The George Washington University
Elliott School of International Affairs

Proposal for the Creation of a National Commission for Strategic Planning

April 19, 2004
Forward Engagement IAFF 720.80, Spring 2004
Professor Leon Fuerth

Prepared By:
Forward Engagement Spring 2004 Team

Kristin Adair
Alex Alum
Kal Ananthakrishnan
Charles Bushman
Steven Cahall
Charles Cannon
Sean Connell
Ken Fletcher
Creight Hottinger
Go Kasai
Melissa Nachatelo
Daniel Nadel
Paul Snow
Michael Trulson
Emily Waechter

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EXECUTIVE SUMMARY

Changes of unprecedented magnitude and velocity will confront the United States in the upcoming decades, promising to challenge both its domestic democratic process and its international leadership. Globalization makes these changes all the more interconnected and intense, as advanced communication and technology collapse time and space. Spheres of action traditionally considered isolated are increasingly fluid and unstable—temporal boundaries no longer apply in the realms of governance, economics, science and technology, security, and health. The true impact of these fields lies at their multiple points of intersection—where issues from one area penetrate and alter another area, sometimes imperceptibly in the present, but with potentially transformative effects in the long term. The benefits of these interactions are boundless, yet so too are their dangers, as evidenced by the lethal combination of advanced technology and globalization, which threatens state stability when used by amorphous, flexible terrorist networks.

The United States finds itself atop the global order. Its inescapable leadership role as the global political, economic, and military hegemon demands responsiveness and an active role in shaping the future. To date, the United States has remained a reactive, and sometimes dangerously short-sighted, world power—demonstrated by its inability to "connect the dots" in time to avert tragedy like that of September 11th, 2001. Government discourse often arises in response to, rather than in anticipation of, the nation's (and the world's) most consequential events. The increasing velocity of change demands a different approach. In pursuit of good governance, the United States should continue to draw lessons from history, but it also must engage the future through awareness of and plans for the variety of paths the future may take. Without a national strategy that blends forecasting and policymaking, and systematic attempts to connect the dots across agencies, sectors, and issue-areas, national prosperity is at risk.

Through an incremental process of practicing forecasting techniques, identifying future contingencies of interest (FCIs), and then developing policy options to deal with various contingencies, the Spring 2004 Forward Engagement team concluded that in order to shape future opportunities, absorb or alter future threats, and successfully adapt to a rapidly changing human and natural environment, the United States must commit to strategic engagement. Based on a brief discussion of FCIs and complex interconnectivity, the following report details the need for a national commission to integrate forecasting and policy development. It further proposes a

mandate and structure for the institution, and grapples with the political realities that will impact the commission's creation and its influence.

The proposed National Commission for Strategic Planning (CSP) has been created to:

- Meet the demands posed by an increasingly interconnected world;
- Infuse today's policymaking process with a deep understanding of the relevance of future contingencies of interest.

In pursuit of these goals the CSP will:

- Identify future contingencies of interest and continuously trace and analyze their evolution and interactions;
- Provide salient policy options to the President, Congress, and relevant government agencies;
- Reevaluate policy options as changes demand, and analyze the impact/unintended consequences of current policies;
- Coordinate inter-agency efforts to create a consistent and informed long-term national strategy for the future.

Created by Congress through the National Policy Planning Act of 2004, CSP shall assist in promoting long-term strategic goals for U.S. policy. The Commission will work toward imbuing the policy process with a systematic approach to forecasting that facilitates decisionmakers' ability to build policies that take into account potential futures and unintended consequences. The CSP shall be foremost concerned with generating/analyzing FCIs and providing coherence to long-term policy solutions. By continuously reviewing current U.S. policy, the CSP can incorporate new developments into proposed policy options and allow for mid-course corrections.

The CSP will form a network of communication among the legislative and executive branches of government, various agencies, and the private sector. The CSP's nine commissioners, appointed by both the President and Congress, will serve as the primary nexus between the Commission's findings and the channels of policy. Commission task forces, divided according to subject areas, but collaborative and cross-cutting in their pursuits, will rely on internal subject matter experts (SMEs), as well as outside academics, experts, and practitioners to develop FCIs and examine robust policy options that could serve the United States' long-term interests. All actions of the Commission will emphasize interconnectivity. The CSP's structure is designed to foster cooperation and collaboration and ultimately to enhance the United States'

ability to interpret cross-cutting trends and fault lines, anticipate future events, and develop policy alternatives for various contingencies.

There is an urgent need for the United States to be better prepared for the opportunities and challenges that will accompany emerging trends and future discontinuities across the spectrum of security, economics, environment, health, governance, and science and technology. Responsible policymakers will acknowledge the importance of these future contingencies, as well as their volatile interactions, by shaping policies that give the United States the flexibility to maximize gains, minimize negative fallouts, and hedge against undesirable outcomes. With the creation of the CSP as an institutionalized mechanism for long-term policy and strategic planning, the United States will strategically position itself for greater responsiveness and adaptability in an ever more complex environment that holds both promise and peril for the future.

INTRODUCTION

Challenges to the democratic process grow daily as advances in technology and communication shrink both time and space. Democracies have thus far been able to debate the evolution of these technologies and their effects on society. However, the debate often lags behind developments. As changes in the inter-related fields of governance, science and technology, economics, security, and public health continue to accelerate the United States may find itself increasingly incapacitated by the very democratic process that defines its identity. The U.S. government will face domestic and international governance pressures related to demographic and environmental changes, globalization, the evolving concept of the social contract, and the age of innovation. Therefore, the United States must improve its own government structure to foster the necessary foresight and flexibility that will enable the country to skillfully cope with the magnitude and velocity of change in the aforementioned fields. Indeed, increased adaptability may be absolutely crucial to preserving America's global leadership role.

The current structure of the U.S government and of the American political process is not conducive to long-term thinking. Elected officials concerned with pleasing their electorates, highlighting their achievements while in office, and reducing political risks have little incentive to factor long-term implications of policy into their decision-making processes. Moreover, as a whole, the government lacks a common analytic structure for thinking about the future. While some departments within government agencies engage in forecasting (e.g., in the intelligence community), there is no mechanism by which these departments and agencies can share and exchange information with one another. Currently, therefore, the benefits of any long-term strategic planning that takes place in government is not maximized to its potential. Bureaucratic procedures, the political process, and the process by which government agencies secure their funds foster a reactive, instead of a proactive system. A proactive forecasting process will allow the United States to better preserve its liberal democratic system of governance.

An effective government will be able to position itself to anticipate and respond to a wide array of events and trends, or future contingencies of interest (FCIs), that arise. It will have the ability to examine the volatile "nodes" where various FCIs intersect—technology, energy, environment, health, demographics, multipolarity, and the North-South divide—and to shape the path that the future takes. This paper proposes a mechanism by which forecasting may be

institutionalized in the policymaking process, allowing government officials and representatives to better understand domestic and international changes, providing them with a range of options, and encouraging them to consider the associated costs and benefits of particular courses of action. Such institutionalization will, ideally, make government less risk-averse and will also give future generations a voice in today's policy.

THE CASE FOR A COMMISSION FOR STRATEGIC PLANNING

"Everything is connected, and often with incredible sensitivity."[1]

Planning for the future is essential to good government. It should go without saying that a primary concern of the U.S. government is the future and the long-term impact of policy decisions, yet little such planning takes place on a broad, systematic basis. Isolated groups in certain government agencies may exist, such as those that examine the future of technological developments for the Department of Defense (DoD), but their analysis is perforce limited by the mindset, goals, and culture of the departmental setting.

For the purposes of this paper, the issues that a wider, deeper governmental planning process needs to study are termed "future contingencies of interest" (FCIs). "Nodes" provide the context within which these contingencies operate. Speaking of "contingencies" emphasizes that future events are contingent on the actions government takes today. Using the term "node," or a connecting point at which several spheres of human interaction and other forms of FCIs meet, is a means to express interconnectedness and complexity. To thoroughly understand FCIs, then, one must be prepared to study them in the context of interconnectedness in which they evolve.

Taking context into account is vital. In today's world everything and everybody is caught up in a nonlinear web of incentives, constraints, and connections. Recognizing complex system interactions demands understanding that a tiny change in one sphere of activity can have tremendous, transformative effects in another—seemingly slight perturbations and/or isolated circumstances can foster an environment of dynamic interaction and powerful outcomes. These nodes mark the nexus where systems and events collide, resulting in ripple effects that transmogrify into unintended consequences. Interconnection thus dramatically increases the complexity of forecasting and policy creation. Analyzing one of the systems in isolation,

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[1] M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos*, Simon & Schuster: New York, p. 66.

therefore, often leads to sub-optimal overall outcomes due to adverse, unintended effects in another system(s). As policymakers attempt to assess and prepare for future contingencies there is prescience in having deep awareness of this interconnectedness inform their decisionmaking.

Though the existence of nodes is a historical constant, awareness of complex interactions is uniquely important in today's world due to the widening, deepening, and speeding up of worldwide interconnectedness over the past several decades.[2] The infusion of high-speed technology as an everyday infrastructure indicates one way in which contemporary globalization is collapsing time and compounding system interaction. Spheres of activity that might have once been distinguishable are now consistently cross-hatched and events are simultaneously unfolding at an unprecedented velocity.

Following are three examples of nodes that promise to alter the world the United States now leads.[3] As their explanations imply, current and future transformations within these realms present the United States with both promising and foreboding scenarios, which the government must recognize in order to develop comprehensive, robust, and flexible policies. They capture the essence of the challenges that domestic and international governance structures must be able to plan for, absorb, and/or alter.

DEMOGRAPHICS

Changes in population and society can have a profound impact on the dynamics both within and among societies. FCIs such as population surges, declines, spiritual affiliations, national allegiances, and migration will interact with each other and drive trends such as urbanization, resource scarcity/unequal distribution, ethno-religious conflict, poverty, protectionism, infectious disease outbreaks, environmental degradation, and failed states. These, in turn, will contribute to shocks in those areas.[4] "Each of these challenges is also a kind of Gordian knot of domestic and international, political and social, economic and security problems."[5]

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[2] Held, Goldblatt, McGrew and Perraton, *Global Transformations*, Stanford University Press, p. 2.

[3] See Appendix 1 for node descriptions and a comprehensive list of FCIs within the fields of economics, governance, science and technology, and security.

[4] Robert Kaplan foresees large states, such as Cote d'Ivoire and Kenya, in sub-Saharan Africa crumbling under the pressures of the "youth bulge," which is expected to be more pronounced in Africa than in the Middle East. Robert Kaplan, "The World in 2005," *The Atlantic* (March 2002). Available at http://www.theatlantic.com/issues/2002/03/kaplan.htm; 28 January 2004.

[5] David Rothkopf, "The Coming Battle of the Ages," *The Washington Post*, 1 February 2004, p. B03.

Domestically, the retirement of the baby boomer generation, the rise of a majority-minority state, and a change in the religious backdrop of society may result in economic upheaval, potential inter-generational strife, and stark sectarian divisions. The shifting composition of U.S. society in turn may shape alliance patterns and trade relationships, while also changing the criteria for international assistance and intervention.

Internationally, demographic shifts might place a higher demand on U.S. military and economic resources in order to maintain global stability. The "youth bulge" in the global South, coupled with the "graying" of the North, will place an enormous amount of pressure on both national and international institutions. Massive migration will create social and political instability, even as it promises to relieve some of the economic pressures of the aging West.

ENVIRONMENT

Environmental concerns spill over into science and technology, economics, security and governance, irrespective of the boundaries man attempts to impose upon them. Environmental dangers that fester in one region have transnational effects and consequences that affect others—global warming, water scarcity, over-fishing, and species extinction, to name a few. Environmental degradation will change the way people relate to their environment and to each other. It will also increase reliance on government to meet demands for resources that are less and less available. Economically, complete industries and livelihoods could be decimated by environmental shocks that are exacerbated or created by man. Technological innovations will continue to have the combined effect of improving society while straining the environment. Technology might also be the tool that enables societies to take better care of the environment through the development of alternative resources.

TECHNOLOGY

In the last several centuries, technology has been at the core of dramatic transformations in human societies necessitating new concepts of society, boundaries, governance, etc. As an example, one could point to inventions such as the textile loom and the steam engine that powered the industrial revolution. Another example from the last few decades of the twentieth century has been the information revolution triggered by computers and the Internet.

Technology will continue to be a central factor in the revolutionary changes of the future. Innovations such as nanotechnology will create new economic wealth that could eradicate poverty and obviate resource wars. At the same time, its potential environmental effects are only

starting to become known and suggest some challenges ahead. Advances in genetic engineering will also have profound implications for the environment, as well as the health and well being of humans. Progress in artificial intelligence, computing, and communications will change the role of human beings in society and alter the relationship between man and machine. The relative importance of machines in society will rise dramatically, which could lead to an eventual fusion of man and machine.

As in the past, the new technologies of the future will raise a number of moral and ethical dilemmas that societies must contend with. How societies and governments resolve these dilemmas will determine what changes will be required in the areas of governance, economics, and security. Self-replicating nanomachines, human cloning, stem cell research and genetically modified foods will continue to generate contentious debates. Greater questions, such as who will own the new technologies, and how the benefits will be shared among societies are challenges that will require coordinated international action.

