rain produced by evaporation will be more acidic due to the increased air pollution. Acid rain will contaminate and hinder agricultural/environmental processes and freshwater sources.</li> <li>• Increased temperatures will cause more intense forest fires which will result in a major loss of biodiversity.</li> <li>• When species interactions are changed or broken, the overall ecosystem function is at risk; there exists a threshold over which the ecosystem as a whole can no longer function.</li> <li>• The slash and burn technique used for clearing rainforest acreage are increasing the release of greenhouse gases and decreasing carbon dioxide sinks.</li> <li>• When enough forest is felled in diverse areas of the Amazon, the greenhouse effect will be compounded and extremely difficult to reverse.</li> </ul>	
<b>P</b>	Government	<ul style="list-style-type: none"> <li>• Governments must choose between internationalism (focusing on cooperation to mitigate global effects) or isolationism (focusing on internal effects)</li> <li>• The global South is disproportionately affected by climate change as it lacks the infrastructure and resources to respond.</li> <li>• Global warming is causing increased melting of the polar ice fields. The melting of polar ice fields causes a rise in sea levels, which are predicted to threaten coastal areas and inundate entire cities.</li> <li>• The first village community (Shishmaref, Alaska) is being moved this summer due to rising waters: estimated cost is \$180 million dollars</li> <li>• Major shifts in temperature may cause ocean currents to shift. These shifts would drastically change meteorological patterns that presently exist in Europe, North and South America, and South Africa causing profound effects on agricultural activities.</li> </ul>
	Security	<ul style="list-style-type: none"> <li>• Resource scarcity may incite resentments translated into violent acts especially in the wealthy countries where responsibility is perceived to lie.</li> <li>• Land scarcity and the depletion of resources cause a surge in immigration fuelling tensions over remaining resource reserves.</li> </ul>



### **Issue-Node #3 – Privacy vs. Security**

The majority of threats challenging the security of the United States in the 21<sup>st</sup> century are complex, incalculable, and originate from a new threat environment with no clearly defined borders, actors, or conventional root-causes. Enhancing security within the framework of this new threat environment means, that certain privacy rights need to be compromised. The debate on privacy *versus* security has posed the two on opposing ends of a continuum. Compromising one side has positive effects for the other.

Potential threats are not exclusively located outside of national borders, but are now more than ever, trans-national in nature. Such threats can just as easily develop within the US' territory. By enhancing surveillance and broadening the government's right to limit privacy rights in fighting security threats, the capacity to protect national security is maximized. However, by further limiting privacy rights, the US is jeopardizing one of its greatest democratic accomplishments and one of its most precious assets: civil liberties.

The overhaul of intelligence and law enforcement structures in the aftermath of 9/11 together with passed legislation provide a more accurate and better framework of action for the federal government to address the new challenges. It has caused however, a lively debate over the compromise between privacy and security and demonstrates that the struggle for security is a fundamental civil liberties issue.

The question of where a line must be drawn between the two ends of the continuum is a key feature of a number of different FCIs. We have chosen three out of a multitude of FCIs that raise this issue.

#### **Privacy vs. Security – FCIs:**

1. Government Surveillance
2. Rising Power of Multinational Corporations
3. Global Health

What follows is a description and detailed analysis of these FCIs, which have a range of potential for further compounding this issue. In order to address these FCIs, the US government should consider the following key questions:

#### **Privacy vs. Security – Key Questions:**

- How do we balance the necessities of improving safety and increasing security with the need for privacy?
- How can the norms and regulations be developed when the question of proportionality is not adequately answered due to a lack of calculable threats?

Privacy vs. Security – FCI Description and STEEP Analysis:

**1) Government surveillance**

The government gaining the ability to track all citizens resulting in a pervasive domestic surveillance has been identified as an FCI. A trend towards increased surveillance can clearly be observed and rapid technological development constantly allows greater surveillance in less time and with fewer costs involved. Public-private partnerships, largely institutionalized by the Patriot Act, enhance efficiency and greater access to sensitive data.

Defining the line between security and privacy would determine the future development of government surveillance. A strong commitment to protect privacy rights and basic civil liberties would necessarily set high boundaries to the government’s actions on surveillance. Some citizens will feel better protected in their privacy, whereas others will feel less secure. The government would not be able to force industry to transfer sensitive data and therefore might be reliant on outsourcing certain intelligence conducts. The public image of government would likely be positively influenced, because citizens would feel like they could trust the government on non-interference in privacy rights. However, another attack on US security through the failure of detecting the threat within its own borders would jeopardize the public’s consent of supporting privacy rights while compromising security.

The decision to further emphasize security measures and increased domestic surveillance while simultaneously compromising privacy rights, would significantly affect governance in the US. Some citizens would feel being target for surveillance by their own government and increase suspicion and distrust in public authorities. Increased surveillance and the goal of constantly maximizing security would increase government spending required to maintain the heightened domestic security. Potential security threats might be quicker and more efficiently detected and security can potentially be enhanced. However, the difficulty of oversight of proportionality and the lack of clear revisability complicate positive outcomes of the policy.

A decision to place more emphasis on either privacy or security would affect the FCI of government surveillance. It would either give more room to surveillance or set clear limitations to government’s ambitions. Both would strongly affect public opinion towards government.

<b>S</b>	<ul style="list-style-type: none"><li>• Some people will have a greater sense of security, knowing that there is someone looking out for them. Others will resent the intrusive nature resulting in resentment of government. Possible civil unrest might occur. Possible reduction in crime as a result of increased surveillance could be a positive outcome.</li></ul>
<b>T</b>	<ul style="list-style-type: none"><li>• Relies heavily on technological industry to develop viable microchips and reliable mapping/tracking systems.</li><li>• Pressure to ensure that new technology is safe for implantation, without major side effects. Government must invest to develop new technology to ensure security of information.</li></ul>
<b>E</b>	<ul style="list-style-type: none"><li>• Companies may be able to map spending habits of consumers/tailor marketing campaigns more efficiently, resulting in greater revenue and economic growth.</li></ul>

<b>E</b>	<ul style="list-style-type: none"> <li>(Dependent on microchip tech) May result in the reduction of paper. In the case of credit cards, less consumption of plastic means less consumption of petroleum for its production. Less waste would be produced.</li> </ul>	
<b>P</b>	<b>Government</b>	<ul style="list-style-type: none"> <li>Pressure on governments to ensure that personal info cannot be stolen or misused.</li> <li>Governments must prove that security systems are sophisticated enough and that the government itself is trustworthy enough to track citizens.</li> <li>Burden on government to convince populace of the need for and utility of such a system.</li> </ul>
	<b>Security</b>	<ul style="list-style-type: none"> <li>Security of nation-state might potentially be enhanced through increased surveillance. It will be difficult to measure the actual increasing security.</li> </ul>

## 2) Rising power of Multinational Corporations

The FCI identified is a cadre of global corporations that grow so large that they control more economic power and influence more lives than the governments of the countries in which they operate, including the United States. Global corporations will continue to increase market access, revenue, employment bases and influence.

Defining the line between security and privacy can both positively and negatively influence the power of multinational corporations. Strengthening privacy rights, the government will be able to impose stricter regulations on data storage and the interchange of sensitive data within the private sector. It would therefore limit the flexibility of large corporate networks and potentially slow down crucial business procedures. Availability of data within the smallest amount of time has become a crucial asset for business success. Imposing stricter privacy rights, the government can get a ruling hand over the handling of data within the private sector, at least domestically in the United States.

However, stressing civil liberties against the maximization of state action in security might also have a contradictory effect. While imposing legislative rules through security policies, that can force corporations to cooperate, privacy rights enforcement will not call for large scale corporate responsibility. Under the umbrella of security, the government could more vigorously demand cooperation from the private sector. And therefore perform more control over corporations. Through legislation such as the Patriot Act, the government can demand data sharing e.g. from large financial institutions. It can impose a “citizen-soldier burden on the gatekeepers of financial institutions.”<sup>2</sup>

The importance of public-private partnerships is central to effective domestic surveillance. A decision between privacy and security will therefore have a strong impact on the rising power of corporations.

<b>S</b>	<ul style="list-style-type: none"> <li>• People’s lives become more affected by decisions corporations take than by decisions undertaken by governments.</li> <li>• Societal norms and values become influenced by the dominant corporations not by the people.</li> <li>• Corporations are not directly accountable to the people</li> </ul>
<b>T</b>	<ul style="list-style-type: none"> <li>• Communications and IT technology contribute to the ability of corporations to act on a global scale.</li> </ul>
<b>E</b>	<ul style="list-style-type: none"> <li>• Globalization slows.</li> <li>• Governments are forced to invest to create industries that will ensure greater self-sufficiency.</li> <li>• Depending on how successful the above efforts are, airlines may become perceived as potentially profitable (as the more reliable method of international commerce) prompting investment and revenue generation.</li> </ul>
<b>E</b>	<ul style="list-style-type: none"> <li>• If corporations find that “going green” increases their profitability, then this trend might be beneficial to the environment.</li> <li>• However, without the presence of strong government regulatory bodies to encourage environmentally sustainable approaches, pollution may increase, as might demand on natural resources. This might in turn contribute to other FCIs such as climate change.</li> </ul>

<b>P</b>	Government	<ul style="list-style-type: none"><li>• Corporations operate their own foreign policy.</li><li>• Influence of state governments declines as the significance of corporations rises.</li><li>• Corporations exert incredible influence over the decisions and operations of governments.</li></ul>
	Security	<ul style="list-style-type: none"><li>• As states and borders become less significant due to the international network of corporations, and as global economic integration increases, traditional motives for war decline.</li><li>• On the other hand, security-relevant decisions are now being made by corporations, not states.</li></ul>

### 3) Global Health

The importance of global health to international stability and national security has been identified as an FCI. Especially worrying are the figures on the global HIV/Aids pandemic and recent outbreaks of the Avian Flu or SARS which drastically demonstrate how vulnerable global security is to health issues in numerous ways. US national security depends on a stable and functioning health system within the country. However, pandemics in Africa and other parts of the world might have tremendous consequences for US national security in the long run.

The line between security and privacy will have effects on global health and the ability to fight trans-national health threats, such as pandemics. Giving up a certain amount of privacy, such as personal health data, could enable the government to watch more systematically the development of diseases and spot threats within the country more accurately. If every citizen is forced to open information on personal health, the flow of diseases could be stemmed and pandemics could be potentially contained more effectively. Enforced testing of either its own citizens, or tourists and immigrants entering the country could be legitimised by the degree of the security threat.

However, the limitations of civil liberties are obvious. Forcing citizens to give access to personal health information is a serious containment of privacy rights. The potential negative effects that removing civil liberty protection in personal health might have are tremendous. The government could identify ill and infected persons as possible security threats and lawfully discriminate them for the greater good. Turning personal health information public, the infected might face serious problems in finding or maintaining a job. They would have to live with a social stigma and tolerance and acceptance within the society would decrease.

Drawing the line between privacy and security has an impact on the question of global health and the fight against global pandemics. The costs and benefits of enforced regulations in sensitive areas such as personal health data have to be very carefully considered.