Countless other nodes exist such as health, multipolarity, and energy. The unifying theme among nodes is that they are not isolated to one traditional sphere of human activity, but play out simultaneously across the realms of economics, security, governance, science and technology, and public health. The current era of "hyperchange" requires that policymakers be cognizant of intense system interactions and their far-reaching effects.

Unfortunately, at this time the U.S. government infrastructure is highly segmented among departments, which is not conducive to building the coordinative efforts required to address and institutionalize an appreciation of interconnectivity. As interconnectivity deepens and time collapses, the available window for addressing nodes and their attendant FCIs shrinks and policy becomes more consequential. Therefore, there is prudence in establishing an institution dedicated to coordinative foresight and consequent collaborative policymaking—best accomplished through a national commission that simultaneously informs the policy decisions and direction of the President and the Congress.

NATIONAL COMMISSION FOR STRATEGIC PLANNING

THE NATIONAL POLICY PLANNING ACT

For the purpose of preparing the United States to meet the demands posed by an increasingly interconnected world and for the purpose of understanding how future contingencies of interest can inform today's policy-making environment, the Senate and the House of Representatives of the Congress of the United States of America hereby create the National Commission for Strategic Planning (CSP).

Entrusted leaders and stewards of the United States, the Congress recognizes the importance of working with the Executive branch to assure a free and prosperous society in the United States, not only for today but also for future generations. In order for this to be possible, it is essential that the U.S. government strive to anticipate—not simply react to—societal and technological developments that test our bureaucratic and democratic system of governance. The Congress understands the importance of actively assessing the linkages in policy work across agency and department boundaries in order to make such strategic positioning possible. Harmonizing the U.S. government's various efforts in order to better confront future concerns in an era of rapid change will be a principal goal of the National Commission for Strategic Planning.

The CSP shall be established by the National Policy Planning Act of 2004 (NPP Act), Section 27, which states the need for forward-thinking measures to be taken to interconnect policy considerations within the executive and legislative branches of government. The Act, put forward by the Senate Committee on Governmental Affairs, must pass through both houses of Congress and be signed into action by the President. The mandate of this Act will be fully enacted by January 1, 2005. Pursuant to the directives of Congress and the President, it will begin full operation within one year from the date of enactment. Operation will entail a nine-member Board of Commissioners, staff, analysis/reporting and policy development capability including: evaluation of current policy to pursue consistency in current and future planning; generation of policy options; collection of industry information and trends related to agriculture, demographics, economy, energy, environment, governance, health, security, science and technology, and other areas of interest; and coordination with government bodies to facilitate the inclusion of industry information in policies pursued by members of Congress and the Executive Office.

The broad scope of the CSP will allow the Commission to utilize public and private experts in order to implement forward-thinking measures into policymakers' daily considerations. The development of multifaceted policy options based on analytic and collaborative work will be the foundation of the CSP contribution, leaving policy implementation to the Congress and the President. The Commission, in its advisory role, shall be responsible for monitoring the integration of forecasting into the governance system as well. In this pursuit, the Commission will seek feedback and participation from executive agencies regarding the integration of future contingencies into ongoing U.S. policy work. To complete its objectives, the CSP will utilize existing resources from government and non-government agencies, experts, and academics.

CSP MANDATE

The National Commission for Strategic Planning shall be responsible for identifying future contingencies of interest pertinent to U.S. interests and providing recommendations to the President, Congress, and relevant government agencies in order to coordinate efforts to create a consistent and informed national strategy. CSP shall assist in promoting long-term strategic goals for U.S. policy and work in conjunction with the President and Congress to assure that future dimensions of policy options are taken into consideration by national policymakers across agencies. The CSP shall exist as an independent commission the capability to gather data from and provide impartial recommendations to all government committees, agencies, and actors while at the same time drawing considerably from private sector expertise to formulate its policy options. This mandate, in order to best serve the United States, shall renew without procedure every six years from the date of enactment, unless Congress initiates and secures passage of legislation terminating the Commission.

In order to carry out its mandate, the CSP will focus on three main goals:

- Identifying FCIs that could impact U.S. interests and evaluating their short- and long-term consequences. The nodes where FCIs commingle and combust continually create questions that Congress and the Executive should be prepared to address. To assist decisionmakers in recognizing and addressing these questions, the CSP will actively evaluate trends emerging from both the public and private sectors, decipher their effects on U.S. policy, coordinate solutions to bring consideration of these trends into policy work, and propose policy options attached to potential scenarios when appropriate. Consistent exploration of current trends in

security, technology, society, law, and other fields will be a necessary component of the CSP's directives.

- Providing coherence to U.S. policy by advising policy development and encouraging decisionmakers and policy staff to embrace their role as stewards of the future and excel as forward-engaged leaders. Review of current government efforts to share information and understand future contingencies of interest demonstrates an urgent need for sharing information and building foresight into policy work across inter- and intra-agency lines. The CSP will exist as the official resource and guide for government bodies to evaluate the interconnectivity of developments in multiple fields so they may apply them to their current policy considerations.

- Conducting periodic reviews of prior policy options to incorporate new developments and to allow for mid-course corrections. On a regular basis, the CSP is responsible for reviewing current policies, gauging effects of implementation, carefully reviewing the "unintended consequences" of certain policies, and exploring how they alter prior assumptions and CSP assessments. Based upon its regular findings, the CSP shall work with respective agencies to identify inconsistencies or recommend policy modifications that will enable the government to best adapt to changes in circumstances and potential trends or discontinuities. Such flagging and policy advisements shall be distributed on a case-by-case basis to the appropriate governmental parties and actors to enhance their policy work.

The NPP Act of 2004 grants the CSP, as an independent commission, authority to examine agency work and recommend potential policy modification. Under this directive, the Commission shall initiate its own investigation of trends and policy interactions based on the consensus of the CSP Board of Commissioners. The Commission's task forces, as described in detail below, shall be the first watch for industry, society, and environmental trends and provide informed initiatives for the Board to pursue. As its mandate states, the CSP shall also serve the Congress and the President directly. Therefore, upon the request of a Congressional committee chairperson or the Executive Office and as determined by its Board of Commissioners, the CSP shall conduct an assessment inquiry into a specified field. The CSP shall then work in conjunction with the appropriate congressional committees, government agencies, and

departments to develop suitable policy options.[6] In addition, within the White House, the CSP shall collaborate closely with the National Security Council (NSC), which according to the National Security Act of 1947 is tasked with "advising the President with respect to the integration of domestic, foreign, and military policies."[7] The NSC shall be the primary receptor of information, findings, and policy options generated by the Commission. The Commission will also work with the President's National Domestic Council and National Economic Council.

Assessment reports will be generated and delivered to the requesting body or member within a timely manner. All reports initiated by members of Congress shall be made available to other Congressional committees and members, in addition to the requestors. Reports produced by the CSP for the President or other governmental agencies shall be released to the relevant party and will be available for access by the Congress and the public, with the caveat of excluding information that is classified for national security purposes. As a forward-thinking institution that seeks to illuminate and inform the U.S. policymaking process, the CSP will also disseminate findings as "living documents," meaning they will be circulated for comment by designated congressional committees and among the Principals of the Executive Branch, understood most often as the Principals Committee of the National Security Council. Therefore, the CSP will not only provide advice and counsel on complexity and future-related issues to the U.S. government's policy-makers, but it will also create a constant feedback loop among agencies and advisory committees, as well as allowing multiple perspectives to permeate the process. It will ultimately be up to the Commissioners to crystallize the issues in such a way as to facilitate consumption by policymakers.

The Commission's work will be transparent and participatory. CSP findings shall be made available to the public in order to generate public discussion and consideration for future contingencies of interest. To encourage free participation, the CSP will also at times hold round table discussions involving members of both the private and the public sectors. However, in order to enable all participants to speak freely, statements made during these deliberations and

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[6] In many cases, the Commission will work with the U.S. House of Representatives' International Relations, Appropriations, Budget, Education and the Workforce, Science, and Governmental Reform committees and the U.S. Senate's Agriculture, Nutrition, and Forestry, Appropriations, Banking, Housing, and Urban Affairs, Environment and Public Works, Foreign Relations, Governmental Affairs, and Health, Education, Labor, and Pensions committees.

[7] U.S. Congress, "The National Security Act of 1947," in Karl F. Inderfurth and Loch K. Johnson, eds. (New York, NY: Oxford University Press, 2004), p. 24.

included in Commission findings will not be attributed to specific individuals or released during proceedings, although the names of these participants will be disclosed.

In order to meet its directives, the CSP shall have full access to information and upon its request be furnished with any necessary documents (classified or unclassified), statistics, estimates, recommendations, or technical assistance by executive branch departments and government agencies in a timely manner. As is mandated, the CSP shall also actively collaborate with private agencies, firms, associations, and experts to ensure that information is updated regularly and accurately through a survey of the best available knowledge. This will be necessary to carry out the CSP's information-collecting and reporting activities. In addition, the NPP Act mandates that findings of the CSP will be taken under advisement by the Executive in the preparation of the National Security Strategy of the United States.

ROLE IN THE BUDGET PROCESS

To further the goal of integrating CSP's work into all relevant government policy, the Commission will have a mandated role in the Executive's budget process and program review. In order to minimize the budget and staff needed for this additional work, the CSP will only participate at the highest-level working groups on the budget and will participate in annual or semiannual program review processes. This work would be performed by core staff, led by the Deputy Director. Staff work on the budget and program review processes would give the Commission valuable knowledge of current and future government programs and policies, allowing for additional review of inclusion of past FCI-related policy recommendations. Additionally, this will give CSP a voice when important decisions are being made. It will also ensure a greater degree of connection between the CSP and other government agencies. This builds on the Commission's strength of having government agency liaisons by furthering communications and creating a more receptive environment for future CSP data requests, findings, and recommendations.[8]

The CSP would essentially have a role similar to that of other high-level reviewers such as Program Analysis and Evaluation at DoD, but would not be controlled by the department

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[8] Creating a good work environment between the Commission and government agencies is critical to the CSP's mission. If a cooperative, collaborative relationship does not exist, the agencies can severely hamper the working of the CSP by delaying data requests, only rotating poor performers, and actively lobbying against CSP recommendations with their Congressional committees.

heads.[9] However, to ensure independence and keep it out of the executive chain of command, it would not have the ability to direct executive branch policy. It could, as mandated above, have access to all relevant program data. The CSP would thus be given the opportunity to respond to budget and program plans in a timely manner during the process rather than making historical observations after the budget has been finalized. It would also have the opportunity to raise concerns when agency plans or assumptions contradict CSP findings.

STRUCTURE

National Commission on Strategic Planning
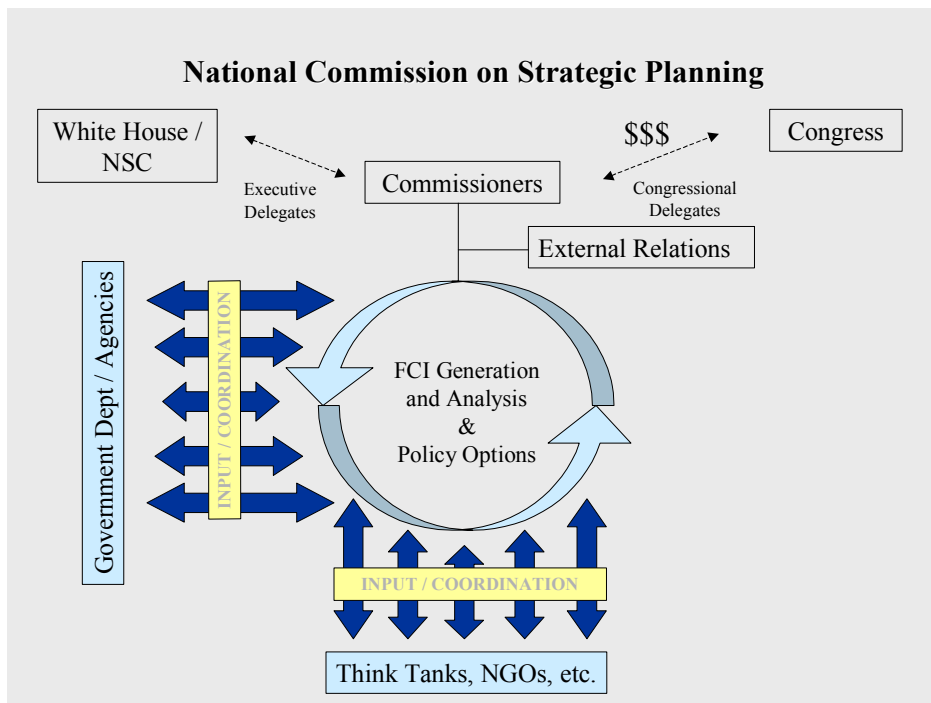
The Commission is composed primarily of two entities, commissioners and task forces. Both include subject and policy experts from the public and private sectors with broad-ranging experience and expertise across several issue areas. While the primary duty of the task forces is to identify and analyze future contingencies of interest with an eye toward potential trajectories of development, it is the responsibility of the Commissioners to metastasize this information into

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[9] DoD's Office of Program Analysis and Evaluation: "Analyzes and evaluates plans, programs, and budgets in relation to U.S. defense objectives, projected threats, allied contributions, estimated costs, and resource constraints; reviews, analyzes, and evaluates programs, including classified programs, for executing approved policies; provides leadership in developing and promoting improved analytical tools and methods for analyzing national security planning and the allocation of resources; ensures that the costs of DoD programs, including classified programs, are presented accurately and completely; assesses effects of DoD spending on the U.S. economy, and evaluate alternative policies to ensure that DoD programs can be implemented efficiently." See http://www.pae.osd.mil/.

sets of both short- and long-term policy options, which they present to the President and Congress for consideration.