<b>S</b>	<ul style="list-style-type: none"><li>• Quarantine programs spark debates over civil rights.</li><li>• US loses some of its diversity as it closes itself to immigrants, international students and foreign tourists.</li><li>• Increased telecommuting and internet socializing as everyone tries to protect themselves from contagion by staying at home</li></ul>
<b>T</b>	<ul style="list-style-type: none"><li>• More funding for medical research for treatments for resistant diseases.</li></ul>
<b>E</b>	<ul style="list-style-type: none"><li>• Increase in disease burden slows economic development of poorest countries, both in the short run (because of the decreased productive work force) and in the long run (because of disruption in young people's education).</li><li>• Medical insurance costs soar in industrialized countries because of the higher incidence of disease and higher treatment costs associated with multi-drug resistance. This hurts both firms' profitability and consumer spending, resulting in a recession.</li></ul>

<b>E</b>	<ul style="list-style-type: none"> <li>• Spraying for mosquitoes becomes more crucial as the diseases they carry become deadlier. This results in environmental damage.</li> <li>• The search for new cures makes the need to preserve rare plant and animal species more urgent. Efforts to protect rainforests and other threatened ecosystems are redoubled.</li> </ul>	
<b>P</b>	<b>Government</b>	<ul style="list-style-type: none"> <li>• Higher medical insurance costs combine with aging populations in industrialized countries to push government-funded health programs to the crisis point.</li> <li>• Nationals of countries with multi-drug-resistant disease outbreaks can no longer travel internationally.</li> <li>• Boost to the WHO and other NGOs as international cooperation to stop pandemics becomes more urgent</li> </ul>
	<b>Security</b>	

## **Issue-Node #4 – Transition to a Hydrogen Economy**

*Should the United States invest politically, financially and economically in the transition to a hydrogen economy?*

In the US there is a growing interest in sustainable energy sources. Economic, political and environmental reasons come into play; potentially creating an environment friendly towards change and the rethinking of energy policy within the US. A transition to a hydrogen economy would significantly lessen America's carbon emissions and result in a self-sufficiency that might insulate the US from the economic impact of the rapidly growing energy demands of India and China. It will shelter the US from the political, diplomatic, and financial impacts of its reliance on energy from unstable regions and therefore adapt US foreign policy leverage. Hydrogen energy, while requiring significant technological improvements and substantial cost reductions in order to become a viable energy source, could lead the long dreamed of shift away from oil and biomass as our main energy sources.

The decision for a transition to a hydrogen economy would touch various FCIs and radically shape the issues at stake for other policy decisions.

### **Transition to a Hydrogen Economy – FCIs:**

1. Global Warming
2. Power Shift to Asia

What follows is a description and detailed analysis of these FCIs which are intimately related to this issue. In identifying the transition to a hydrogen economy as a major policy goal, the US government should consider the following key questions:

### **Transition to a Hydrogen Economy – Key Questions:**

- How to appropriately stimulate progress in technologies, policies, and markets?
- Will the large amounts of R&D funding necessary be justifiable to the public and viable politically (e.g. cross-party lines)?
- Furthermore, how should we manage a coherent cross-sectoral policy from Science and Technology to energy and environment and to foreign policy and strategic planning?
- How can international standards for safe hydrogen use be effectively reached?
- Should Congress authorize and appropriate funding for basic (pre-commercial) research into hydrogen fuel technology?
- Should Congress pass tax incentives for citizens that purchase and operate vehicles with high fuel economy?



Transition to a Hydrogen Economy – FCI Description and STEEP Analysis:

**1) Global Warming**

Global warming and the scenario of abrupt climate change was identified as an FCI for governance in the US. The worsening global warming trends would drastically affect coastal areas through rising sea levels. Warmer ocean temperatures might lead to an increase in major storms that destroy valuable infrastructure and human lives. Agricultural output would decline due to the dramatic falls in water tables, and an increase in evaporation world-wide. Global water scarcity might cause intra and inter-state water wars. Environmental deterioration would lead to economic decline.

The decision to transition into a hydrogen economy would have overall positive effects on bringing global warming to a halt and managing abrupt climate changes. Slowing down the trend of global warming would improve environmental conditions and the long-term prospects for agriculture in the US. Health conditions of the entire population would improve as air pollution decreases significantly. Smog warnings in bigger cities decline and ecological reserves are better protected.

Internationally the drivers for conflict such as resource scarcity and migration decrease on a long term. Through its market dominance as the first country to entirely switch to a hydrogen economy, the US will be economically the most powerful nation. It will be largely respected as a credible advocate for environmental consciousness and improve its ties with many nations.

Still unknown are what negative externalities they could generate, such as the recent suggestion that large-scale hydrogen leakage could contribute to ozone depletion.

<b>S</b>	<ul style="list-style-type: none"><li>• Mass migration occurs due to resource and land availability pressures.</li><li>• Resource scarcity causes societal unrest potentially leading to violence.</li></ul>
<b>T</b>	<ul style="list-style-type: none"><li>• A significant focus is placed on scientific and technical responses to mitigate climate change.</li><li>• Science will lose important species of plants and animals that could have been used for medicinal purposes</li><li>• Funding for Science and Technology may be transferred to emergency response funds, and thus loss of R&amp;D in S&amp;T will hamper future innovation and jeopardize the US' position as the world's scientific and technological leader</li><li>• Rising sea levels and warming oceans will cause larger storms. Experts believe that global warming could increase the intensity of hurricanes by over 50 percent.</li><li>• Water insecurity will increase with large storms. The tendency for rainfall to be more concentrated in large storms as temperatures rise will increase river flooding, without increasing the amount of freshwater available.</li><li>• Water tables will fall below well depths causing millions to migrate or suffer and die from dehydration and starvation. Malnutrition and lack of potable water will increase the quantity, contagion, and severity of diseases.</li><li>• Agriculture uses 70% of the world's freshwater, 1/3 of the world's food crops are produced by irrigated agriculture; it is possible that food scarcity will be a way of life for everyone, rich and poor.</li><li>• Water wars may become common, as 45.3% of freshwater basins on Earth include political</li></ul>

	<p>boundaries of 2 or more countries. These freshwater basins service 40% of the world's population, and account for 60% of global river flow.</p>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Income gap increases. The number of people in poverty increases.</li> <li>• Governments' financial resources become focused on responding to climate change. Other aspects of governmental services suffer as a result.</li> <li>• Globalization and economic development slow (especially in poorer nations)</li> <li>• Global warming models predict faster temperature increases at higher global latitudes. This will significantly affect the US because high temperatures throughout the US may reduce US agricultural productivity.</li> <li>• Global Warming may cause water scarcity in all regions of the world. According to global warming models, the inland areas of the northern hemisphere are expected to receive less moisture, meaning lake and river levels will be lower. Some reports predict the level of the Great Lakes will drop between 2 and 8 feet.</li> <li>• Increased Earth temperatures will directly and indirectly affect human health.</li> <li>• Higher temperatures increase the level of ozone at ground level. Even modest exposure to ozone can cause healthy individuals to experience chest pains, nausea, and pulmonary congestion.</li> <li>• Increased temperatures will increase the risk of some infectious diseases, especially those that typically thrive in warm areas. Diseases that are spread by mosquitoes and other insects could increase in the US as it warms.</li> <li>• The US has the possibility to invent and control an "Earth-Friendly" market that utilizes US comparative advantage in science and technology</li> </ul>	
<b>E</b>	<ul style="list-style-type: none"> <li>• Some areas become uninhabitable. Other areas that were previously inhospitable become more habitable.</li> <li>• Global weather and precipitation patterns change. Number and severity of natural disasters may increase.</li> <li>• Resources, notably food and water, become increasingly scarce.</li> <li>• Loss of biodiversity. Significant upset to Earth's ecological system.</li> <li>• Higher temperatures will cause evaporation to occur much quicker; rain produced by evaporation will be more acidic due to the increased air pollution. Acid rain will contaminate and hinder agricultural/environmental processes and freshwater sources.</li> <li>• Increased temperatures will cause more intense forest fires which will result in a major loss of biodiversity.</li> <li>• When species interactions are changed or broken, the overall ecosystem function is at risk; there exists a threshold over which the ecosystem as a whole can no longer function.</li> <li>• The slash and burn technique used for clearing rainforest acreage are increasing the release of greenhouse gases and decreasing carbon dioxide sinks.</li> <li>• When enough forest is felled in diverse areas of the Amazon, the greenhouse effect will be compounded and extremely difficult to reverse.</li> </ul>	
<b>P</b>	<p>Government</p>	<ul style="list-style-type: none"> <li>• Governments must choose between internationalism (focusing on cooperation to mitigate global effects) or isolationism (focusing on internal effects)</li> <li>• The global South is disproportionately affected by climate change as it lacks the infrastructure and resources to respond.</li> <li>• Global warming is causing increased melting of the polar ice fields. The melting of polar ice fields causes a rise in sea levels, which are predicted to threaten coastal areas and inundate entire cities.</li> <li>• The first village community (Shishmaref, Alaska) is being moved this summer due to rising waters: estimated cost is \$180 million dollars</li> <li>• Major shifts in temperature may cause ocean currents to shift. These shifts would drastically change meteorological patterns that presently exist in Europe, North</li> </ul>

		and South America, and South Africa causing profound effects on agricultural activities.
	<b>Security</b>	<ul style="list-style-type: none"><li>• Resource scarcity may incite resentments translated into violent acts especially in the wealthy countries where responsibility is perceived to lie.</li><li>• Land scarcity and the depletion of resources cause a surge in immigration fuelling tensions over remaining resource reserves.</li></ul>

## 2) Power shift to Asia

This FCI describes the overall movement of power from the United States to Asia. This could lead to a balance of power in a multipolar world with the United States as merely one of many major actors. Alternatively, it could lead to the rise of a new global hegemon, perhaps in the form of China or Japan. The possible loss of dominance (or even crash) of the dollar would contribute to this. Innovation in science and technology could shift from the US with MNCs following the available technology.

Policy decisions related to the transition to a hydrogen economy would affect the power shift to Asia significantly. Depending on how quick and successful the economic transition turns out, it can have both positive and negative effects.

Establishing a hydrogen economy in the US could guarantee US dominance on the world's energy market in the long run, if hydrogen economies become a global trend. As a result, the US would be the leader in the new 'energy revolution' and would reap significant economic benefits that would allow it to sustain its superpower status and address its societal problems. Know-how and technologies will be based in the US. Energy independence creates economic advantage on the global markets, whereas Asian countries still depend on fossil fuels. Asian countries will depend largely on the traditional energy market, with higher costs through decreasing resources and strong competition.

However rising costs of the transition to a hydrogen economy might have a short and medium term negative effect on the American economy. With Asian power rising unexpectedly fast, the US might lose track of key power areas, while concentrating too much on its economic transition. If MNCs cannot be convinced of the necessity of the economic transition, they could move to Asia entirely and give up their home base.