Commissioners

The National Commission for Strategic Planning is composed of nine commissioners. Commissioners will be selected from among former high-level policymakers in the executive and legislative branches of government as well as the military and intelligence communities, and leaders in the private, non-governmental, and academic sectors. A common thread among these commissioners will be their wide recognition and reputation as experts, visionaries, and policy leaders who are not shy about overturning convention and asking uncomfortable questions that challenge any and every possible preconception.

The President will appoint five commissioners. Of these, only three may be members of the same political party. In addition, at least two of the President's five appointees must be private citizens. The Congress will appoint four commissioners (two selected by the Senate, two by the House of Representatives).[10] Of the commissioners appointed by Congress, which are selected by House and Senate majority and minority leadership, at least two of the four must be private citizens. In addition, no more than two of the four may be members of the same political party. Therefore, the structure of the Board of Commissioners is such that it is a mix of public and private sector luminaries, offering a broad scope of expertise and opinion and not dominated by one political ideology.

Commissioners are appointed to serve staggered three-year terms.[11] The turnover in commissioners ensures a greater diversity of ideas and reduces the chances of particular interests or ideologies dominating its work.[12] Commissioners cannot serve consecutive terms, but can be reappointed to the Commission after they have stepped down provided there has been a six-year

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[10] The advantage of an odd number of Commissioners lies in the fact that, like the Supreme Court, there will be a "tie-breaker." On the other hand, with an even number the Congress and the Executive would have equal clout.

[11] Commissioners will serve full-time for their three year appointments. The executive, administrative, and expert staff will be completely accessible to the Commissioners to assure rapid and complete exchange of information, i.e., if Commissioners want to talk with specific SMEs they should have that ability, with no bureaucratic barriers so long as the Executive Director is not cut out of the loop.

[12] There is some debate about whether Commissioner's terms should be staggered. Staggering could reduce the Commission's cohesiveness and detract from time spent working on FCIs as each new member would have to be brought up to speed. It could also raise more frequent opportunities for partisan bickering over appointments. At the same time, it would be detrimental to the ongoing work of the Commission to have a complete changing of the guard every three years, which would be the outcome if a staggered system were not implemented.

gap between appointments. This is to ensure a healthy rotation of commissioners from all backgrounds and a constant mix of new ideas and insights, while enabling commissioners who were especially beneficial to the Commission to have future opportunities to serve.

One commissioner will be appointed to serve as chairperson by the President. The chair position rotates every two years. The Chair delegates all management and administrative responsibility to the Executive Director of the Commission.

Role of Commissioners

The Commissioners develop policy options to present to the President and Congress in relation to future contingencies of interest and their multifaceted interactions. Commissioners will maintain iterative long-term policy approaches reflective of new information and FCIs that emerge. Commissioners request and receive reports from the task forces (described below), through which they conduct continuing periodic reviews of policies for effectiveness and suggest mid-course corrections to adjust for new and emerging trends.

Staff

Permanent commission staff are limited to four managerial positions, a core group of "subject matter experts" (SMEs), and support staff and adjunct researchers as necessary. However, the Commission is also "staffed" by employees rotated in from government agencies for a short-term period, whether for assistance on a specific FCI research project or for a two-year period to work on several issues.

Executive Director

Chosen by the Commissioners, the Executive Director is responsible for all managerial, operational, and administrative aspects of the CSP. This person also serves, together with the Chairperson, as the primary liaison with the White House and Congress. The Executive Director serves for a five-term, and can serve two consecutive terms.

The Executive Director will ideally have extensive prior government and private sector experience and a comprehensive familiarity with the workings of federal agencies, the Executive Office, and Congress. He or she must qualify for a top-secret clearance or better, and will preferably have experience in or exposure to forecasting and a strong, broad familiarity with the policy issues involved.

Deputy Director

The Deputy Director serves effectively as "chief of staff" for the Executive Director and directly supervises each of the Subject Matter Expert Task Forces. The Deputy Director represents the Commission in the budget and program review process. As with the Executive Director, the Deputy Director must qualify for a top-secret clearance or better.

Director of External Relations

The Director of External Relations serves under the Deputy Director and is the main point of contact for federal agencies, offices in the executive branch, and the private sector. The Director is also responsible for media relations and public outreach efforts. The Director will work directly with the Commission's Government Agency Liaisons.

Chief Legal Counsel

The Chief Legal Counsel (CLC) will serve as an advisor to the Executive Director as well as to the Commissioners. The CLC will monitor the functions of the Commission in order to ensure that all operations, and particularly its interactions with Congress and the Executive branch, are conducted within constitutional and legal boundaries. In addition, the CLC will necessarily be involved as an advisor when national security matters require that the Commission receive or generate information classified under relevant federal statutes.

Government Agency Liaisons

The CSP will have a group of government liaisons responsible for coordinating with each federal agency, serving under the Director of External Relations but based primarily at their respective agencies. In conjunction with this, each federal agency will designate a liaison for the Commission who will be based primarily at the Commission. This "exchange" of liaisons will reinforce efforts to coordinate between the Commission and government agencies.

Congressional Liaisons

Similar to the arrangement with federal agencies, the Commission also has designated congressional affairs liaisons who coordinate with the House and Senate.

Task Forces

Composition

At the core of the Commission are task forces staffed by subject matter experts. SMEs include scientists, practitioners, researchers, and government agency experts, some of whom will be rotated into the Commission for a two-year period from their home agency. SMEs will have expertise in a wide variety of areas, including experts in particular fields and people whose specialization lies at the intersection of traditionally separate fields. SMEs should have significant knowledge of and/or experience working with government agencies, Congress, and the political/budgetary process. Each task force will be composed of several SMEs who are permanent employees of the Commission, one of whom will be designated as the lead SME of the task force. It is standard operating procedure for the lead SME on an issue to include on his/her core team a SME for the other sectoral areas, in order to institutionalize the cross-cutting approach.

As noted above, task forces will also be staffed by two to three specialists/experts rotated in from government agencies, depending on the specific FCI projects at hand. These people will be rotated among the task forces, again to reinforce the integrated and crosscutting nature of the tasks at hand.

In addition, each task force will be assigned to organize a study group of outside experts who might come from academia and research institutions, think tanks, NGOs, and industry. The SMEs will have responsibility for devising various forecasting mechanisms that would be appropriate for the subject area.

Role of Task Forces

The role of the task forces is to detect, identify, analyze, and monitor future contingencies of interest, emerging trends, and discontinuities that fall primarily within the realm of their subject area. It is their responsibility to create "signposts" signaling various trends pointing to potential futures, to track the development of these trends over time, and provide potential policy options and responses. Task forces collectively prioritize FCIs based on the velocity of change, depth of consequences, and other relevant factors. They closely coordinate with each other on topics and issues that cut across sectoral lines in order to promote cross-fertilization of ideas and accommodate new information. Each task force is dedicated to a particular sector of potential FCIs and pays particular attention to the complex interaction of FCIs within these areas, while

also noting cross-sector interactions among economics, environment, governance, security, science and technology, and public health.

Through their analyses, task forces generate periodic reports—subject to peer review by their external study group—to present to the Commissioners for consideration. These reports present detailed summaries of FCIs, expectations for their evolution, and a broad range of potential policy options having positive, neutral, and negative outcomes. The Commissioners review these reports, officially prioritize FCIs on the basis of their perceived ripeness for policy action, and develop a range of policy options, carefully illuminating their respective trade-offs and potential outcomes. The Commissioners then present this information to the Principals Committee of the NSC, as well as the Governmental Relations Committees and others for integration into current and future policy development and implementation.

CSP Organization Chart

* Task Forces interact and collaborate on an on-going basis
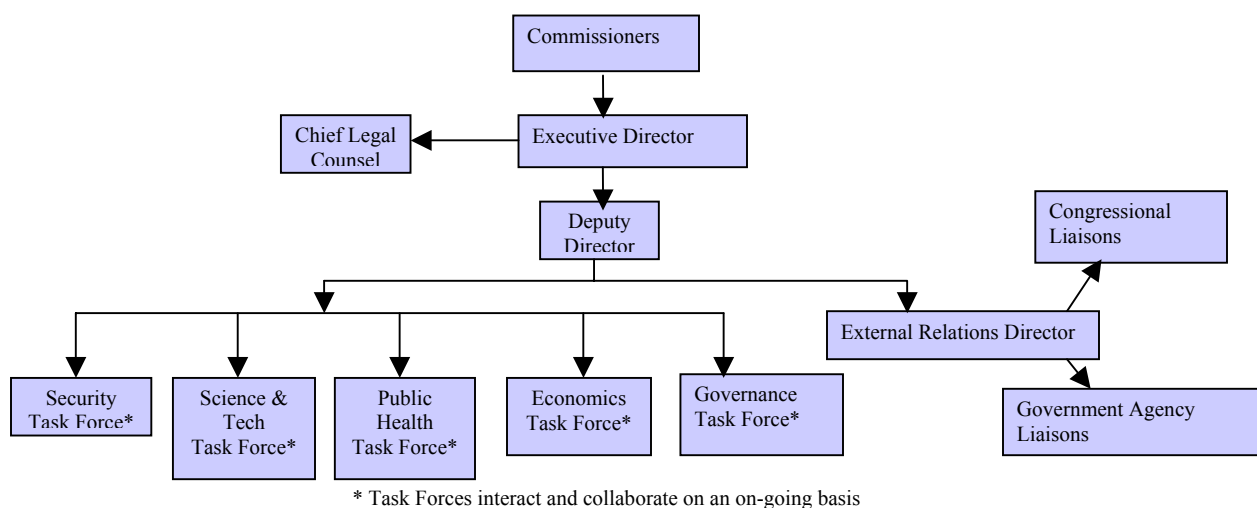
TECHNIQUES

The Commission is designed to institutionalize within the government "a new approach for systematic consideration of a multiplicity of plausible futures in a way that will enhance our ability to make good decisions today in the face of deep uncertainty."[13] Therefore, the activities undertaken by the CSP are designed to enhance the United States' ability to interpret crosscutting trends and fault lines, anticipate future events, and develop policy alternatives for various

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[13] Robert J. Lempert, Steven W. Popper, Steven C. Banks, *Shaping the Next One Hundred Years: New Methods for Quantitative, Long-Term Policy Analysis* (Arlington, VA: RAND, 2003), p. iii.

contingencies. This will allow the U.S. government maximum flexibility and position the United States as a leader on domestic, international, and transnational issues.

In pursuit of its mandate, the Commission's task forces will employ various forecasting tools and methods—both qualitative and quantitative—including projection, prediction, scenarios, and Delphi Method to first recognize rapidly approaching systemic changes, then to achieve robust understandings of complex interactions, and finally to generate adaptable policy options that can be implemented in the present to cope with a range of contingencies that may emerge over time.

In developing policy options, task forces will draw from expertise in various think tanks, academic institutions, and forecasting organizations embedded within government agencies. CSP will explore and use cutting-edge forecasting techniques, thereby engaging in the informed "risk-taking" that it encourages throughout the government structure. For example, the task forces can work with the RAND Pardee Center to apply its computer-aided scenario generation tool, which importantly integrates values and policy options.[14]

Pursuant to their tasks explicated in the National Policy Planning Act, task forces will often convene roundtables that explore FCIs and their interactions resulting in comprehensive "findings" that will be fed into policy options presented to Congress and the Executive. Findings will be available to the public for comment. In this vein, part of the role of the CSP will be to interact with the public and serve as a clearinghouse for information. The goal of the CSP website will be to emerge as a primary resource for cutting edge information. At the same time, it will provide a network for the public to engage in forecasting and policy discussions.

In the sphere of public relations, CSP will participate in domestic and international conferences across sectors, such as computer/electronics, global warming, and various other social, medical, and scientific conferences. In addition, the CSP will sponsor an annual FCI conference to draw together experts in a public setting. This will infuse discussions and heretofore segmented business and public sectors with robust forecasting information, reinforcing cross-fertilization.[15] As the CSP gains traction, at the Executive Director's

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[14] Ibid.

[15] The Commission will not have any formal association with international organizations, at least until it is firmly established in the United States, especially politically. The recommendations of the Commission will affect all branches of government; therefore, those recommendations will migrate out to the international community along already established lines of communication. In addition, the scientific community in the United States—both hard

discretion, it can attach funding opportunities to research proposal competitions—raising both the Commission's profile and the attention FCI work receives.

FCI CASE STUDY: GENETICS

The objective of this section is to illustrate the functioning of the CSP with the help of a practical example, in this case, genetics. The section will trace genetics from its identification as a potential FCI through its evolution as it is considered by the Commission, until it is finally fed into the policymaking process. The complex interactions within the field of genetics and among genetics and its FCI counterparts is also considered as part of the planning and policymaking processes.