<b>S</b>	<ul style="list-style-type: none"><li>• Large swathes of society would take on an Asian influence. Cultural norms would become more Asian, following common precepts held in a new Asian hegemon.</li><li>• Asian language and media becomes more pervasive, with a variety of services offered in Cantonese, Mandarin and Japanese.</li></ul>
<b>T</b>	<ul style="list-style-type: none"><li>• Massive reductions in government and private financing for R&amp;D programs in the US.</li><li>• Business failures reduce S&amp;T research in the US</li><li>• Reductions in US R&amp;D lead to loss of comparative advantage and possible shift of S&amp;T supremacy to other countries.</li><li>• Brain drain as US scientists and researches move overseas to more affluent countries.</li><li>• Loss of foreign students who no longer come to the US to attend college reduces R&amp;D occurring at universities</li></ul>
<b>E</b>	<ul style="list-style-type: none"><li>• Massive devaluation of the dollar as people look to sell off all US valued assets.</li><li>• Major recession in the US. Widespread bankruptcies of businesses and individuals. Enormous job losses due to bankruptcies.</li><li>• Stock market crash due to the loss of faith in the dollar.</li></ul>

	<ul style="list-style-type: none"> <li>• Housing market failures as credit is no longer available and dollar devaluations increase the risk associated with buying a house.</li> <li>• Increasing interest rates as lenders cope with dollar devaluation.</li> <li>• Loss of purchasing power of US citizens because of dollar devaluation.</li> <li>• Increased relative costs of foreign goods because of dollar devaluation.</li> <li>• Loss of US economic dominance.</li> <li>• Foreign companies and governments buy up strategic resource reserves around the world.</li> <li>• Potential run on banks if people loose faith in the banking industry.</li> <li>• Possible growth of black markets.</li> <li>• There is capital flight as investors look to other markets and opportunities.</li> <li>• US exports increase because the fall in the dollar's value makes them more competitive</li> </ul>				
<b>E</b>	<ul style="list-style-type: none"> <li>• Loss of government resources directed at protecting the environment.</li> <li>• Possible easing of environmental standards and enforcement to spur business</li> </ul>				
<b>P</b>	<table border="1"> <tr> <td data-bbox="235 688 435 1205"><b>Government</b></td> <td data-bbox="435 688 1445 1205"> <ul style="list-style-type: none"> <li>• Loss of borrowing ability forces the government to increase taxes to pay for government spending</li> <li>• Massive budget cuts for US programs would have to occur to balance the budget.</li> <li>• Foreign aid programs would have to be cut as the government focuses its attention inward on its core responsibilities.</li> <li>• Reduced ability for the US government to influence worldwide events and issues due to loss of funding for foreign interventions.</li> <li>• Possible reduction in government emergency reaction time because budget shortfalls preclude quick responses.</li> <li>• Balanced budgets would be necessary since there would be no chance for government borrowing to cover any budgetary shortfalls.</li> <li>• End of pork-barrel politics and catering to special interests because unnecessary or non-critical programs would have to be cut.</li> <li>• Increased government accountability with respect to budgetary and spending decisions since all expenditures would have to be properly justified</li> </ul> </td> </tr> <tr> <td data-bbox="235 1205 435 1432"><b>Security</b></td> <td data-bbox="435 1205 1445 1432"> <ul style="list-style-type: none"> <li>• Massive reductions in military and security spending because of budgetary problems.</li> <li>• Decline in US military power over time because of a lack of funding.</li> <li>• Reduction in spending on new military technologies due to resource shortages.</li> <li>• Possible crime sprees due to the loss of wealth and increases in poverty by US citizens.</li> </ul> </td> </tr> </table>	<b>Government</b>	<ul style="list-style-type: none"> <li>• Loss of borrowing ability forces the government to increase taxes to pay for government spending</li> <li>• Massive budget cuts for US programs would have to occur to balance the budget.</li> <li>• Foreign aid programs would have to be cut as the government focuses its attention inward on its core responsibilities.</li> <li>• Reduced ability for the US government to influence worldwide events and issues due to loss of funding for foreign interventions.</li> <li>• Possible reduction in government emergency reaction time because budget shortfalls preclude quick responses.</li> <li>• Balanced budgets would be necessary since there would be no chance for government borrowing to cover any budgetary shortfalls.</li> <li>• End of pork-barrel politics and catering to special interests because unnecessary or non-critical programs would have to be cut.</li> <li>• Increased government accountability with respect to budgetary and spending decisions since all expenditures would have to be properly justified</li> </ul>	<b>Security</b>	<ul style="list-style-type: none"> <li>• Massive reductions in military and security spending because of budgetary problems.</li> <li>• Decline in US military power over time because of a lack of funding.</li> <li>• Reduction in spending on new military technologies due to resource shortages.</li> <li>• Possible crime sprees due to the loss of wealth and increases in poverty by US citizens.</li> </ul>
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## **Application and Implementation**

The methodology illustrated above is designed as a holistic and effective policy-making tool regarding FCIs and their potential cascading consequences. However, this tool can not be employed without an organizational framework in government designed to use it. As will be discussed in the following section, this staff believes that the current Forward Engagement institutions in government are insufficient for effectively tackling FCIs. As such, we have provided a host of recommendations and analysis for the Commission to consider.

In addition, we have also employed the Component-Level Implementation Process (CLIP) as a tool that enables policy makers to mitigate the political risk inherent in introducing programs with long-term objectives whose final results may not be seen for decades. We have chosen to apply the CLIP to our fourth Issue-Node: Conversion to a Hydrogen Economy.

# Organizational Process and Structural Recommendations

## INTRODUCTION TO PROCESS AND RECOMMENDATIONS

The nature of FCIs requires a proactive policy approach that evaluates many alternative futures. In doing so, we avoid making assumptions regarding a most likely future and assessing only the present. There must be a venue that allows the process to holistically evaluate context, develop policy, and build capability to deal with strategic, long-term developments. Therefore, we must create an enduring organization that leverages strategic advantage and develops a forward-looking, robust, iterative decision process.

What follow are this staff's recommendations to reorient both the legislative and executive branches of US Government to more actively engage FCIs. Our key recommendations are:

- Replace the House and Senate Annual Commission on Forward Engagement with House and Senate Select Committee on Forward Engagement.
- Establish a federally funded Center for Future Studies.
- Establish an executive-branch Inter-Agency Working Group on Forward Engagement.

## LEGISLATIVE ORGANIZATION

This panel recommends that the House and Senate Annual Commissions on Forward Engagement (HACFE/SACFE) be disbanded and that their duties be incorporated into two new committees: a House Select Committee on Forward Engagement (HSCFE) and a Senate Select Committee on Forward Engagement (SSCFE). Additionally, these Select Committees will have binding authority and jurisdiction to write legislative proposals that impact long-term strategic planning for:

- National Security, specifically regarding the ability to recover, adapt and respond to a Future Contingency of Interest (FCI), keeping the idea of “continuity of operations” and resiliency in the system as a strategic imperative
- Social (psychological and cultural) issues as they pertain to National Security
- Long-term science and technology research and development programs
- Long-term economic policy as it pertains to National Security
- Environmental issues of long-term consequence
- Global political issues as they relate to National Security
- Disaster preparedness
- Bioethics
- Labor and education issues as they relate to projected future needs of the workforce

A Select Committee is non-partisan and will consist of a fifty-fifty party split plus one in favor of the majority party. The following committees will have at least one member on the HSCFE/SSCFE:

- Education and the Workforce
- Energy and Commerce
- Government Reform
- Homeland Security
- International Relations
- Resources
- Science
- Intelligence
- Armed Services

As part of our continuing investigation into the optimal legislative structure for Forward Engagement, the Fall 2006 Commission conducted a comparative analysis of establishing a Joint Congressional Committee (as discussed by our predecessor body in Spring 2006) versus establishing separate Select Committees in each House of Congress. The results of the comparative analysis, by which we determined the established of House and Senate Select Committees to be the preferable option, are shown below:

**Comparative Analysis: Proposed Spring and Fall 2006 Committee Structures**

	Spring 2006	Fall 2006
Committee Structure	<b>Joint Congressional Committee (JFEC)</b>	<b>House and Senate Permanent Select Committees (HSCFE &amp; SSCFE)</b>
Precedent	Joint Economic Committee Joint Committee on Taxation Joint Intelligence Committee ( <i>defunct</i> ) Joint Committee on the Library of Congress ( <i>defunct</i> )	House Permanent Select Committee on Intelligence Senate Select Committee on Ethics Senate Select Committee on Intelligence
Membership	20 members, 10 from each chamber of Congress. - gives more influence to Senate than to House	Consists of representatives from each of the preexisting committees in the House or Senate which have jurisdiction in matters related to FE
Partisanship	60% majority, 40% minority	Equal party membership, +1 member to the majority - Helps to insulate from politics as much as possible
Functionality	Joint structure does not fit the individual cultures and procedures of the separate chambers of Congress.	Separate committees allow functional details to be tailored to fit the unique procedural and cultural peculiarities of each chamber of Congress.



Furthermore, Congress should establish the Center for Future Studies (CFS) as recommended by the Spring 2006 Commission Report. The Spring 2006 Report argued that “The Center would accomplish two important objectives. First, it would institutionalize a process for soliciting expert advice in the formulation of FCIs. Second, it would create a mechanism to promote forward engagement.”<sup>4</sup> We endorse this proposal and recommend expanding the purview of this organization.

We recommend that the Center for Future Studies provide research support to the House and Senate Select Committees on Forward Engagement, culminating in the production of a yearly, detailed report on Future Contingencies of Interest. This report is to serve the purpose of introducing the CFS’s identification of potential policy issues arising from FCIs into the policy process. Under the previous institutional arrangement this function was served by both the HACFE and SACFE. We find separate research into the FCI issue to be largely redundant, and potentially partisan, and believe this function should be consolidated under the auspices of the Center for Future Studies. Furthermore we envision the CFS as a point of interface with the executive-level Forward Engagement structure we propose in a subsequent section.

The Spring 2006 Report proposed structuring the CFS as a “GONGO” (Government Operated Non-Governmental Organization) directly funded, organized and directed by the Congressional Forward Engagement Committees.<sup>5</sup> We propose an alternative to this organization. We do not wish the funding of the CFS to detract from the ability of the HSCFE and SSCFE to serve their function, so we propose that the Center’s funding be directly appropriated rather than come from the funding of the Select Committees. In essence we proposed that the CFS be treated similarly to a Federally Funded Research and Development Center (FFRDC). FFRDCs receive federal funding but remain functionally and operationally separate from government interference. They regularly provide input to both the executive branch and Congress through testimony and studies.

In our investigations, the Fall 2006 Commission studied the concept of establishing a Congressional Office of Forward Engagement (OFE) using the model of the now defunct Office of Technology Assessment (OTA). It was decided that this structure would have represented unnecessary budgetary and functional redundancy in light of the research capabilities of the extant Congressional Research Service as well as the proposed SSCFE and HSCFE. Furthermore we find that the establishment of Center for Future Studies would adequately serve the function of the OFE, namely to introduce new ideas into the Congressional Forward Engagement Committees in the form of FCIs and associated issues. However, the OTA model presented a number of important characteristics that should be considered in establishing the Center for Future Studies, most importantly an emphasis on non-partisanship and isolation from congressional interference in its research activities.