STEP 1: ISSUE IDENTIFICATION

Through the use of roundtables, the Delphi Method, and consultations with public and private sector experts, the Science and Technology Task Force identifies genetic engineering as a new development that could have enormous consequences for the future of human society.

STEP 2: RESEARCH

Once the issue is identified, the Task Force enlists the cooperation of an appropriate think-tank or research institution to develop a thorough, scientific study of genetics, resulting in a comprehensive report that includes projections, scenarios, and potential wildcards. The report addresses the economic, social, ethical, environmental and security implications of advances in genetics. For example, the report may identify the enormous potential of genetics to cure many diseases that are currently incurable such as cancer, HIV/AIDS, and diabetes. At the same time, the report raises the possibility of genetics being abused as a tool of discrimination. In addition, the report highlights issues of ethics involved in technologies such as human cloning and germ-line engineering and the social effects of using genetics for human enhancements.

Furthermore, the report details the interplay of genetics with FCIs in other nodes. The report describes new security implications for the United States brought about by the increasing capabilities of genetic engineering to produce powerful biological weapons. On the economic

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and soft sciences—has frequent exchanges with others around the world and thus will present inclusive insights. Interaction on an international level can take place at various conferences and through interaction with experts, both foreign and domestic.

front, the report details the economic potential of advances in biotech field due to genetic engineering. It also considers the impact of increasing the human lifespan on the basic structures of the U.S. economy, and the consequent relative gains experienced by developed countries of the North vis-à-vis their Southern counterparts. On the demographic front, the report considers the societal impact of an increasing percentage of geriatrics in the population. And on the environmental front, the report addresses the potential to create new varieties of genetically enhanced plants and animals. It also details the potential effects of such research on the ecological balance. Scenarios are developed that indicate possible future impacts of genetic engineering on international and domestic societies and governance.

STEP 3: POLICY OPTIONS

The report is returned to the Science and Technology Task Force, which works collaboratively with the other task forces to study the implications of genetic engineering, and to develop sets of policy options and their attendant scenarios. The Commissioners then review the report, the task force findings, and policy option deliberations.

The policy recommendations could include:

1) A complete or partial ban on research in technologies such as human cloning and germ-line engineering coordinated and enforced universally.

2) The prevention of discrimination based on genetics much like the ban of discrimination based on nationality, sex, race, or ethnicity.

3) A recommendation for federal investment in research and educational infrastructure to expedite the developments in genetics and maintain or regain U.S. leadership in science and technology.

4) Modification of IPR laws to encourage private investment in genetic research while at the same time making its benefits available to every segment of society.

5) A recommendation to reconsider the retirement age, the system of social welfare (social security, medicare, pensions, etc.)

6) A recommendation to install regulatory framework to oversee research in genetically enhanced plants and animals to ensure that there is no irreversible danger to the environment.

STEP 4: INFUSION INTO THE POLICY PROCESS

The Commissioners interact with the government agency and congressional liaisons to discuss results and solicit feedback, allowing them to assess institutional and political

constraints. The Commissioners then present the Congress (in this case targeting first the science, health, and foreign relations committees) and the Executive (through the NSC and the Science Council) with a distilled range of options to pursue regarding genetics.

Based on the policy options presented by the Commission, a desirable outcome would be for Congress in conjunction with the Executive Branch to develop forward thinking yet flexible legislation that includes sunset clauses allowing for periodic reevaluation of the issue. Depending on the policy recommendation and Congressional and Executive considerations, this could include laws that ban certain types of research in genetics, laws that make discrimination based on genetics illegal, budgetary changes that provide federal funds for building research and educational infrastructure, changes to the social security system, retirement, system of taxation in anticipation of increasing human longevities, changes to environmental regulatory framework, and legal changes to IPR laws.

In addition, the government agency liaisons, such as the Department of Health and Human Services, bring the report to their respective agencies and begin processes of reviewing policy options and building awareness of future trends and intersections, and thus flexibility, into their processes.

The Office of the President could initiate an international effort to build a treaty to ban certain types of genetic research such as cloning, germ-line engineering and research on genetics based biological weapons throughout the world. This treaty could resemble similar efforts in the areas of nuclear non-proliferation and the environment.

STEP 5: CONTINUOUS RESEARCH

The Science and Technology Task Force at the direction of the Executive Director conducts periodic review of developments in the field of genetics to ensure that policy leads developments instead of reacting to them. The Task Force periodically conducts a review for new developments that either negate previous assumptions or bring new issues into play. It also monitors the effects and unintended consequences of current policies. Such activities could be conducted through the advisory services think tank. Follow-up findings on genetics will be provided periodically, when the Task Force recognizes consequential developments that merit immediate attention. Ongoing monitoring and activity may lead the Commissioners to offer mid-course options for policy modification.

POLITICAL CONSIDERATIONS / CHALLENGES

While a National Commission for Strategic Planning would significantly enhance the government's ability to confront problems and threats before they emerge, significant obstacles must be overcome both to obtain policymakers' support for such a commission, and to make this entity an effective forward-engagement arm of government. Given the immediate problems that policymakers must address (unemployment, rising cost of prescription drugs, terrorism, the war in Iraq, etc.), a publicly funded institution dealing with issues that may emerge in the next 10 – 20 years may be both portrayed and perceived as a waste of limited valuable resources. Indeed, for the CSP to successfully achieve its objectives, senior level policymakers and the general public must become convinced that the net benefits of the establishment of such a commission will outweigh its costs.

Regardless of the efforts taken, it would be safe to assume that some policymakers will remain both opposed to CSP's creation, and hostile to its mission. Given the Commission's broad mandate (analyzing and generating FCIs, and offering policy options), critics will argue that the Commission has no clearly defined mission. It may be characterized as an entity that is a "jack of all trades, while a master of nothing." Moreover, critics may claim that the Commission's functions do not differ significantly from those of think-tanks, congressional committees, and departments within various government agencies that engage in long-term forecasting. Despite the veracity of the claim that long-term forecasting does take place within certain strata of the government, and that there are many NGOs that engage in long-range analyses, the CSP will differ from these entities in that forward engagement will, for the first time, be systematically institutionalized in government.

Certainly, many will question the need for a governmental institutionalized mechanism to engage the future.   Government bureaucracies may feel that the CSP is intruding into their particular areas of expertise, especially when it offers policy options that are contrary to what that particular bureaucracy considers an appropriate course of action. For instance, the CSP may conclude that a certain type of weapon will not address the security needs of the U.S. either now or in the future, and should not, therefore, be developed. On the other hand, the Pentagon may disagree based on its own studies and analyses. In such a scenario, the CSP will be perceived as an obstacle rather than a tool. Indeed, the effectiveness of the CSP is dependent upon the credibility that government bureaucracies give it. As a coordinative commission, the CSP must

receive information in good faith from different agencies in order to effectively help these agencies to collaborate in the implementation of a consistent national strategy. Given the interconnectedness of many of the issues and FCIs to be addressed by the CSP, inter-governmental cooperation is of the essence if the ultimate objectives behind the creation of the CSP are to be achieved. If government agencies perceive the Commission as an impediment, rather than a facilitator, to achieving their particular goals, then the credibility and effectiveness of this Commission will be significantly undermined.

Maintaining the leadership of the CSP as nonpartisan (or bipartisan) as possible, and maintaining the functional cohesiveness of the CSP are further challenges that must be overcome to ensure the Commission's credibility. While necessary efforts have been made to diffuse the influence of politics in the functioning of the Commission (see above section on "structure"), it will be most difficult to make the Commission completely invulnerable to accusations of acting in a partisan manner. In fact, accusations of divisive partisanship may come from within the CSP. Commissioners may accuse SMEs of tailoring the conclusions of a given study to suit a particular political agenda, although this may be averted by the diversity of expertise included in the task forces. Furthermore, the conclusions of one particular task force may contradict the conclusions of another task force analyzing a related issue. Such contradictory conclusions may actually be beneficial, since they will prepare policymakers for alternative plausible futures. However, it is imperative that disagreements do not disintegrate into partisan bickering, since such an overt display of partisanship will be detrimental to the integrity and the credibility of the Commission.

Ultimately, whether the CSP serves its function depends largely on whether policymakers are willing to seriously consider the Commission's research and findings when drafting policy. This carries with it much risk. As stated in the introduction to this report, elected officials tend to consider the immediate, rather than the long-term impact of policy. They seek to minimize political risk, while highlighting their achievements in office. From a political standpoint, therefore, it makes little sense to consider the long-term impact of a policy drafted in the present. The creation of the CSP will probably not significantly minimize the political risk associated with elected officials' long-term thinking; however, it will encourage them to embrace their roles as stewards not only of the government, but of the future. There will always be risk when confronting issues and threats that have yet to materialize, or that may never materialize.

However, until the present, this risk has been largely responsible for the lack of long-term thinking in government, a problem that the CSP will, ideally, resolve.

CONCLUSION

Exposure of the structural and bureaucratic roadblocks that kept the CIA and FBI from sharing information related to domestic terrorism through the 9/11 Commission's hearings, has focused much attention on the interagency process and its deficiencies related to communication and forecasting. Therefore, circumstances may be ripe to introduce legislation that institutionalizes a collaborative, coordinative organization dedicated to responsible analysis and consideration of future contingencies of interest, such that it can feed a more prepared and forward-leaning policymaking process. There is an urgent need, brought home by the terrorist attacks of September 11, 2001, but much farther-reaching in scope, for the United States to be better prepared for the opportunities and challenges that will accompany emerging trends and future discontinuities across the spectrum of security, economic, environmental, health, governance, and science and technology.

The virtue of the National Commission for Strategic Planning is its ability to evaluate the nexus of both threats and opportunities, as well as the multi-faceted interactions of FCIs. It institutionalizes the concept of surveying issues in relation to one another and detecting patterns of interaction, or nodes, that could lead to various futures. Additionally, it is designed to stay ahead of the curve, uncovering potential FCIs, demystifying at least some of their interactions, and making them accessible to policymakers through tying them to policy options and scenarios. The Commission's work will be iterative, and it will expand the inter-agency dialogue to include acknowledgement and integration of rapid change and future uncertainty into the decision-making process. Through its mandate it will encourage forward-engaged policy. And, with a "seat at the table," the Commission will be able to establish itself as a mission-critical, credible advisory institution on the future.

The U.S. political and bureaucratic system currently suffers from its emphasis on segmented and reactive policy development. Yet these structural weaknesses by no means preclude the government's ability to adjust to shifting environmental, societal, and security demands in the current era of rapid change across societal, national, and electronic networks. Drawing on the strength of the United States' participative government, open society and

innovative private sector, and building on the intellectual foundations of forecasting organizations embedded in various government agencies, the government can infuse the decision-making process with keen foresight. The CSP will enable the United States to construct flexible, robust policies that take into account the United States' unique national identity, enhance U.S. leadership, and further global and national security. Recognizing the importance of both presidential and congressional leadership, and the role of elected officials as stewards of the future, the CSP seeks to elevate long-term, complex strategic planning to a level that makes it accessible to both the executive and legislative branches of government, and indeed makes it necessary to their operation. The CSP will provide the means and method for the United States to develop an integrative, forward-engaged approach to policy development and implementation—giving decisionmakers an enhanced ability to recognize and shape opportunity, manage change, and avert disaster.

APPENDIX 1:

NODES/FCI REPORT

FUTURE CONTINGENCIES OF INTEREST

Science & Technology, Economics, Security and Governance
Authored by: Alex Alum, Kal Ananthakrishnan, Steve Cahall, Go Kasai, Emily Waechter

INTRODUCTION

Change has always been a part of human existence. But not all change has had the same impact on human societies. Some changes have had impacts that were limited spatially and temporally, i.e. changes which were significant to particular societies at particular points in their history. Other changes have been global in scope and utility but have had relatively small effects on human societies. A few changes have been so fundamental as to dramatically alter human destiny. In the last 12,000 years, one can identify three such changes that revolutionized the way humans live – the invention of agriculture around 10,000 B.C., the industrial revolution that began in the late 17th century and the information revolution of the 20th century.

While each of these pivots around which human destiny has turned have been uniquely profound, it is worthwhile to point out a few key similarities and differences. First, each of these systemic changes was driven by a variety of interacting factors. These interactions were invariably multi-way with each factor affecting and being affected by a combination of others, creating feedback loops. For example, the information revolution was the result of a number of interacting factors such as advances in computing and telecommunications. In turn, it both shaped and was affected by globalization and other economic factors. These factors themselves were further driven and their interactions shaped by the rise of the internet.

Second, each of these momentous changes affected multiple facets of human existence. For example, the invention of agriculture resulted in human societies being transformed from hunter-gatherer societies to sedentary societies with food surpluses – this then gave rise to writing, art and new social organizations such as governments and standing militaries. Each

pivotal change mentioned created new types of economies, newly empowered social classes and fundamental changes in human lifestyles.

Third, the pace at which the aforementioned revolutions affected human societies differed vastly. The invention of agriculture and the transition from a hunter-gatherer life style to sedentary existence took human societies several millenniums to accomplish. The industrial revolution spanned several centuries and is a process that is still playing itself out over many parts of the world. On the other hand, the information revolution managed the dramatic transformation of human societies in less than a few decades.

If the historical trend is any indicator, the future portends profound changes that will be the result of complex interactions among multiple factors that will affect many facets of human existence. Furthermore, these changes are likely to occur in a highly compressed time frame. If we do not anticipate or plan for them, their impact can tear the very fabric of our society.

This objective of this paper is to identify a set of Future Contingencies of Interest (FCI) in the broad categories of Science & Technology, Economics, Security and Governance. In addition, this paper captures the interactions between the different categories. It is our belief that, while each of the FCIs are important by themselves, the systemic and fundamental changes that we try to anticipate could only occur as a result of the interaction among several. Our analysis of the interaction has illuminated a few important areas of convergence among the different groups, termed nodes, which are events or issues whose impacts will be felt broadly across science and technology, economics, security and governance. For example, "Energy" is a node – because, the development of new forms of energy by science and technology could impact the economy and have implications for security and governance.

The paper is organized into two chapters that focus on the inter-group interaction and four appendices that focus on the intra-group interaction of FCIs. The first chapter, organized as a matrix, captures the interaction of each FCI with the other groups. As an example, we analyze the impact of nanotechnology, an FCI within the science and technology group, on economics, security and governance. The second chapter captures the nodes, which are points of intersection of multiple FCIs. Appendix A focuses on the intra-category interaction of FCIs in the science and technology group; Appendix B focuses on FCIs in the economics group; Appendix C focuses on FCIs in the security group; and finally Appendix D focuses on FCIs in the governance group.

Needless to say, there are no guarantees when predicting the future. But the point of indulging in this exercise is to have a vision of the future and engage ourselves in actively shaping it in accordance with that vision, rather than passively waiting for events to shape themselves. The adage, "the plan is nothing, planning is everything", aptly sums up the motivation of this exercise.

CHAPTER 1: INTER-GROUP INTERACTION

FCI / Field	Science & Technology	How will these FCIs interact with the fields of:		
		Economics	Security	Governance
Science & Technology				
Nanotechnology		- Trillion dollar nanotech econ by 2015, creating 2+ mil. Jobs - Private/public holding - Disappearing MNCs	- Revolution in military technology - Widen military tech gap for advanced nations	- Short-term widening of gap between 1st and 3rd world - Terrorism applications
Genetics		- Biotech Industry	- Bioterrorism - Superhuman soldiers	- Changing demographics due to increased life expectancy - Ethical / Legal issues (IP, access to tech/benefits) - Religious objections - Birthing discrimination
Environment		- Industrializations effects (resource depletion, global warming, acid rain, ecosystem disruption, species displacement / disappearance) - Scarcity of resources -> volatile markets	- Conflict over resources	- Migration away from resource depleted / polluted environments - Demographic shifts
Energy		- Alternative energy markets: hydrogen, solar, fusion energy - Dramatic changes in econ. relations if non-oil based production	- Altered geopolitical climate - Decline of Middle East -> regional instability	N/A

FCI / Field	Science & Technology	Economics	Security	Governance
Disease		- Change demographics = lose workforce - Market for cures	- Anti-immigration policies - Bioterror	- Changing demographics - Social demands on government cures
Artificial Intelligence		- Marketing / sales rights of products produced by A.I. (i.e. computer code)	- Nonhuman combatants - New rules of warfare / engagement	- Do they have rights? - Ethical and moral dimensions - Changing definitions of citizens
Economics				
High-Technology Textiles (production moves to industrialized nations, see Appendix)	N/A		- Growing North-South gap --> possible source of conflict	- Growing North-South gap - Immigration - FTA effects - Demographics
Energy	- See in Science & Technology		- See in Science & Technology	- See in Science & Technology
Rejection of Capitalism by part of developing world	- Ambiguous		- Fragmentation into regional blocs - Ideological alliances - Rise of Islam	- U.S. global leadership weakens
India	- Ambiguous		- Changing security balance in Asia - Instability with China - Multipolar world	- Stabilizing influence in region? - Rise of multipolarity - Spread of democracy
China	- Ambiguous		- Changing security balance in Asia - Instability with India - Multipolar world	- Weakening worldwide influence of democracy as non-democratic state becomes economic superpower
Environment	- See in Science & Technology		- See in Science & Technology	- See in Science & Technology

FCI / Field	Science & Technology	Economics	Security	Governance
Countries in developing world default on IMF loans	N/A		- Vast instability - Anti-globalization / anti-Americanism	- Instability - Collapse of international lending systems / FDI - Collapse of social services in developing world
Security				
Increased Asymmetric Warfare	- Anti-asymmetric warfare technologies	- 2nd order consequence on economy		- Racial profiling during immigration - Changing immigration policies
Geopolitical shifts and alliances	N/A	- Security alliances bound with economic alliances - North-South divide - Economic blocs by political ideology (e.g. Islamic trading bloc)		- Regionalism - Multipolarity
Revolutionary weapons development	- Low-yield nuclear weapons - Nanotechnology based weapons	- Dual-use technologies		- Use of low-yield nuclear weapons - Increased allocation of resources towards defense technology
Surveillance	- Sci-tech industry acts as enabler	N/A		- Privacy / Civil rights concerns - Information burden on government
Demographics	N/A	- FTAs reflect demographic changes - Labor shortage due to aging population		- Growing tax burden - Medical care burden due to aging population - Intergenerational political tension

FCI / Field	Science & Technology	Economics	Security	Governance
Security (cont'd)				
State Disintegration	N/A	- Exclusion from world markets - Economic collapse		- Vast instability - Genocide - Warlord power - Diseases - Reduced influence of democracy - Mass migrations / refugees
Governance				
Internet Governance	- Techno-centric enforcement mechanisms	- Altered nature of e-Commerce	- Enforced security of vital internet infrastructure - Active Internet policing / law enforcement	
Water Scarcity	- Desalinization	- Increased volatility of water market - Collusion by water-producing nations	- Resource-driven conflict - Humanitarian crises	
Mass Privatization	N/A	- Role of state vs. private in provision	- Profit-driven vs. public interest security schemes	
Space Colonization	- Sci-Tech industry acts as enabler	- Intergalactic commerce and FTAs	- Colonization conflicts - Intergalactic terrorism	
Regionalism	N/A	- Breakdown of global markets in favor of regional - Regional trade wars - Lower overall efficiency --> lower overall standards of living	- Inter / Intra regional conflict - Clash of civilizations - Multipolarity	

FCI / Field	Science & Technology	Economics	Security	Governance
Governance (cont'd)				
Disease	- See in Science & Technology	- See in Science & Technology	- See in Science & Technology	
State Disintegration	- See in Security	- See in Security	- See in Security	

CHAPTER 2: FCI NODES

I. Technology

From the earliest stone tools down to the modern laptop computers, technology has always been central to human existence. For millions of years, our unique ability to make tools has separated us from other less advanced species. In the last several centuries, technology has been at the core of dramatic transformations in human societies. As an example, one could point to inventions such as the textile loom and the steam engine that powered the industrial revolution. Another example from the last few decades of the twentieth century has been the information revolution triggered by computers and the internet.

We foresee that technology will continue to be a central factor in the revolutionary changes of the future. New technologies such as nanotechnology will create new economic wealth that could eradicate poverty and obviate resource wars. Advances in genetic engineering will have profound implications for the environment, as well as the health and well-being of humans. Progress in artificial intelligence, computing and communications will change the role of human beings in society and alter the relationship between man and machine. The relative importance of machines in society will rise dramatically and this could lead to an eventual fusion of man and machine.

As in the past, the new technologies of the future will raise a number of moral and ethical dilemmas that societies must contend with. How we resolve these dilemmas will determine what changes will be required in the area of governance, economics and security. Self replicating nanomachines, human cloning, stem cell research and genetically modified foods will continue to generate contentious debates. Greater questions, such as who will own the new technologies,

and how the benefits will be shared among societies are challenges that will require coordinated international action.

II. Energy

Energy is another factor that has enriched human existence. Ever since humans learned to harness fire as a source of energy, the quest for newer and more efficient forms of energy has continued. The invention of agriculture and a sedentary existence became economically viable only after humans were able to harness animal power to augment their muscle power. At the heart of the industrial revolution was an attempt to replace human and animal power with more efficient forms of machine power. Ever since the industrial revolution, fossil fuels have been the primary sources that have met human energy needs. Today, most societies are economically and politically dependent on fossil fuels.

Developing new sources of energy such as solar, hydrogen and fusion energy will have major implications for the economy and security of nations. These new energy sources will precipitate a major shift away from a fossil fuel based economy to an economy based on cleaner and more sustainable energy sources. The environment may be the biggest winner in such a move as cleaner energy implies fewer pollutants in the atmosphere. Moving to a form of energy that can be locally harvested will change the part that energy security calculus plays in international relations.

III. Environment

Environmental concerns spillover into science and technology, economics, security and governance. Environmental dangers that fester in one region have transnational effects and consequences that affect many societies and economies. Global warming (which has implications such as the melting of the polar ice cap, the cessation of the Gulf Stream, the

depletion of the ozone, etc.), water scarcity, over-fishing, species extinction, etc. will change the way people relate to their environment and will increase reliance on government to meet demands for resources that are less and less available. Economically, complete industries and thus livelihoods could be decimated by environmental shocks exacerbated or created by man. Technological innovations will continue to have the combined effect of improving society while straining the environment; however, technology may be the tool that enables societies to take better care of the environment through the development of alternative resources. As people struggle to manage in a world of less bounty, the borders that once hemmed societies in will become bloody as people engage in a fierce battle for resources driven by basic survival instincts. Concerns about long-term state viability will take a backseat to concerns for day-to-day survival.

IV. Health

Just as individuals can travel across the world with much ease, so can the viruses and diseases which people and animals bear. No country can pursue an effective health policy in isolation. This node is, indeed, a global issue which reverberates across a broad range of issue areas and future contingencies of interest. Health is a security concern not only because some diseases – like HIV/AIDS, SARS, parasitic infections, etc. – threaten to eliminate entire populations within certain regions, but also because they can easily cross national borders. The possibility that bioterrorists may genetically or chemically manipulate these diseases to make them more infectious or resistant to treatment, for instance, is a health related future contingency of interest that would have policy implications for security and science and technology. Health also impacts economics, since sick and dying workforces are unproductive and unable to contribute to the national/international economy. Lastly, health is deeply embedded within the

realm of governance, since policy makers must decide the amount of resources that will be allocated to deal with public health problems, and must also make such decisions as curbing immigration from disease-ravaged areas, and quarantining infected populations.

V. Demographics

Demographics is recognized as a node because of the profound interactions that will shape changes in population and society. These interactions take place within the issue areas of governance, security, and economics and will impact future contingencies that fall within these sectors including, but not limited to, urbanization, resource scarcity/unequal distribution, ethno-religious conflict, protectionism, infectious disease outbreaks, environmental degradation and destruction, etc.[16]

At home, the intersecting events of the retirement of the baby boomer generation, the rise of a majority-minority state, and a change in the religious backdrop of society may result in economic upheaval, potential inter-generational strife, and sectarian divisions the likes of which the United States has never experienced challenging state, federal, and local abilities to maintain order. The changing composition of U.S. society in turn may shape U.S. alliance patterns and trade relationships, while also changing the criteria for international assistance and intervention.

However, shocks within the United States will occur alongside global demographic shifts that will likely place a higher demand on U.S. military and economic resources in order to maintain global stability. The population explosion/youth bulge in the South will place an enormous amount of pressure on both national and international institutions. Massive migration will create social and political instability, even as it promises to relieve some of the economic pressures of the "graying of the West." Demographic pressures will place the Hobbesian world

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[16] Advances in science and technology may intensify demographic pressures by extending the human life span and/or genetically engineering away proclivities for disease. However, the impact of demographic changes on science and technology is less visible.

where life is "nasty, brutish, and short" characterized by a "war of all against all" at the doorstep of Lockian world where the social compact binds men to their governments in pursuit of peace and security.

VI. Multipolarity

With the disintegration of the Soviet Union and the end of the Cold War, the United States remained the sole superpower in the world. While the U.S. remains the most economically and militarily potent nation, there is the possibility that the economic rise of other countries (like China, India, and Brazil), and the formation of strategic security and economic alliances will threaten to undo the current unipolar international order. Indeed, the rise of multipolarity will impact a wide range of issue areas. The emergence of nuclear armed alliances (such as an Islamic front) will affect the security agenda that the U.S. pursues. Multipolarity also has implications for governance, since the U.S. may seek either to limit or promote immigration from emerging powers. It may also seek to limit the export of technology or intellectual property to these powers. Lastly, a rise in multipolarity will also have economic repercussions. If, for instance, countries decide to form regional free trade areas, or free trade alliances based on ideology to counterbalance against American economic hegemony, the U.S. will be forced to reconsider its economic policies.

VII. North-South Divide

Gaping development, health, demographic, and governance gaps between the industrial nations of the North and the developing countries of the South continue to widen. As new technologies reward the West for resources poured into research and development, the South will continue to struggle to meet the basic needs of its ever-increasing population, destabilizing governments and changing migration patterns that already challenge many nations with pressing

immigration issues. The division of globalization's "spoils" will be a cause of resentment and could lead to an increased "us" vs. "them" mentality that could threaten burgeoning economic and security relationships, such as those the EU has been nurturing. The next round of destabilizing conflict is set to occur along the Mediterranean littoral, where the abundance of the North and the poverty of the South collide. Economic relationships, security challenges, and civil society interact in this hotbed where the confluence of economics, security, and governance is palpable.