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<sup>4</sup> Spring 2006 Report.

<sup>5</sup> Spring 2006 Report.

## **EXECUTIVE ORGANIZATION**

As Forward Engagement is a topic that spans most sectors of government, it is inappropriate to force a home for it at any one executive agency. In addition, through combining perspectives, a broader series of threats and challenges can be seen on the horizon. Therefore we propose the creation of an inter-agency working group, empowered to coordinate Forward Engagement across various policy areas, so as to avoid strategic surprise.

We recommend that the working group be composed of, at the least, officials from the Office of Management and Budget and the Departments of State, Commerce, Defense, Homeland Security, Energy, Health and Human Services. These represent a minimum set of “stability” interests. Furthermore, we would also desire to see inclusion of staff from the Environmental Protection Agency and the Justice Department. We envision that the working group be chaired by a new position, the Deputy National Security Advisor for Forward Engagement.

This working group would be responsible for fulfillment of the policy goals set out through legislation as well for forwarding an agenda to prevent strategic surprise. Ideally such a group would be a funding agency in the vein of the Defense Advanced Research Projects Agency (DARPA), but with a broader mandate (not simply defense and enabling technologies for the military) and smaller budget, as they would not need to make prototype versions of capital systems. Their vision would be more long term, and specific to some of the issues and FCIs determined by either the Select Committee or through the CFS, acting, again, in an advisory role. However, we envision a working group that builds in a capability to adapt to near-term challenges through aggressive funding of specific technologies, studies, or pilot projects.

In addition, it may be of interest to contemplate a Goldwater-Nicholls-type reform for the executive agencies. As Goldwater-Nicholls mandated that military promotions be dependent on periods of working in cross-service capacity, a new reform could mandate that promotions to specific positions within the federal service be contingent on time on the staff of this working group. In doing so, we would broaden inter-agency cooperation, spread awareness of agency culture, and build functional ties between the federal agencies.

Without such a group, what would government response to FCIs look like? Policies could be carried out through the executive branch, but the executive agencies are resistant to change. In addition, as discussed in the above section, FCIs are often not domain specific. If we require a transition, for example, to a hydrogen economy as outlined in the CLIP section of this report, what agency would lead that effort? How would, for example, the Department of Energy hasten the military acquisition process so that the military would move away from the use of JP-8 fuel? Would the Department of Defense be able to view a potential reworking of the National Highway System that could exploit more efficient technologies?

The ability to fund research and development is another problem for the current agency system. Research and development that serves multiple purposes can fall through the cracks, or does not receive the levels of funding that it might “need”. In addition, members of Congress currently attempt to fill that gap by funding universities in their home district or state, although these researchers may not be the most capable. The creation of a working group with a broader vision

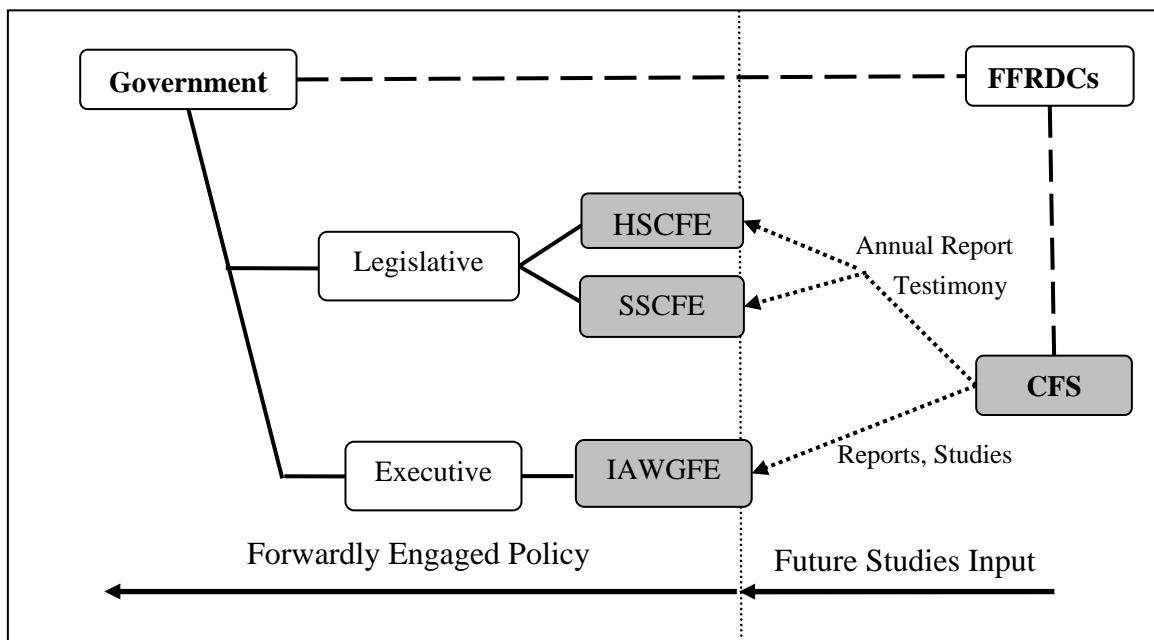
and without geographic bias would prevent some of these problems.

The creation of this working group enables a robust response to Future Contingencies of Interest and a deeper capacity for Forward Engagement in general. By creating a working group, we move further away from the patchwork policy that leads to haphazard approaches to strategic planning. A serious approach to Forward Engagement requires institutional capability to enact long-term policy, as well as cultural reforms to ensure that the capability is not squandered. This proposed working group would enable both. We also recommend that Congress and the Administration create a Joint Commission to research and report on the executive branch recommendations articulated above. This Commission should report by the end of the Spring Congressional Session.

**CONCLUSION**

The Fall 2006 Commission has proposed an institutional structure by which we believe a holistic approach to FCIs and the policy issues related to them might be introduced into the practices of the federal government. This structure is shown in Figure 2. By adopting this institutional structure we believe that both the executive and legislative branches will become forwardly engaged.

**Figure 2: Institutional Framework for Forward Engagement**



## **Amendments to Public Law 6414**

This Commission proposes the following amendments to the Rules of the House of Representatives to establish a Permanent Select Committee on Forward Engagement, in order to strategically plan for the future of the United States through policy and foresight. The Commission notes that these amendments should be mirrored in the Rules of the Senate so as to have the same effect in that body.

### **Resolution**

*Resolved,*

That there is hereby established in the House of Representatives a Select Committee to be known as the Permanent Select Committee on Forward Engagement.

### **Purposes and Functions**

SEC. 2. (a) That clause 3 of Rule X of the House of Representatives is amended by adding at the end the following new paragraph.

'(n) The Permanent Select Committee on Forward Engagement shall review and study long-term, strategic activities and programs of the federal agencies.'

SEC. 3. (a) That clause (4) of Rule X of the House of Representatives is amended by redesignating paragraph (e) as paragraph (f) and inserting after paragraph (d) the following new paragraph

'(e) the Permanent Select Committee on Forward Engagement will assume all responsibilities of the House Annual Commission on Forward Engagement.'

SEC. 4. (a) Rule X of the House of Representatives is amended by adding at the end the following new paragraph:

12. (a) (1) There is established a Permanent Select Committee on Forward Engagement (hereafter in this clause referred to as the "Select Committee"). The Select Committee shall be composed of not more than 19 Members, Delegates, or the Resident Commissioner, of whom not more than 10 may be from the same party. The Select Committee shall include at least one Member, Delegate, or the Resident Commissioner from each of the following committees:

- (A) the Committee on Education and the Workforce;
- (B) the Committee on Energy and Commerce;
- (C) the Committee on Government Reform;
- (D) the Committee on Homeland Security;

- (E) the Committee on International Relations;
- (F) the Committee on Resources;
- (G) the Committee on Science;
- (H) the Permanent Select Committee on Intelligence; and
- (I) the Committee on Armed Services

(2) The Speaker and the Minority Leader shall be ex officio members of the Select Committee but they shall have no vote in the Select Committee and may not be counted for purposes of determining a quorum thereof.

(3) The Speaker and Minority Leader each may designate a member of his leadership staff to assist him in his capacity as ex officio member, with the same access to committee meetings, hearings, briefings and materials as employees of the Select Committee.

(b)(1) There shall be referred to the Select Committee proposed legislation, messages, petitions, memorials and other materials relating to the following:

(A) Labor and education issues as they relate to projected future needs of the workforce.

(B) Science and technology research and development programs of five years or more

(C) Disaster preparedness

(D) Environmental issues of long-term consequence

(E) Bioethics

(F) Economic policy and programs of five years or more

(G) National security issues in the long-term (five years or more) specifically as they relate to

(i) Domestic social and cultural issues

(ii) International engagement and affairs

(iii) Continuity of operations and resilience during crisis

(2) Proposed legislation initially reported by the Select Committee containing any matter otherwise in the jurisdiction of a standing committee shall be referred by the Speaker to that standing committee. Proposed legislation initially reported by another committee that contains matter within the jurisdiction of the Select Committee shall be referred by the Speaker to the Select Committee if requested by the chairman of the Select Committee.

(3) Nothing in this clause shall be construed as prohibiting or otherwise restricting the authority of any other committee to study and review an activity related to forward engagement to the extent that such activity directly affects a matter otherwise within the jurisdiction of that committee

(c)(1) For purposes of accountability to the House, the Select Committee shall make regular and periodic reports to the House on the nature and extent of forward engagement and long-term strategic activities of the various departments and agencies of the United States. The Select Committee shall promptly call to the attention of the House, or to any other appropriate committee, a matter requiring the attention of the House or another committee.

(2) The Select Committee shall obtain annual reports from the Secretary of State, the Secretary of Defense, the Secretary of Energy, the Secretary of Commerce, the Administrator of the EPA, the Secretary of Labor, the Secretary of Education, and the Secretary of Health and Human Services. Such reports shall review the long-term, strategic programs and activities of the agency or department concerned.

(3) Within six weeks after the President submits a budget under section 1105(a) of title 31, United States Code, or at such time as the Committee on the Budget may request, the Select Committee shall submit to the Committee on the Budget the views and estimated described in section 301(d) of the Congressional Budget Act of 1974 regarding matters within the jurisdiction of the Select Committee.

(d) (1) In this clause the term “strategic programs and activities” refers to programs and activities that seek to build capability to deal with possible future scenarios and contingencies of interest

(2) In this clause, “contingencies of interest” refers to events or trends, positive or negative, that have a transformative effect in multiple spheres of government interest not bound by the responsibilities of any one executive agency or department, or Congressional committee

(3) In this clause, the term “department or agency” includes any organization, committee, council, establishment, or office within the Federal Government

(4) For purposes of this clause, reference to a department, agency, bureau, or subdivision shall include a reference to any successor department, agency, bureau, or subdivision to the extent that a successor engages in strategic programs and activities in an area now under the jurisdiction of a department, agency, bureau, or subdivision referred to in this clause.

# Component-Level Implementation Process (CLIP)

## Introduction to CLIP

We strongly recommend adopting the Fall 2004 panel's recommendation to employ the Component-Level Implementation Process (CLIP), which enables policy makers to “examine long-term developments, break them down into nearer-term components, and then consider the broader relevance of those components.” We believe this approach represents an improvement over today's piecemeal approach and complements this Commission's structural recommendations.

- CLIP breaks complex problems into manageable pieces, turns those pieces into policy recommendations, and then translates the recommendations into legislative language and timelines. FCIs appropriate for CLIP could come from the Inter-Agency Working Group on Forward Engagement (IAWGFE), the Center for Future Studies (CFS), or through the House or Senate Select Committees on Forward Engagement (HSCFE/SSCFE).
- CLIP's success depends on describing a desired long-term end state and developing a series of short-term steps to achieve it. It is important that each component be valuable in its own right and can stand on its own so that benefits are achieved regardless of whether or not the final goal is achieved. CLIP mitigates the political risk inherent in introducing legislation when the final results may not be seen for decades.
- We use a case study — **Kick-Starting the Transition to a Hydrogen Economy** — to illustrate the merits of this approach. The scenario describes the long-term objective, lists the ties to the FCIs, describes limitations, and details various short-term components whose implementation supports the achievement of this objective.

**GOAL:** Kick-start the transition to a hydrogen economy by creating conditions that lead individuals and firms to replace hydrocarbon-based sources of energy with hydrogen fuel

**DEFINING A HYDROGEN ECONOMY:** Hydrogen produced from fossil fuels (with carbon capture and sequestration), renewable energy, and nuclear energy will be used throughout the transportation and electric power sectors. Hydrogen will be produced in centralized facilities in remote locations, in power parks and fueling stations in our communities, in distributed facilities in rural areas, and onsite at customers' premises. Today we have a hydrocarbon economy. Tomorrow we will have weaned ourselves from carbon and will live in a “hydrogen economy.” In the hydrogen economy...

*America will enjoy a secure, clean, and prosperous energy sector that will continue for generations to come. American consumers will have access to hydrogen energy to the same extent that they have access to gasoline, natural gas, and electricity today. It will be produced cleanly, with near-zero net carbon*

*emissions and it will be transported and used safely. It will be the “fuel of choice” for American businesses and consumers. America’s hydrogen energy industries will be the world’s leaders in hydrogen-related equipment, products, and services.*<sup>6</sup>

**TABLE: CURRENT STATUS OF THE HYDROGEN ECONOMY**

In 2006: Proposal for a new “H-Prize Act of 2006” (H.R. 5143) passes the US House of Representatives. The bill offers a series of million-dollar prizes to be awarded for significant developments in support of a transition to a hydrogen economy.
In 2005: several Congress members formed the House Hydrogen and Fuel Cell Caucus, a bipartisan group of House and industry representatives.
Iceland has initiated an aggressive effort to transition to a hydrogen energy base.
California's SunLine Transit agency—with some assistance from federal grants—leads local government agencies in converting its buses to hydrogen.
From 1998 to 2000, Chicago's Transit Authority ran three hydrogen buses as part of a successful joint pilot study with Ballard Power Systems.

**DRIVERS AND OBSTACLES:** The transition to a hydrogen economy is directly or indirectly relevant to a number of our FCIs, specifically:

- Switch to alternative energy
- Global warming
- Power shift to Asia
- Disruption of the maritime commons
- New age of war
- WMD event

The transition to a hydrogen economy will significantly lessen America's carbon emissions. In addition, the resulting self-sufficiency will insulate the US from the economic impact of the rapidly growing energy demands of India and China; will shelter the US from the political, diplomatic, and financial impacts of our current reliance on energy from unstable regions; and enable the US to be better prepared to counter the effects of a man-made or natural disaster. In

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<sup>6</sup> United States Department of Energy, *A National Vision of America’s Transition to a Hydrogen Economy – 2030 and Beyond*, Washington, D.C., February 2002, p.17. Hereafter referred to as *National Vision*



the US, there is a growing public interest in sustainable energy sources for both economic and environmental reasons.

The main reason so little action has been taken to accelerate the transition to a hydrogen economy is the length of time required; some analysts estimate that a full transition will take seventy years. Since political realities generally require lawmakers to focus on legislation that offers immediate payoffs, Congress has been reluctant to pass measures that address such a long-term objective. The following sample CLIP aims to counteract this tendency by breaking down the long-term goal of kick-starting the transition to a hydrogen economy into progressive short-term legislative steps which offer substantial stand-alone benefits.

### **SAMPLE CLIP TIMELINE**

#### **110th Congress (2007-2008)**

- Authorizes and appropriates funding for basic (pre-commercial) research into hydrogen fuel technology

##### *Immediate, stand-alone payoffs:*

- Demonstrates government commitment to both reducing US dependence on foreign energy sources and to repairing America's environmental situation
- Supports American universities and researchers
- Contributes to maintaining America's competitive advantages in basic scientific research and technological innovation
- Creates demand for experts in hydrogen fuel technology

##### *Long-term, contingent payoffs:*

- Lays the foundation for a fledgling hydrogen energy economy
  - Progress in basic research leads private firms to invest more in applied research
  - Scientific breakthroughs dramatically reduce costs of hydrogen power
  - Strengthens links between university research departments and private firms, which helps preserve America's competitive advantage in hydrogen fuel technologies as scientific advances continue to enhance firms' capabilities after other countries transition to hydrogen economies
- Passes tax incentives for citizens that purchase and operate vehicles with high fuel economy

##### *Immediate, stand-alone payoffs:*

- Boosts auto companies' investment in fuel-economizing innovations

- Makes it easier for low-income car buyers to invest in models with high fuel economy
- Puts downward pressure on US gas consumption, reducing the economy's dependence on imported oil

*Long-term, contingent payoffs:*

- Leads auto companies to produce more vehicles with high fuel economy, which are more competitive for export to countries where fuel is much more expensive than in the US
- Combines with policies that specifically encourage the introduction of hydrogen fuel to reduce cost barrier to adopting hydrogen vehicles

**111th Congress (2009-2010)**

- Authorizes and appropriates funds for a phased transition to hydrogen fuel generators in post offices and other federal buildings<sup>7</sup>

*Immediate, stand-alone payoffs:*

- Hydrogen power generation provides both electricity for government buildings and water for heating and cooling systems, which pays a large part of the cost of the hydrogen fuel processors. In “hot spot” areas where demand for electricity has outpaced the existing power infrastructure, the investment in installation of hydrogen fuel generators earns a profit through electricity generation alone.
- Utility's self-sufficiency improves government's ability to respond to man-made or natural disasters and supports continuity of operations (COOP) planning.
- Legislation signals government's intention to subsidize the transition to a hydrogen economy, giving a dramatic boost to venture capital investment in the technology.
- Provides secure "first customer" demand which allows firms to invest in mass production of hydrogen fuel generators.

*Long-term, contingent payoffs:*

- Demonstration of cost-effective use of hydrogen fuel generators in government buildings leads to their adoption by private sector industries and eventually individual homeowners.
- Convergence of venture capital investment, government procurement, and private sector demand continues to drive mass production of hydrogen fuel cells, which lowers their unit price enough to make them cost-competitive with hydrocarbon fuels in an increasing number of situations.

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<sup>7</sup> Amory B. Lovins and Brett D. Williams (1999), “A Strategy for the Hydrogen Transition,” The Rocky Mountain Institute.

- Electric utility companies introduce mechanisms that allow individual homeowners to earn money by using surplus energy from their hydrogen fuel generators to power surrounding grid, and this leads to explosion in demand for home hydrogen fuel generators. The result is massive private investment in hydrogen fuel generator production capacities and a dramatic reduction in their unit cost. Hydrogen fuel generators become commonplace in middle-income households.
- Subsidizes producers and consumers of hybrid vehicles that run on hydrogen as well as hydrocarbon fuels

*Immediate, stand-alone payoffs:*

- Wins support of car manufacturers
- Signals government's intention to subsidize the development of hydrogen fuel vehicles, giving a dramatic boost to venture capital investment in the technology
- Helps preserve auto industry jobs

*Long-term, contingent payoffs:*

- Facilitates establishment of new hydrogen niche market for the US auto industry, which will become a key US competitive advantage as hydrogen fuel technology spreads around the world
- Leads to the development and refinement of a variety of hybrid vehicles, from which the federal government will select vehicles for its own fleet
- Stimulates early investment in complementary innovations including hydrogen fuel offered by gas stations
- Convergence of subsidies with widespread hydrogen fuel generators and tax incentives makes hybrid hydrogen vehicles a cost-effective choice for ordinary consumers who have regular access to a hydrogen generator at home or work.
- Oil companies respond to rise of hybrid cars by investing in mass distribution of hydrogen fuel at conventional gas stations.

**112th Congress (2011-2012)**

- Works with president to establish carbon emission cap-and-trade program at the federal level: in order to exceed their carbon emission quotas, firms must either purchase unused emissions allowances from other firms, or take action to reduce carbon emissions by an equivalent amount elsewhere. Such action may include financing the replacement of hydrocarbon fuels with hydrogen (in such a way that the resulting reduction in carbon emissions is equal to or greater than the firm's excess carbon emissions) in developing countries.

*Immediate, stand-alone payoffs:*

- Reduces US carbon emissions, improving air quality
- Harmonizes disparate state regulations on limiting carbon emissions, reducing firms' cost of compliance
- Diplomatic dividends as US is no longer a free rider on the Kyoto protocol
- Puts US in a position to pressure other countries on their emissions; this can be used as a diplomatic bargaining chip and linked to other issues of interest to the US

*Long-term, contingent payoffs:*

- Provides strong incentive to reduce emissions by switching to hydrogen fuel
  - US and European Union cap-and-trade schemes give rise to an entire emissions brokerage industry dedicated to financing emission-reducing projects in developing countries and marketing the resulting emissions credits to firms that exceed their pollution quotas. As the cost of hydrogen fuel drops and oil prices rise, it begins to make economic sense for more and more developing countries to switch to hydrogen fuel. The emission brokers finance the investments needed for this transition, creating a rapidly expanding emerging-economy market for hydrogen fuel technologies. Thanks to the government-led drive to expand domestic hydrogen technology capabilities early on, US firms have a comparative advantage in this area and reap a windfall from hydrogen technology exports.
  - US leadership on emissions reduction converges with increasing international concern and more conclusive scientific evidence on the relationship between emissions and climate change, creating the conditions for the establishment of an effective global emissions cap-and-trade system.
- Funds Department of Energy initiative to develop comprehensive national and international standards and specifications for hydrogen fuel technologies

*Immediate, stand-alone payoffs:*

- Enforces safety standards for hydrogen fuel products in the US
- Builds confidence in hydrogen fuel technologies among the populace
- Boosts profitability of hydrogen firms by allowing them to compete on the basis of product and process innovations rather than rival (incompatible) technology standards

*Long-term, contingent payoffs:*

- International standardization paves way for US hydrogen firms to globalize their operations (outsourcing and export)
- Fixed standards lead firms to invest in product and process innovation rather than in “standards wars”, which accelerates innovation in the hydrogen industry

## 113th Congress (2013-2014)

- Purchases hybrid (hydrogen/hydrocarbon) vehicles for post offices and other government fleets (GSA, etc) whose headquarters have been equipped with hydrogen fuel generators; appropriates funding for local and state governments to transition fleets and/or facilities to hydrogen.