VIII. Space Colonization

Space colonization may be driven not only by the innate human urge to explore, but also by pressing environmental and demographic changes on earth that render humans in need of another "outpost." Space colonization bleeds nearly equally into the issue areas of governance, economics, security, and science and technology. Decisions made in each of the aforementioned sectors both on earth and in space regarding a potential new era of colonization will impact the others.   Therefore, decisions will need to be constantly evaluated in light of relative developments in each issue area.

Within this century, science and technology innovations and discoveries could lead to either the colonization of a planet or the establishment of space stations for small colonies of individuals. Continued sci-tech innovations will be necessary the longer humans inhabit space, as they face survivability issues and natural and man-made shocks—some similar to the ones the earth and some that are outside the realm of imagination. Building a new society will necessarily entail the establishment of a new system of governance, perhaps unlike anything here on earth and calls for intra-planetary governing bodies will be made. Trade relationships with earth, including with its component states, as well as with other space colonies, will be vital to the success of each

colony. Regulation of inter-galactic trade will be an issue across borders and planets. Private firms will likely seek to capitalize on new technology and new markets. The weaponization of space will be made easier with colonies where access to these weapons will allow for easier maintenance, but also quicker disaster. In addition, each colony may erect its own protection force and develop its own fiercely-guarded "nationalism," which could begin with their identification with a home country and morph into identification with their space home.

CONCLUSION

The United States and the international community have been experiencing an enormous amount of change since the beginning of the Knowledge Revolution in the late 20th century. This builds on prior centuries of change, which while of enormous import occurred at slower rates and essentially allowed people to catch up with their effects and shape them to a certain extent.

The Knowledge Revolution has ramped up quickly and will likely continue to surprise the humans who were its very creators. This revolution, coupled with concurrent broad societal and environmental changes, promises more innovation, more tumult, and more unforeseen events for the future. It may indeed lead to another as yet unanticipated revolution building off of the advances in science and technology.

In order to safeguard and improve its own democracy, the United States must lead in acknowledging future contingencies of interest and shaping policies to either curtail their negative impacts or harness their opportunities. Liberal democracy will be most impacted in the nodes where these FCIs intersect—the very points where science and technology, economics, governance, and security collide: technology, energy, environment, health, demographics, multi-polarity, North-South divide and space colonization. As the world becomes more complex and more interconnected it will become increasingly difficult to deal with changes in these areas as discrete elements. Thus, the management of these areas and their attendant FCIs will need to be more robust.

APPENDIX A: SCIENCE AND TECHNOLOGY

Authored by: Kal Ananthakrishnan, Charles Bushman, Sean Connell.

I. Introduction

In our current Western democratic society, the measure of success is not power or knowledge, but wealth. In this sense, wealth is not limited to money, or other valuable items. Rather, wealth describes the access each member of society has to things that enhance his existence. Historically, wealth referred only to money, because purchasing items was the only way to amass wealth. But the information revolution of the late twentieth century has rendered this definition obsolete. Because of personal computers and the Internet, college students can today access information from libraries around the world – information that was not even available to the world's richest man 20 years ago. In a democratic sense, the availability of information today enhances the existence of everyone who accesses it.

The emergence of new technologies, however, still follows a model of affluence. Technical innovations are first sold as "novelty" items to rich people, before eventually being turned into a commodity for the general public. The creation of wealth by a new technology cannot take place until it is available to everyone. Because the cost of computers is relatively low today, much of Western society can access the Internet. An example of a technology that never surpassed its novelty phase is supersonic air travel: the price of tickets prohibited anyone but the rich from using such travel, ultimately resulting in its failure. A technology that could have potentially enhanced *everyone's* existence is now defunct.

Thus, in order for an emerging technology to be successful, it must hold the potential of enhancing humanity's existence, and it must be available to all of society. Many of the future contingencies of interest (FCIs) described in this paper hold the potential for creating

wealth. But the future availability of these technologies depends on their economic viability, and on other factors such as emerging technologies and government support. This paper therefore goes beyond describing FCIs and explores the complex relationships future technologies could have with each other.

In some cases the relationship is cause-and-effect, such as the importance of inventing nanotechnology before programmable matter is used. Other cases see two possible futures serving as complements or substitutes for each other, as with the invention of fusion energy and fuel cells. Regardless of the relationship, all FCIs are related, and the role of public policy will be to promote positive, wealth-generating technologies, while avoiding technologies that could have a negative impact on society.

II. Future Contingencies of Interest

A. Nanotechnology

If nanotechnology realizes the potential that experts have predicted for it, society will experience radical transformation in many areas. On the positive side, the ability to make new materials will make resource limitation and scarcity of goods a thing of the past and render resource wars, poverty and hunger obsolete. Furthermore, this wealth will be generated without depleting the valuable resources of our planet. The power to manufacture any material locally on demand will mean that many areas of the world that currently cannot support a twentieth-century manufacturing infrastructure, with its attendant costs, difficulties, and environmental impacts, could become self-contained and clean. Moreover, the contributions of nanotechnology to health care could extend human longevity by more than twenty percent.

On the other hand, these incredible changes will disrupt many aspects of society and politics. If nano-factories can produce a wide variety of products when and where they are

wanted, it will make obsolete many of the current businesses and institutions that regulate our economic order. The result will be chaos and confusion. Many troubling questions such as who will own and control the technology, how it will be regulated to prevent misuse, and what effect it will have on the gap between the rich and the poor are ethical and moral questions that must be carefully resolved.

B. Genetics

The twenty-first century could very well be the "age of the gene." Genetic engineering holds the promise of eradicating all forms of diseases, increasing human longevity by as much as twenty percent, vanquishing hunger and malnutrition through genetically modified foods, ensuring the survival of many endangered species, and forever terminating the problem of pests.

However, genetics also poses some of the most ethically troubling questions related to human existence. Areas of genetics such as stem cell research and human cloning have raised concerns about the dangers of embarking on these courses without full understanding of their implications. Furthermore, genetics may prove to be the most powerful tool of discrimination ever developed by society. For example, a person's genetic makeup could be used against them to deny them insurance because they are predisposed to certain diseases. Most troublingly, genetic tests can be used against unborn fetuses to terminate those babies that do not measure up to a certain standard. When combined with the ability to produce a "designer baby" – a baby with a certain desirable genetic makeup, such discrimination could lead to the virtual creation of a new species of "super humans." This newly empowered class will dominate their less fortunate brethren whose parents were unable to provide their children with the advantages of genetic engineering.

C. Energy

The availability of cheap, reliable energy was at the foundation of the industrial age, the automotive age, and the age of information technology. In each of these instances, new technological developments and innovations enabled more efficient and effective use of energy resources. Because our primary energy sources today are finite and have severe negative externalities, the sustainability of society and our capacity for future progress depends on the development of technologies enabling access to new sources of energy and more efficient use of existing resources.

Renewable energy technologies are already rendering solar power, wind energy, and biofuels increasingly efficient and cost-competitive with fossil fuel energy sources. 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. Fusion energy—if its vast potential is realized through the development of technology that does not fully exist today—would provide a clean, uninterrupted, and inexhaustible energy supply to the world. As the infrastructural and operational costs of tapping into these energy sources fall with improvements in technology, dissemination of technology will ensure that these new energy technologies are available to the entire world community.

These new sources of energy bear promise of reducing pollution and environmental destruction caused by both fossil fuels and large-scale hydroelectric dam systems. In conjunction with new manufacturing and production technologies and processes that also reduce necessary energy consumption and polluting byproducts, these new forms of energy could combine to halt global warming trends through reduced emissions. Moreover, they could restore energy independence to countries that currently rely on imported petroleum to power their

economies—removing one of the most volatile elements of geopolitics and constraints on national security. They could also enable some of the world's poorest countries and societies to provide access to energy, improving living standards, production capabilities, and economic growth opportunities. Still unknown are what negative externalities they could generate, such as the recent suggestion that large-scale hydrogen leakage could contribute to ozone depletion.

At the same time, consumption of hydrocarbon energy sources continues unabated and is projected to increase rapidly in coming decades, especially with anticipated rapid economic growth in China and India. Expanded consumption will exacerbate pollution and could increase the pace of global warming and the climate change it generates. On the other hand, hydrocarbon energy supplies could collapse at a much earlier point in time than anticipated, leading to regional and even worldwide economic depressions that trigger severe governance crises and social dislocation.

D. Environment

The environment has historically been a driver of technology developed to overcome environmental barriers and constraints in order to take advantage of natural resources. The cumulative negative impacts of this are starting to manifest themselves to the extent that the environment is now a critical driver of the future. One important reason for this is the inherent complexity of the environment itself, and its propensity for generating large and wildly unpredictable effects from seemingly simple causes. The environment serves as a fundamental restraint on other science and technology FCIs; it is when these FCIs transcend or overcome environmental barriers that the impacts become greater.

Further depletion of the ozone layer, continued pollution, and unabated human development pose short-term challenges that must be met through improved technology that not

only mitigates environmental impact but also repairs environmental damage. Technology alone will not solve these problems; strong laws and regulations and shifts in economic mentalities and systems are essential for its success. Failure to address these short-term issues could lead to more dire future problems we are already seeing glimpses of today, such as severe water shortages, global warming, climate change, rising sea levels, and ecosystemic collapse. These developments will test to their ultimate the ability of technology, governance, society, and economics to successfully and creatively overcome some of the gravest challenges ever to the continued existence of humanity.

    E. <u>Diseases and Epidemics</u>

Across the globe, populations are constantly threatened by the outbreak of disease. Future epidemics could result from two factors: accidental plagues that arise from the spread of natural pathogens, or intentional biological and chemical attacks carried out by states or terrorists. While the risk of such attacks occurring will increase, humankind's ability to contain epidemics and treat affected citizens will continue to improve. The future development of vaccines and treatment methods will reduce the danger posed by currently known agents, just as past generations benefited from vaccines for once-dangerous diseases such as smallpox and polio. However, future advances in immunology can create two possible scenarios: the elimination of deadly diseases through inoculation, or the genetic mutation of currently-immunized disease strains, causing once-curable afflictions to return to their historic pandemic status.

    F. <u>Artificial Intelligence</u>

Artificial intelligence (AI) is the human aspiration to create machines that can think like us. AI will be a key driver of change in human societies of the future. The continuing increases

in computational speed, coupled with our own increasing understanding of the human brain, have already resulted in the building of machines that are able to out-perform the human brain in many ways. Enabled by advances in hardware, new software technologies such as Bayesian computing and neural networks will, in the future, enable computers that can reason deductively and inductively.

The resulting practical applications, such as humanoid robots, will free mankind from the necessity of work. Universal translation machines will break down cultural barriers thereby speeding up the process of globalization. In the not too distant future, humans will find ways to integrate machines as part of their bodies that will increase their capabilities or enable them to stay connected to a world wide information grid. Some examples of such technologies are embedded communication devices and brain internet links. Eventually humans may someday even be able to store their consciousness onto a machine thereby achieving human dreams of immortality.

III.   FCI Interaction

A. Nanotechnology

Nanotechnology will interact with other FCIs identified in this paper in the following ways:

- *Nanotechnology & Genetics:* Advances in nanotechnology and genetic engineering will intersect to provide immense advances in human health care by formulating new routes for targeted drug delivery to previously inaccessible parts of the body, developing new rejection-resistant organs for transplanting, and improved vision and hearing sensors.

- *Nanotechnology & Environment:* Nanotechnology will affect the environment as well. On the positive side, nanotechnology will enable the development of environment-friendly biodegradable fertilizers and other compounds that will detoxify contaminated

water supplies. On the flip side, nano-particles released into the environment either from industrial waste or societal waste could endanger human health by penetrating deep into the lungs and passing more readily through the skin. Furthermore, toxins may combine with nano-particles in the environment, making the toxins themselves chemically stable and thereby enabling them to travel farther through air or water.

B. Genetics

Genetic Engineering will interact with the other FCIs in the following ways:

- *Genetics & Nanotechnology:* As noted, genetic engineering and nanotechnology will continue to enhance each other with dramatic application for human health care. The decoding of the human genome, combined with our ability to build nanomachines, will enable the repair of individual cells and ability to turn off those genes that cause diseases. These advances will make the surgeon's scalpel an obsolete instrument. The focus of health will shift dramatically from finding cures to prevention.

- *Genetics & Environment:* Genetic engineering's greatest effects will probably be felt on the environment. In the area of species management, the sequencing of animal genomes will help us devise newer and more effective techniques to ensure the continued survival of many endangered species. Genetic engineering will enable the development of genetically modified plants that are capable of resisting pests while producing better tasting, faster growing, and more nutritious foods.

- *Genetics & Energy:* In his book The Sun, the Genome & the Internet, author Freeman Dyson envisions that, in the distant future, genetic engineering will enable humans to devise energy-efficient plants that will convert as much as 10% of the sunlight they are exposed to into liquid energy that can be collected through underground pipes fed

by the roots of the tree. The energy supply systems of the future might be large forests of genetically enhanced trees that supply clean, environment friendly energy for most human needs.

C. Energy

Energy will interact with other science and technology FCIs in the following ways:

- *Energy, Nanotechnology, and Biotechnology:* Developments in nanotechnology and biotechnology could be applicable to new energy technologies, and vice versa. Nanotechnology could engender new means of emissions and pollution reduction, especially in relation to carbon sequestering. Specific advances in nanotechnology may turn out to require hydrogen and fusion energy capabilities. Biotechnology could be used to produce genetically-modified crops that are particularly well-suited for biofuels, or which absorb greater levels of greenhouse gases and remove them from the atmosphere.

- *Energy and Artificial Intelligence:* Artificial intelligence advances could serve an important role in the operation of fusion energy facilities. Separately, artificial intelligence in terms of robotics may require hydrogen or fusion technology to reach its full potential.

Energy & Environment will interact in very significant ways, and merit special consideration:

- The consumption of hydrocarbon energy sources at continued current or increased levels will generate environmental destruction from coal and oil extraction and air and water pollution. This destruction will accelerate global warming, climate change, and ecosystemic collapse unless hydrocarbon consumption is reduced. Renewables, hydrogen, and fusion technology hold out hope for halting these trends.

- Large hydroelectric dams are increasingly revealing their long-term negative externalities as fish runs disappear, silt builds up to dangerous levels behind the dams instead of replenishing the soil in river floodplains and estuaries, and inefficient irrigation systems and—most ominously—climate change reduces snowpacks and river flows powering the dams. Technological improvements could make it possible in the future to derive greater amounts of energy from very small, super-efficient dams that could work in combination with hydrogen power generators and have less detrimental environmental impacts, rendering large dams obsolete.

- New energy technologies, particularly hydrogen and fusion, could serve as the basis for improved, "clean" production methods and processes that work to reduce pollution and environmental damage on a vast, systemic scale. Net energy consumption would be reduced while economic productivity would continue to expand.

D. Environment

The environment will interact with other science and technology FCIs in the following manner:

- *Environment & Nanotechnology:* Nanotechnology could have beneficial environmental impacts—as in allowing for the creation of valuable natural minerals that no longer need to be extracted from the earth, or even the ability to repair environmental damage. Nanotechnology will assist in the development of production processes that are less polluting and wasteful of natural resources. It could also be detrimental—as in the case of the specter of "grey goo" or as a new source of environmental pollution in and of itself.

- *Environment & Biotechnology:* Biotechnology is already having profound effects on the environment. As genetically modified plants and animals are introduced, cross-breeding with naturally-occurring plants and animals could either improve crop bounty and animal quality or potentially lead to severe disruptions in the food chain and collapses in biodiversity. In medically-oriented biotechnology—particularly pharmaceuticals and stem cell therapies—the environment would be indirectly impacted by the demographic impacts, as lifespans lengthen and populations continue to increase.

- *Environment & Disease:* Disease has a benign but parasitical relationship with the environment. While diseases in and of themselves will not positively or negatively impact the environment, certain environmental triggers—climate change, pollution, loss of habitat that increases contact between humans and wild animals, reactions between chemical elements—can foster devastating epidemics.

- *Environment & Artificial Intelligence:* Artificial intelligence at first glance appears somewhat removed from the environmental FCI. However, does the possibility of machine consciousness include environmental awareness? Were artificial intelligence to become a powerful, driving force in society would virtual, idealized environments take the place of natural, devastated environments?

E. Disease

The field of immunology and disease treatment has remained relatively unchanged for the last half-century. Although the quality of treatment rendered has improved drastically, diseases are treated with chemical medications, and inoculations are given to patients to build immunity for future diseases. While these current methods will continue to improve in the future, the greatest changes in immunology will result from advances in biotechnology and nanotechnology.

- *Disease & Biotechnology:* Given current developments in biotechnology, scientists hope to develop the method of RNA-interface therapy for disease treatment. This method uses chemicals to prevent harmful proteins from forming in individual cells, while non-harmful proteins are not interrupted. It is during this protein-creation process that diseases such as AIDS and cancer are spread. RNA-interference, although still in infancy, holds the potential of eliminating these deadly diseases.

- *Disease & Nanotechnology:* With the advent of nanotechnology, molecule-sized machines can be used for health care and disease treatment. These machines can be used to deliver medicines to specific organs or parts of the body, potentially parts that could not be reached using conventional methods.

F. Artificial Intelligence

AI will interact with other FCIs in the following way:

- *AI & Nanotechnology:* Advances in nanotechnology will result in orders of magnitude increases in computing power. This in turn will enable the development of new hardware and software methodologies such as Bayesian machines, neural networks, and quantum computing that will eventually lead to the building of truly intelligent machines.

IV. FCI Nodes

In this section, we attempt to put a timeline expectation on when some of these technologies will be realized. The three groups are: a) current technologies – those technology areas in which there is ongoing research that will lead to practical application within a decade; b) intermediate technologies – those areas where progress is expected to result in applications in 10 to 20 years; and c) long term technologies – where practical applications are foreseen no sooner than 20 years from now.

A. Nanotechnology

Current: Nanotechnology is in its infancy. There is an immense amount of research currently underway that has resulted in a few practical applications, such as nanotubes and nanowires which have applications in electronics. However, the National Nanotechnology Initiative (NNI), a federal initiative on nanotechnology, has predicted that nanotechnology based products will amount to US$1 trillion by the year 2015. Most of the progress initially can be expected in the area of material science and electronics.

Intermediate: In 10 to 20 years, one can expect to see applications in medicine and the environment starting to emerge. Nanomachines capable of performing simple tasks such as identifying and destroying cancer cells in human bodies will be made possible. Bio-degradable fertilizers and new compounds will emerge that will detoxify waste dumps and clean our soil and water supplies.

Long Term: In the long term, one can expect the emergence of more exotic applications such as programmable matter and desktop size machines that are capable of producing any product on demand locally.

B. Genetics

Current: Tremendous advances have already been made in the field of genetics. The Human Genome Project has successfully completed the sequencing of the human genome. Stem cell research is making constant advances. Even though human understanding of cloning is still immature, animals have been successfully cloned. The recent announcement by researchers in South Korea that they had successfully cloned a human embryo and derived stem cells from it is a significant technological step forward. Genetically modified foods are part of our regular diet.

<u>Intermediate</u>: In the next 10 to 20 years, we can expect to see progress in genetics creating a revolution in organ transplants and tissue regeneration. More exotic applications that will emerge include genetically engineered animals that are hardier and able to better withstand local conditions. Genes from the hardy llama in South America, for example, could be introduced into camels in the Middle East and vice versa to greatly expand the range of each. Genetically modified plants that are more pest-resistant will also be among the new applications that emerge.

<u>Long Term</u>: In the long term, applications such as RNA-I therapy and designer children will become possible.

C. <u>Energy</u>

<u>Current</u>: Renewable energy technologies and hydrogen fuel cells have already crossed the horizon. Large-scale wind energy farms and plans for even larger off-shore facilities are an indication that the commercial viability of renewables is at hand. Early-generation fuel cells are already in use in hundreds of buildings. Some major petroleum companies are starting to invest significant funding and resources into developing non-petroleum energy technologies.

<u>Intermediate</u>: Over the next 10 to 20 years, the future prognosis for hydrogen technology and fuel cell vehicles will be much clearer and a large-scale shift to a hydrogen-centered energy infrastructure could already be underway. Governments of developed countries most dependent on oil imports would lead the way in promoting fuel cell vehicles and power systems. Renewables will expand at a steady pace, depending on further cost reductions and policies promoting their use. Fusion research at the ITER reactor will be underway. Slow progress in technological developments in each of these areas will accelerate demand for scarce oil resources as consumption in China and India skyrockets.

Long Term: In the long term, a "hydrogen economy" or "fusion economy" could become a reality and eliminate the need for oil as a major energy source. These and other technological developments could possibly reduce the utility of large hydroelectric dams for electricity generation. Failure to realize these new energy technologies could lead to increased global instability as countries vie for increasingly scarce oil sources and the effects of carbon emissions-driven climate change wreaks havoc.

D. Environment

Current: The key question with the environment is what kind of technological developments it will drive and generate. Numerous environmental indicators today portend significant future environmental changes, most of which are detrimental to humanity. Ozone depletion and rising global temperatures are scientific facts, and shrinking glaciers and thawing of polar ice caps are already being observed. The collapse of the North Atlantic cod banks has found echoes in declining salmon runs in the Pacific Northwest, and losses in biodiversity around the world could reflect not just human destruction of the environment but also the earliest stages of climate change. The shrinking of the Aral Sea is only the most extreme example of increasing water shortages, caused primarily by human overuse but which climate change could exacerbate. These developments are expected to continue absent changes in hydrocarbon emissions and current societal behavior.

Intermediate: Over the next 10 to 20 years, hydrocarbon emissions, pollution, and environmental destruction are anticipated to accelerate as technological and political responses continue to be developed and implemented. Ozone depletion will persist before levels stabilize, and global warming as a human-driven phenomenon will likely be established as a conclusive fact. This should drive more determined efforts to respond to the challenges posed by the effects of climate

change. Water shortages worldwide are expected to become more evident, with major social, economic, and governance implications, and will drive efforts to make desalination technology more affordable and develop less wasteful irrigation technologies and practices..

<u>Long Term</u>: The long term prognosis of environmental factors is hugely dependent on technologies developed, decisions made, and actions taken during the intermediate stage. In a best case scenario, global warming and ozone depletion tendencies could slow or halt as new, ultra-efficient manufacturing and production processes become the systemic norm, and as developments in nanotechnology, biotechnology, and new energy sources reduce burdens on the environment that eliminate the need for destructive resource extraction. These new technologies possibly even work to repair earlier environmental damage. Desalination powered by fusion energy plants becomes affordable and mitigates the impact of water shortages. New irrigation technologies and methods reduce the burden on freshwater bodies that also contributes to water shortages.

At the other extreme, failure to reduce emissions or address other significant environmental problems leads to accelerated global warming. Environmental devastation on an unimagined scale occurs as coastal areas flood and climate change renders heavily-populated regions uninhabitable and agricultural areas barren. Ozone levels become so low that people must stay inside at all times. Entire ecosystems collapse, destroying agriculture, spreading disease, and fostering massive food shortages and epidemics. Hydrocarbon resources are exhausted and extreme energy shortages (absent renewables, hydrogen, and fusion) lead to worldwide economic collapse. Seas, lakes, and rivers dry up as freshwater becomes an increasingly precious resource. Oil and water shortages lead to resource wars that pit "haves" against "have nots" worldwide.

E. <u>Disease</u>

<u>Current</u>: Immunizations exist for many diseases that historically presented immense challenges to humankind. Many industrialized nations routinely inoculate all citizens, and affordable immunization is slowly becoming the norm in undeveloped countries as well. We should assume that current trends in immunology will result in better and more vaccines in the future. However, immunology is currently unable to deal with viruses and diseases that spread other ways. Cancer and AIDS are currently the greatest threats to populations, and conventional methods of treating these diseases are marginally effective or ineffective.

The threat of an accidental plague continues to pose a threat to humankind. Scientists to not fully understand threats such as the Ebola virus, which continues to cause small, periodic outbreaks in remote regions of Africa. Recent outbreaks of the SARS virus and Avian flu in East Asia show the inadequacies of current systems to deal with the threat of an epidemic. A threat also exists of biological attacks by terrorists. Recent attacks of anthrax and ricin show the widespread panic that ensues from relatively minor incidents. If a chemical agent were used on a populated area, medical personnel would likely be unable to cope with the afflicted population, to say nothing of the panic that would arise.

<u>Long-Term</u>: Barring a chemical or biological attack, the science of immunology will continue to develop and refine its present methods. This future could lead to two extreme scenarios. Optimally, immunology will eventually be able to inoculate all current diseases, as well as new afflictions that could arise in the future. However, in a worst-case scenario, a number of vaccinated diseases will develop an immunity to their vaccines or to treatment methods. Currently treatable diseases such as smallpox and cholera would turn into pandemics if their vaccines became ineffective.

The future also holds the potential of new methods for treating diseases. Advances in genetic engineering and RNA-interference therapy could eliminate genetic diseases and afflictions such as AIDS or cancer. Developments in both of these fields will likely not take place for 30 to 50 years.

F. <u>Artificial Intelligence</u>

<u>Current</u>: Artificial Intelligence is still in its infancy. Advances in hardware technology, coupled with software improvements, have resulted in new areas such as Neural Networks and Bayesian computing that will eventually contribute to machines that can learn. Humanoid robots that can do simple household chores are already starting to appear in Japan and Europe.

<u>Intermediate</u>: In the next few decades one can expect to see dramatic improvements over the initial models of humanoid robots. These advanced models will be able to perform most household chores thereby creating more leisure time for humans.

<u>Long Term</u>: In the long run, robots will be intelligent enough to be able to perform every task that human can. Humans will be free from having to work. Other exotic applications include brain internet connection that will enable human beings to stay connected to a world wide web of information simply through their thoughts, and the integration of machines and humans to create a new species of living beings.

V. Conclusions

The future contingencies of interest discussed in this paper will have profound positive and negative implications for society. It is also clear that no FCI will develop in an autonomous manner without either influencing other FCIs or somehow being influenced by others.