### *Immediate, stand-alone payoffs:*

- Demonstrates federal government's commitment to a hydrogen fuel economy
- Makes hydrogen fueled cars more visible to the American people
- Saves federal government money since these vehicles can be fueled with government-owned hydrogen fuel generators

### *Long-term, contingent payoffs:*

- Builds market for future hydrogen fueling stations
  - Provides crucial first customer for hybrid cars, allowing firms to invest in mass production; this reduces unit cost of hybrid cars, increasing their appeal for private consumers
  - Facilitates establishment of new hydrogen niche market for the US auto industry, which will become a key US competitive advantage as hydrogen fuel technology spreads around the world
- Funds public service announcements promoting hydrogen fuel economy; funds hydrogen-fuelled race car (NASCAR) once a competitive prototype is developed

### *Immediate, stand-alone payoffs:*

- Spreads awareness of hydrogen fuel technologies, expels myths and educates public about safe uses of hydrogen
- Demonstrates US government's commitment to protecting environment and reducing dependence on foreign oil
- Greater visibility of hydrogen fuel increases investment in the technology
- Demonstrates the viability of a hydrogen fueled car to car enthusiasts

### *Long-term, contingent payoffs:*

- Greater confidence in hydrogen technology converges with government subsidies and reduction in unit costs to increase consumer demand for hydrogen fuel generators and hybrid cars
- Cultivates new generation of environmentally aware consumers

## **114th Congress (2015-2016)**

- Begins gradual withdrawal of government subsidies as private sector investment in hydrogen energy technologies takes off

### *Immediate, stand-alone payoffs:*

- Reduces government spending and frees up budget for other priorities
- Increases autonomy of hydrogen fuel industry firms

### *Long-term, contingent payoffs:*

- Since firms know government subsidies will be phased out, they invest in cost-effective processes from the start
- Private sector is more efficient in developing technology than the government, so withdrawal leads to quicker innovation in hydrogen technology

**APPENDIX A: Public Law-6414**  
**\*\*TO BE AMENDED\*\***

**IN THE HOUSE OF REPRESENTATIVES**

**December 13, 2005**

**A BILL**

To establish a House Commission to identify, investigate and inform Congress on future contingencies that may have transformative positive or negative effects on all realms of the human experience, specifically on science and technology, governance, security, and economics.

*Be it enacted by the House of Representatives of the United States of America in Congress assembled,*

**SEC 1. SHORT TITLE.—This Act may be cited as the House Annual Commission on Forward Engagement.**

**SEC 2. ESTABLISHMENT OF COMMISSION**

There is established in the legislative branch the House Annual Commission on Forward Engagement (in this title referred to as “Commission”).

**SEC 3. PURPOSES OF THE COMMISSION**

- (a) **PURPOSES.**—The purpose of the Commission is to—
- (1) investigate and identify national and global future contingencies that would have transformative positive or negative effects on all realms of the human experience, specifically on science and technology, governance, security, and economics.
  - (2) gather information through research, expert testimony, committee hearings, and past Commission reports on the identified future contingencies.
  - (3) make projections on the positive or negative scope and impact of identified future contingencies.
  - (4) report to Congress on the Commission’s findings, allowing for the legislative opportunity to respond efficiently, intelligently, and authoritatively to opportunities and threats that lie beyond traditional means of forecasting.
  - (5) enhance public perception of the relevance and criticality of potential human benefits or repercussions of identified future contingencies and the import of governmental mechanisms designed to preemptively address these issues.

**SEC 4. COMPOSITION OF THE COMMISSION**

(a) **MEMBERS.** The Commission shall be composed of 8 members, of whom—

- (1) 1 member shall be appointed by the majority leader of the House of Representatives, who shall serve as chairperson of the Commission;
- (2) 1 member shall be appointed by the minority leader of the House of Representatives, who shall serve as vice-chairperson of the Commission;
- (3) 3 members shall be appointed by the senior member of the leadership of the House of Representatives of the Republican Party, who shall serve as members of the Commission;
- (4) 3 members shall be appointed by the senior member of the leadership of the House of Representatives of the Democratic Party, who shall serve as members of the Commission

(b) **QUALIFICATIONS:**

- (1) **DEADLINE FOR APPOINTMENT.**—New members of the Commission shall be appointed on or before June 1 of each year.
- (2) **INITIAL MEETING.**—The Commission shall meet and begin the operations of the Commission on or after September 1 of each year.
- (3) **CONGRESSIONAL FORWARD ENGAGEMENT SESSIONS.**—The Commission will meet before February 1st of each year to separately address each identified future contingency and its implications for science and technology, governance, national security, and the economy.
- (4) **QUORUM; VACANCIES.**—After its initial meeting, the Commission shall meet upon the call of the chairperson or a majority of its members. Five members of a Commission shall constitute a quorum. Any vacancy in a Commission shall not affect its powers, but shall be filled in the same manner in which the original appointment was made.
- (5) **TERMS; TERM LIMITS.**—Members will serve the Commission for no more than 1 year beginning in September of each year. Any member may be reappointed to membership of the Commission consistent with 4a of this title, with the exception that no member shall serve more than 1 year consecutively.

## **SEC 5. FUNCTIONS OF THE COMMISSION.**

(a) **IN GENERAL.**—The functions of the Commission are to—

(1) conduct an investigation that:

- (A) identifies national and global future contingencies that would have a transformative positive or negative effects on all realms of the human experience, and may include relevant facts and circumstances relating to—
  - (i) science and technology;
  - (ii) governance;
  - (iii) security;



- (iv) economics; and
  - (v) other areas of the public and private sectors determined relevant by the Commission for their inquiry.
- (2) reviews, evaluates, and determines the likelihood and timeframe of the realization of identified future contingencies
  - (3) identifies structures or mechanisms already in place that may be able to exploit the opportunities or minimize the threats of identified future contingencies.
  - (4) submits to the Congress such reports containing such findings and conclusions as are required by Section 12 of this title.
- (b) **RELATIONSHIP TO PREVIOUS COMMISSION'S PRIORITIES.**—  
When investigating facts and circumstances relating to the future contingencies, the Commission shall
- (1) first review the information compiled by, and the findings, conclusions, and recommendations of the previous Commission; and
  - (2) after that review pursue any appropriate area of inquiry if the Commission determines that—
    - (A) the previous Commission had not investigated that area
    - (B) the previous Commission's investigation of that area had not been complete, or
    - (C) new information not reviewed by the previous Commission had become available with respect to that area.

## **SEC 6. POWERS OF COMMISSION**

(a) **IN GENERAL.**—

- (1) **HEARINGS AND EVIDENCE.** The Commission or, on the authority of any member thereof, may, for the purpose of carrying out this Title shall:
  - (A) hold such hearings and sit and act at such times and places, take such testimony, receive such evidence, administer such paths; and
  - (B) subject to paragraph (2) (A), require, by subpoena or otherwise, the attendance and testimony of such witnesses and the production of such books, records, correspondence, memoranda, papers, and documents as the Commission or such designated subcommittee or designated member may determine advisable.
- (2) **SUBPOENAS.**—

(A) **ISSUANCE.**—

(i) **IN GENERAL.**—A subpoena may be issued under this subsection only

(I) by the agreement of the chairperson and the vice-chairperson; or

(II) the affirmative vote of 5 members of the Commission.

(ii) **SIGNATURE.**—Subject to clause (i), subpoenas issued under this subsection may be issued under the signature of the chairperson or any member designated by a majority of the Commission, and may be served by any person designated by a majority of the Commission.

(B) **ENFORCEMENT.**—

(i) **IN GENERAL.**—In the case of contumacy or failure to obey a subpoena issued under subsection (a), the United States district court for the judicial district in which the subpoenaed person resides is served, or may be found, or where the subpoena is returnable, may issue an order requiring such person to appear at any designated place to testify or to produce documentary or other evidence. Any failure to obey the order of the court may be punished by the court as contempt of that court.

(ii) **ADDITIONAL ENFORCEMENT.**—In the case of any failure of any witness to comply with any subpoena or to testify when summoned under authority of this section, the Commission may, by majority vote, certify a statement of fact constituting such failure to the appropriate United States attorney, who may bring the matter before the grand jury for its action, under the same statutory authority and procedures as if the same statutory authority and procedures as if the United States attorney had received a certification under sections 102 through 104 of the Revised Statutes of the United States (2 USC. 192 through 194).

(3) **CONTRACTING.**—The Commission may, to such extent and in such amounts as are provided in appropriations for this Title, enter into contracts to enable the Commission to discharge its duties under this title.

(4) **INFORMATION FROM FEDERAL AGENCIES.**--

(A) **IN GENERAL.**—The Commission is authorized to secure directly from any executive department, bureau, agency, board, commission, office, independent establishment, or instrumentality of the Government, information, suggestions, estimates, and statistics directly to the Commission, upon

request made by the chairperson, the chairperson of any subcommittee created by the majority of a Commission, or any member of designated by a majority of a Commission.

**(A) RECEIPT, HANDLING, STORAGE, AND**

**DISSEMINATION.**—Information shall only be received, handled, stored, and disseminated by members of the Commission and its staff consistent with all applicable statutes, regulations, and Executive orders.

**(5) ASSISTANCE FROM FEDERAL AGENCIES.—**

**(A) GENERAL SERVICES ADMINISTRATION.**—The Administrator of General Services shall provide to the Commission on a reimbursable basis administrative support and other services for the performance of the Commission's functions.

**(B) OTHER DEPARTMENTS AND AGENCIES.**—In addition to the assistance prescribed in paragraph (1), departments and agencies of the United States may provide to the Commission such services, funds, facilities, staff, and other support services as they may determine advisable and as may be authorized by law.

**(6) GIFTS.**—The Commission may accept, use and dispose of gifts or donations of services or property.

**(7) POSTAL SERVICES.**—The Commission may use the United States mails in the same manner and under the same conditions as departments and agencies of the United States.

**SEC 7. NONAPPLICABILITY OF FEDERAL ADVISORY COMMITTEE ACT**

**(a) IN GENERAL.**—The Federal Advisory Committee Act (5 USC. App.) shall not apply to the Commission.

**(b) PUBLIC MEETINGS AND RELEASE OF PUBLIC VERSIONS OF REPORTS.—**  
The Commission shall-

- (1) Hold public hearings and meetings to the extent appropriate;  
and
- (2) Release public versions of the reports required under Section 12 (b) of this Title.

**(3) PUBLIC HEARINGS.**--Any public hearings of the Commission shall be conducted in a manner consistent with the protection of information provided to or developed for or by the Commission as required by any applicable statute, regulation, or Executive order.

**SEC 8. STAFF OF COMMISSION**

(a) **IN GENERAL.**—

(1) **PERSONNEL AND ADMINISTRATION COMMITTEE**—The Commission shall have a Personnel and Administration Committee composed of the chairperson, the vice-chairperson, and the senior ranking Commission member.

(A) **COMMITTEE FUNCTIONS.**—All decisions pertaining to the hiring, firing, and fixing of pay of Commission staff personnel shall be by a majority vote of the Commission, except that-

(i) The chairperson shall be entitled to appoint and fix the pay of the executive director, and the vice-chairperson shall be entitled to appoint and fix the pay of his senior staff person; and

(ii) The chairperson and vice-chairperson each shall have the authority to appoint, with the approval of the Commission, at least five professional staff members who shall be responsible to the chairperson or the vice-chairperson (as the case may be) who appointed them. The Commission may appoint and fix the pay of such other staff personnel as it deems desirable.

(iii) **COMPENSATION.**—Commission staff will be hired without regard to the provisions of title 5, United States Code, governing appointments in the competitive service, and without regard to the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates, except that no rate of pay fixed under this subsection may exceed the equivalent of that payable for a position at level V of the Executive Schedule under section 5316 of title 5, United States Code.

(2) **PERSONNEL AS FEDERAL EMPLOYEES.**

(A) **IN GENERAL.**—The executive director and any personnel of the Commission who are employees shall be employees under section 2105 of title 5, United States Code, for purposes of chapters 63, 81, 83, 84, 85, 87, 89, and 90 of that title.

(B) **MEMBERS OF COMMISSION.**—Subparagraph (A) shall not be constructed to apply to members of the Commission.

(3) **DETAILEES.**—Any Federal Government employee may be detailed to the Commission without reimbursement from the Commission, and such detailee shall retain the rights, status and privileges of his or her regular employment without interruption.

(4) **CONSULTANT SERVICES.**—The Commission are authorized to procure the services of experts and consultants in accordance with section 3109 of title 5, United States Code, but at rates not to exceed the daily rate paid a person occupying a position at level IV of the Executive Schedule under section 5315 of title 5, United States Code.

## **SEC 9. SECURITY CLEARANCES FOR COMMISSION MEMBERS AND STAFF**

(a) **IN GENERAL.**—The appropriate Federal agencies or departments

shall cooperate with the Commission in expeditiously providing to the Commission members and appropriately cleared staff to the extent possible pursuant to existing procedures and requirements, except that no person shall be provided with access to classified information under this title without the appropriate security clearances.

## **SEC. 10 APPROPRIATIONS FOR COMMISSION**

### **(a) AUTHORIZATION; DISBURSEMENTS**

- (1) There are authorized to be appropriated to the Commission for each fiscal year such sums not to exceed \$4,000,000 for purposes of the activities of the Commission under this Title.
  - (2) Appropriations to the Commission shall be disbursed on vouchers approved –
    - (A) jointly by the chairperson and the vice-chairperson, or
    - (B) by a majority of the members of the personnel and administration committee established pursuant to section 8(a) of this Title.
  - (3) Official reception and representational expenses not to exceed \$15,000 of the funds appropriated to the Commission for each fiscal year may be used for official reception and representational expenses.
- (c) **FOREIGN TRAVEL FOR OFFICIAL PURPOSES.**—Foreign travel for official purposes by Commission members and staff may be authorized by either the chairman or the vice-chairman.

## **SEC 11. COMPENSATION AND TRAVEL EXPENSES**

- (a) **COMPENSATION.**—Each member of the Commission may be compensated at not to exceed the daily equivalent of the annual rate of basic pay in effect for a position at level IV of the Executive Schedule under section 5315 of title 5, United States Code, for each day during which that member is engaged in the actual performance of the duties of the Commission.
- (b) **TRAVEL EXPENSES.**--While away from their homes or regular places of business in the performance of services for the Commission, members of the Commission shall be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed expenses under section 5703(b) of title 5, United States Code.

**SEC 12. REPORTS OF COMMISSION; TERMINATION.**

- (a) **INTERIM REPORTS.**—The Commission may submit to committees of Congress or the entire body of the House of Representatives interim reports containing such findings, and conclusions as have been agreed to by a majority of Commission members.
- (b) **FINAL REPORT.**—Not later than July of each year, the Commission shall submit to the Congress a final report containing such findings and conclusions as have been agreed to by a majority of Commission members.
- (c) **TERMINATION.**—
- (1) **IN GENERAL.**--The Commission, and all the authorities of this title, shall terminate upon a majority vote for its termination in the House of Representatives.
- (2) **ADMINISTRATIVE ACTIVITIES BEFORE TERMINATION.**—The Commission may use a 90-day period for the purpose of concluding its activities, including providing testimony to relevant committees of Congress concerning its reports and disseminating the final report.

**SEC 13. PRINTING AND BINDING COSTS**

- (a) For purposes of costs relating to printing and binding, including the costs of personnel detailed from the Government Printing Office, the Commission shall be deemed to be a committee of the Congress.

## **Appendix B: Future Map Use and Assessment**

**BACKGROUND:** For the Fall 2006 project, we conducted a limited test using the Future Map software which was provided by Practical Computer Applications, Inc. In our test, we utilized the Future Map software in parallel with the Component-level Implementation Process (CLIP). We selected CLIP for the proof-of-concept test because it allowed us to test the software without endangering the success of the whole project if we ran into significant problems. Furthermore, it appeared that the software would work better with the specific dates of a CLIP project than the broad date ranges associated with FCIs.

**USE:** We used the Future Map software to provide a better visual depiction of our CLIP process. We used the expanded STEEP categories from the FCIs as factors and further modified those to reflect the organizational modifications recommended by the legislative working group. We then added events to the Future Map spreadsheet that reflected specific legislative steps to further our overall goal of kick-starting the transition to a hydrogen economy. From this, we linked related events and further developed selected events by identifying implications. Because of personnel limitations, we did not conduct a full analysis, but instead focused on using the software to demonstrate the concept's feasibility.

### **ASSESSMENT:**

The strengths of the Future Map software:

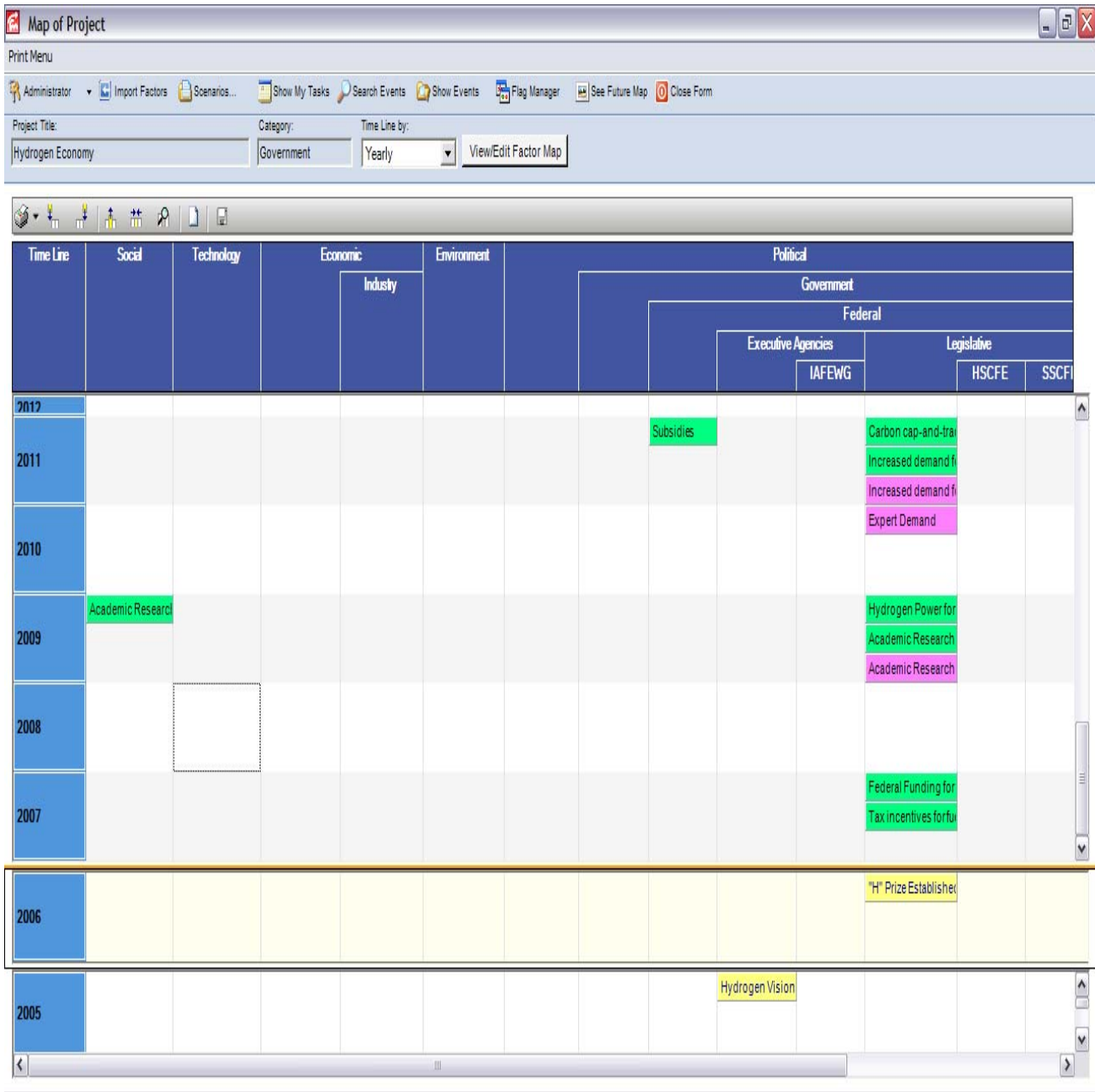
- The ability for multiple users to collaborate via a web-based application and 'wiki' environment
- Ease of installation and account administration
- Willingness of the developer to provide support/training
- The ability to link events and spell out implications
- The ability to provide a visual representation of relationships between FCIs

The limitations of the Future Map tool:

- It requires specific dates (month/year at a minimum) which could limit the ability to use the software to support further analysis of the more open-ended FCIs. The ability to work in fiscal-year, two-year, or five-year increments would be an improvement.
- All entries require a fair amount of manual entry and organization. Events have to be entered and linked and implications spelled out before more detailed analysis can take place.
- Events and implications appear limited to being tied to one factor on the factor map, whereas in many FCIs events would need to cross many factors.

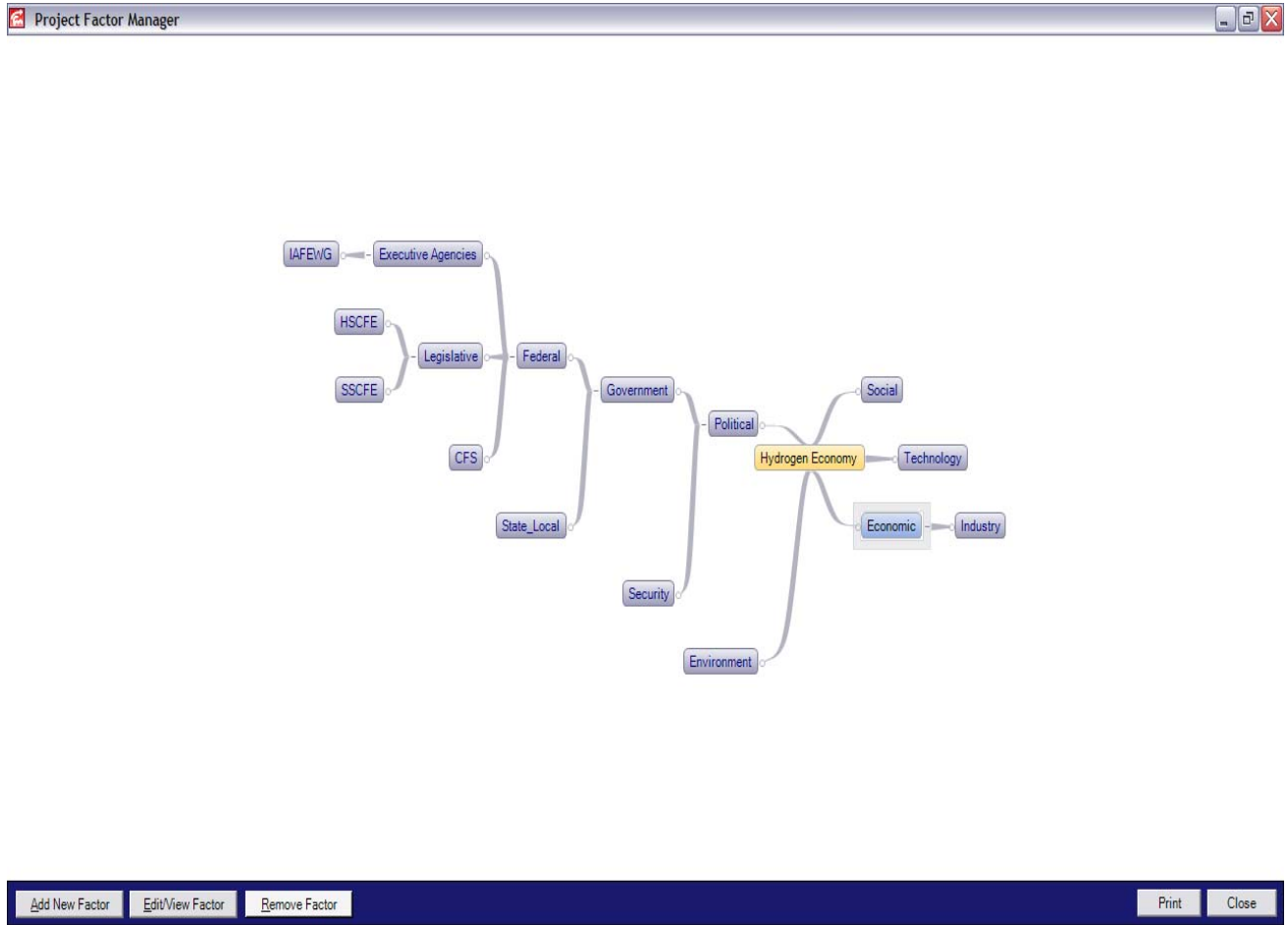
**RECOMMENDATIONS:** The Future Map software can be used to show the further development of the CLIP process. If a more flexible date structure (i.e. five-year timelines) were incorporated, it could support an even more detailed analysis of the complex interrelationships among FCIs. Using the software to conduct nodal analysis would require the manual input of a significant amount of FCI data. Future classes may want to consider investigating other network analysis tools to complement their nodal analyses.

**SCREEN SHOT OF PROJECT MAP:**





## **SCREEN SHOT OF FUTURE MAP'S FACTOR MAP:**



## **APPENDIX C: Review of Identified FCIs**

### **Fall 2006**

- Global warming, abrupt climate change
- Disruption of maritime commons
- Nuclear proliferation
- Global pandemics intensified by multi-drug resistance
- Islamic population in European states reaches tipping point
- The internet and mobile phones become widely accessible in developing countries
- Transnational corporations become more powerful than governments
- Traditional War becomes obsolete → Onset of new age of war
- Convergence of Nano-Info-Bio-Cogno Technologies
- The onset of Neurotechnology
- Life expectancy reaches 100 years
- Widespread adoption of alternative energy
- Viable human clone
- First contact with extraterrestrial life
- Weaponization of space
- Governments gain ability to track all citizens/pervasive domestic surveillance
- Large-scale biological/chemical attack/outbreak
- The End of NATO
- Genomic testing becomes commonplace

### **Spring 2006**

- China and India Emerge as Global Superpowers
- Global Warming Causes Drastic Climate
- Pervasive Computing Redefines Human Activity
- America Ages, Stops Senescing
- Nuclear/Biological/Chemical (NBC)
- Iran Becomes a Regional
- Nuclear Fusion Becomes a Viable Source of Energy
- US Credit Implodes

### **Fall 2005**

- Global Pandemics Intensified by Multi-Drug Resistance
- Life Expectancy Reaches 100 Years
- Humans Attain Ability to Forecast and Manipulate Long-term Weather Patterns
- Converging Sciences Yield Thorough Understanding of Brain Operations
- Biological Basis of the “Human Soul” is Discovered
- Governments Attain the Ability to Track All Citizens
- The End of Energy Scarcity
- The End of Water Scarcity
- US Loses Control over Internet
- Oil Production Reaches its Peak Prematurely

### **Spring 2005**

#### Appendix I: Economics FCIs

- The Future Contingency of the Loss of Dollar Dominance
- Obesity: A Weighty Future Contingency of Interest

Appendix II: Science and Technology FCIs

Climate Change  
The End of the Antibiotic Era  
Emergent Applicants of Quantum Physics

Appendix III: Security FCIs

Superpowers Old and New  
Suicide Attacks Become Commonplace  
The Nanotechnology Revolution  
The Proliferation of Failed States  
An Energy Revolution  
A Revolution in Military Affairs  
The Weaponization of Space  
Regional Balance of Power: Nuclear North Korea or Iran  
Bio-Terrorism  
Governing the Globe's Nuclear Arms Race

Appendix IV: Governance FCIs

AIDS  
Increased Domestic Surveillance  
Colonization of SpaceWaging  
Private War and Winning Public Peace

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Appendix I: Economics FCIs

Global Warming: A Creeping Future Contingency of Economic Interest  
Structural and Theoretical Shifts in the Global Economy  
The Elderly Hold Health Care Hostage – A National Interest Contingency  
A Safe and Clean Method of Destroying Spent Nuclear Fuel.

Appendix II: Governance FCIs

Will Russia Survive?  
Nuclear Terrorist Attacks: Implications for Governance  
The Global Grid.  
A Standing Army for the EU: Implications for US Global Leadership

Appendix III: Science & Technology FCIs

Discovery of extraterrestrial life, past or present  
Confirmation of a Grand Unified Theory (GUT) in physics  
Computing power continues to rise exponentially  
Discovery of a large asteroid on a collision course with Earth  
Space exploration and utilization leads to the successful mining of resources from near-Earth objects (NEOs)  
A room-temperature superconductor is discovered  
Nanotechnology becomes the “industrial revolution” of the 21st Century  
Alternative energy sources, including wind, solar, and hydrogen power, become standard  
Environmental degradation continues around the globe, leading up to the potential for a major catastrophe  
Medical advances redefine human life

Appendix IV: Security FCIs

Cyberstrikes: A Future Contingency of Interest  
Space Arms Race.  
The Rise of Transnational Criminal Groups—A Threat to International Security  
The Problems and Prospects of Private Military Corporations

## **APPENDIX D: Alternative Futuring Techniques**

The efforts of previous staffs were primarily directed at analyzing specific FCIs that they contended. In contrast, our team concentrated on assessing the overarching *themes* and *issues* that emerge when holistically approaching a wide set of FCIs. For this reason, several methodologies employed by previous personnel were not explicitly utilized in our analysis. Although not included in this report, we strongly recommend that future personnel reinstate these methods in some capacity or another. They are detailed below:

### **Action Index:**

An *Action Index* is a numerical value applied to an FCI in order to quantify the need for response. Borrowed from the Department of Homeland Security, and employed by the Spring 2006 Commission staff, the Action index considers:

- 1) Time line/horizon for the FCI; (valued 1.1 -1.6)
- 2) The probability it will come about; (valued 1.1 - 1.6)
- 3) Its potential impact (valued 1-10)

$\text{Action Index} = \text{Impact} \times \text{Probability} \times \text{Time Horizon}$
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The highest potential Action Index number is 160. For the first two, points are assigned as follows: 1.6 points (0-5 yrs), 1.5 points (5-10 yrs), 1.4 points (10-15 yrs), 1.3 points (15-20 yrs), 1.2 points (20-25 yrs), 1.1 point (25-30 yrs).

### **Projection:**

Projection uses past and current trends to synthesize a series of potential future events. By analyzing linear trend progressions in various fields, projection seeks to provide a vague but directed picture of likely future circumstances

### **Prediction:**

A prediction is a specific statement about a potential future event or set of events. Predictions are often generated by using trend projections in order to narrow the set of possibilities. While generating an accurate prediction is difficult and unusual, they can be valuable points of reference when thinking about the future.

### **Delphi Method:**

The Delphi Method is basically forecasting by committee. The researchers solicit the opinions of a number of experts in fields relevant to the question and then compile the results. The idea is that greater consensus indicates a more likely future.

### **Scenarios:**

Our predecessors generated and assessed scenarios in order to closely examine the potential outcomes of specific FCIs. Scenarios are detailed visions of one or multiple potential futures. They are devised by employing forecasting methods such as *projection*, *prediction*, and the *Delphi method* in order to illustrate specific future circumstances that incorporate one or a limited set of FCIs. Although not in the case of the Spring 2006 report, scenarios are often presented in groups of three or four ‘alternate futures,’ which a futurist or policy maker can use to assess which future circumstances are desirable or undesirable.

**Positive / Negative Assessment:**

Previous staffs assessed the potential benefits and consequences specific to FCIs. This analysis can provide policy makers with a qualified assessment that they can use when deciding how to direct policy. Although not utilized in our analysis, this staff identified three applications for this approach:

- 1) Assessing the *positive* or *negative* implications of an FCI based on **bias, special interest** or **subjective position**. From our stand point, this type of assessment would be geared toward determining the positive and negative implications that an FCI could have on US interests and the longevity of our nation's government, people and way of life.
- 2) Assessing the *positive* or *negative* impact that **policy would have on the development of an FCI**. This assessment would show how specific policies can *encourage* or *inhibit* the progression and/or effects of FCIs.  
*For example, we argue that a US official definition of human life, which restricts certain types of research, can encourage the shift of power to Asia (FCI) as highly trained individuals will choose to relocate to countries where a looser definition of life allows for greater research opportunities. On the other hand, the US implementation of a domestic policy to enhance privacy rights may render a negative impact on the US's ability to respond to a pandemic due to limited access to health records.*
- 3) Assessing *positive* or *negative* feedback. **Feedback describes the potential for policy to enhance or diminish in effectiveness over time**. Positive feedback describes a situation where the effects of policy are aggrandized; negative feedback is the reverse, whereas policy becomes less effective as time passes.