There are several key questions that society must contend with as these technologies evolve and their impacts begin to be felt. The first key question pertains to what is a desirable

future, and how do we drive towards it? The question of what our future *ought* to be like is distinct from the question of what our future *will* be like. The debate on what *ought* to become of the new technologies discussed in this paper must be built on ethics and morals. However, this debate has barely started in our society. It is imperative that we let ethics drive technology in the direction of social justice.

The second key question is whether our current trajectory condemns us to a future that we cannot avoid. In some of these FCIs, such as nanotechnology and artificial intelligence, we still have the opportunity to set the course we will sail. With others, such as the environment and diseases, we lack much room to maneuver. As an example, the current Bush administration has banned further derivations of stem cell lines from embryos for the stem cell research purposes. The administration is also pushing for a ban on human cloning. However, our current path virtually precludes that we will be able to navigate away from a future of cloned babies and genetically-enhanced human beings. With our rapid advances in information and communication technologies, knowledge disseminates more quickly than ever before. Banning certain ventures of genetic engineering is more likely to result in the research moving to other countries rather than stopping it. Eventually, the United States will be confronted with the tough choice of either participating or losing out on the advantages that accrue from these technologies. Unless international consensus is developed quickly, events will overtake our meager actions in this field.

A third key question is one of sustainability. In the endless creation of technology and wealth, it is important to remember that we rely on materials and energy derived from the earth, and that these resources are finite. Sustainability places a limit on the amount of wealth we can create before the environment is irreversibly destroyed. Therefore, new technologies must not

only be wealth-creating, but sustainable as well. The future holds myriad possibilities in the

creation of wealth, and it is imperative that we bring such possibilities about responsibly.

APPENDIX B: ECONOMICS
Authored by: Steven Cahall, Go Kasai

I. High-Tech Textile Industry

One of he few comparative advantages in developing economies, particularly South Asia and Sub-Saharan Africa, is the textile industry. Developing economies are comprised of the necessary mix of cheap, low-skilled labor and low relative amounts of capital. Because of this they can manufacture textiles competitively and are reliant on textile exports for a significant portion of income.

It is possible, however, that as fabrics using microfibers and nanotechnology expand the textile industry will become more intricate. The development of complex fibers would entail more complex production methods requiring significantly more capital and skilled labor. As a consequence, textile production would become a semi-skilled industry and the developing world would lose a critical competitive niche. A skilled textile industry would result in "insourcing" as complex production moved back onshore. The retreat of the textile industry would be economically detrimental to the developing world; already feeble economies would face greater immiseration and rely solely on raw material export.

II. Revolution in World Energy

Though cotton was king in pre-Civil War America, oil rules the current state of economic relations. Dependency on fossil fuels for production and transportation creates an unprecedented demand for petroleum and hence unprecedented economic dependency on oil producing nations. These countries, mainly Arab nations in the Middle East, realize the asymmetric nature of the world oil market and are able to explicitly collude prices (and maximize rents) via OPEC. The current economic paradigm revolves around oil consumption.

In response to oil dependency, and the insecurity that it instills in oil-dependent countries (such as the United States), much research and development has been done in search of alternative energy supplies. And, there is a distinct possibility that one or a number of these technologies will eventually permit industrialized economies to wean their dependency. The extent to which this would alter economic relations would be at least paradigmatic, as an entire region dependent on oil wealth would quickly become marginalized. FDI and international trade would slow to a trickle as most of the Middle East lacked alternative production markets to support current consumption levels. Geopolitical changes would be equally as dramatic: no longer would the region's corruption, authoritarianism, and fundamentalism be tolerated by the Western world. It is even possible that the Arab kingdoms would join the economic ranks of Lesser Developed Countries (LDCs).

III. Resurgence of Socialism

Despite the undeniability of capitalism as the hegemonic economic order it continues to be challenged in areas of economic destitution. Communist parties exist in much of the former Soviet bloc and lackluster privatization schemes throughout Eastern Europe and South America have led to a popular re-emergence in socialist thought. It is possible, should growing income gaps between nations continue to entrench the world's poor, that socialism will once again percolate up from impoverished masses and economic experiments in socialism will again commence. Even if only handful of economies rejected the capitalist paradigm the effects on world trade would be significant. There would be a semi-autonomous socialist bloc dislocated from global capitalist markets. Negative effects on the industrialized world include higher prices and lower living standards as cheap labor became unavailable and production moved back onshore.

IV. The Rise of India

Modern day India is replete with 1+ billion people, a highly educated (English speaking) middle-class, and an increasingly liberalized economy. Recent economic projections forecast an 8 percent growth in GDP for FY2003 and economists predict such a surge to continue.[17] Considering such data it is not hard to imagine India as a global economic powerhouse. India, in fact, looks a lot today like America did in the late 19th and early 20th centuries: pools of cheap labor, high capital-labor ratios from foreign investment, and an active entrepreneurial classes with government support. India is already developing industrial bases in IT and bio-technology. Export-led growth could quickly develop India into a rich middle-class superpower.

An economic take-off in India would be unprecedented in magnitude because of India's capacity for consumption. If India's middle-class reached a living standard on par with the US or EU it would redefine the economic balance of power. India's capacity to swallow foreign goods would put it at the forefront of globalization and even challenge US economic hegemony. Continued development of high-tech IT could also fuel India's already robust arms market and lead to an export lead defense industrial base. This would intern fuel regional tensions with Pakistan, as well as contribute to anxieties with the other regional juggernaut: China.

V. The Rise of China

As China begins to compete in every aspect of the market including automobiles, cell phones to even space exploration, the world's largest country could become the next superpower. The economic ascension could have immense impact on the world economy as well as regional security. China may become a huge player in stabilizing the region as it holds considerable influence in the economy and politics of neighboring countries such as Burma and North Korea.

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[17] *The Economist*, February 21st – 27th, 2004, p. 12.

Their economic growth could bring large number of foreign companies into the country, draining away jobs and companies from other Western countries. Growing free trade with ASEAN countries may also empower Southeast Asian countries to pull themselves out of economic underdevelopment.

China's rapid growth is not without cost. The country could pay massive costs in terms of environmental pollution over previous decades and the possible health care problems that may arise. The rise of China's economy would also strain the relationship with Japan and create anxieties within the other regional behemoth: India.

VI. The Clash of the New Superpowers

China is undeniably one of the strongest and fastest growing economies in the world. The country has seen a faster economic growth post-war. India likewise seems on the brink of such growth. Although historically China's growth has far out-paced India's other mitigating factors act to equalize growth rates. Thus, with political and economic reforms in India and continued FDI in China the possibility of dual superpowerdom looms over 2+ billion people. This could also lead to potential clashes between the superpowers.

Both nuclear countries have had a history of tensions. China and India have gone to war on border disputes, and tensions endure as India ridicules China for its military support of Pakistan. Furthermore, China has recently begun to build military posts near the Bay of Bengal in Burma. This secret operation has many experts worried, especially India, where the Bay of Bengal puts India within China's radar. An Indo-Sino military juxtaposition would undoubtedly be disastrous.

If both countries achieve the miraculous economic growth, their appetite for energy would no doubt grow as well. This could also lead to potential conflicts over energy, specifically those from the Middle East, such as Iran and the Caspian Ocean.

VII. Economic Growth Endangers Environment

Worldwide production is tremendous and as a consequence resource depletion is at historical levels. Developing countries rely heavily on natural resources for exports and thus, for economic growth. Exploitation of the environment for short-term economic benefits is challenging feasible sustainability; the consequences that future generations may face are significant.

If current resource depletion worsens there will be catastrophic effects on the environment. Imagine, as Kenneth Rogoff mentions in his Foreign Policy article if, "1.3 billion Chinese and 1.1 billion Indians suddenly all had cars and began churning out automobile exhaust at prodigious US rates."[18]   This is the question that concerns environmentalists as pollution becomes rampant.

Greater industrialization would also mean growing demand for productions of foods, especially meat and scarce foods. The production of meat demands a large production of feeds, specifically wheat. A large exploitation of land to produce food means cutting down vital tropical rainforests in Indonesia and Brazil. This is dangerous because tropical rainforests, especially in Brazil, produces the majority of the world's oxygen. If those carbon sinks are depleted due to economic growth the world make lack the capacity to sustain population growth trends.

VIII. Systematic Default of IMF Loans

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[18] Kenneth Rogoff, "A Development Nightmare," The Foreign Policy, January/February 2004, Issue 140.

Leading developed nations of the world largely funds the International Monetary Fund. A quota system of member nations allows the IMF to collect money to lend to countries in need. Currently the IMF is loaning $107.6 billion to 56 countries with the total quota of about $299 billion. However, the amount of money available on an annual basis is lower that the total and thus, in a case of major financial crisis, the IMF may turn to their large reserves of gold or supplementary borrowing arrangements with member nations to compensate for the shortfall.

Despite these safety measures to prevent a failure in the system, the IMF could face dilemmas if nations routinely default at the onset of crisis. If a country, such as Argentina, systematically defaults on its loans the IMF would face shortfalls in operating cash flows as well as dangerous precedent regarding the enforcement of the international debt regime. The IMF does not have power to force Argentina to compensate for the loss of money due to the default. If a major financial crisis in developing nations recovering from previous economic problems through IMF loans faces another string of global financial crises, the potential effect on the institution would be devastating. The credibility and even their existence of the IMF would be in question.

Authored by: Alex Alum, Chuck Cannon, Creight Hottinger, Paul Snow

APPENDIX C: SECURITY

I. Increased Asymmetric Warfare:

The United States is the most technologically advanced and economically potent country in the world. It is, therefore, highly unlikely that any other country will be able to compete with the U.S. for superiority in conventional weaponry in the near future. The U.S. should, therefore, expect its enemies to wage asymmetric warfare. The following FCIs are a sampling of the forms that asymmetric warfare against the U.S. may take:

A. Suicide Bombers in the US**:**

The September 11th terrorist attacks on the World Trade Center and the Pentagon represented an attempt on the part of militant Islamists to bring the reality of war into the United States. Osama bin Laden has repeatedly stated that he wants Americans to suffer and live in fear, as his "Muslim brothers" must also suffer and live in fear. Many Middle Easterners resent what they perceive to be the United States' unconditional support for Israel, and they blame the U.S.-Israeli alliance for the poverty and violence which is a reality of life in that part of the world. Indeed, suicide bombers operating in the U.S. may represent a new phase in the war against "Western Evil." Such operations will certainly have economic repercussions (people will be afraid to ride public transportation, visit shopping malls, ride airplanes, etc.). Suicide bombings in the U.S. will also affect governance, since ethnic tensions within the American population are likely to become more prevalent. Clearly, the options available to policy makers will be very limited. Short of suspending *habeas corpus* and specifically targeting certain ethnic/racial groups for investigation, is there anything that U.S. policy makers can do?

B. Disease as a biological weapon**:**

The global AIDS epidemic has elicited a global campaign to educate people about means of prevention. Despite the global effort, however, HIV/AIDS remains a threat to humanity, and threatens to kill entire populations in Sub-Saharan Africa. Should bio-terrorists be able to manipulate the genetic composition of the virus so as to make it both resistant to antiretroviral drugs and easier to transmit, how would the U.S. confront the challenge? The possibility that a terrorist organization may deploy an army of HIV infected individuals (or individuals infected with any deadly contagious illness) to intentionally spread disease must also be considered. Such threats would have implications for science, as well as for governance. Will scientists be able to develop new drugs to confront the challenge posed by mutated viruses? Will US law enforcement find itself targeting specific ethnic or socioeconomic groups to confront the threat posed by the possibility that terrorists may recruit individuals to spread viruses and other diseases intentionally?

C. Foreign Insurgent Groups Operate Within the US:

The trend has been for a greater number of intrastate wars and a decline in the likelihood of wars between states. The ongoing war on terror will project well into the future even if most of Al Qaeda and other terror groups are caught over the course of the next decade. The Revolutionary Armed Forces of Colombia (FARC) is one future opponent that has been largely ignored in much of the mainstream national security analyses. FARC is a narcotics-funded insurgency in Colombia that has used a combination of terrorism and guerilla warfare. The United States has been engaged in a series of operations in Colombia to assist the government there as part of the "war on drugs." This has lead to such FARC attacks as the shooting down U.S. operated spy planes and the kidnapping U.S. citizens. In recent years, the United States has sent an increasing number of U.S. "advisors" to aid in the ongoing war. While FARC has

restricted their activities to Colombia and the surrounding countries, the possibility that the FARC may decide to move their operations into the U.S. cannot be overlooked. Using a car-bombing tactic similar to the one used by Pablo Escobar in Colombia, FARC could launch attacks in the target rich environment of the United States while blending into the large immigrant community. This would be the first non-Muslim terror group engaged during the war on terror. How would powerful domestic groups react if the administration began rounding up and detaining suspected FARC members throughout the immigrant community? Would the U.S. population support a rapid expansion of our activities in Colombia in an attempt to combat FARC? The difficulty of fighting a well funded, experienced insurgency operation in a tropical jungle setting based on our experiences in Vietnam would make the case for such a war very difficult to sell. How would the over stretched U.S. armed forces respond to this FCI which could easily surpass Iraq in terms of the number of troops required?

D. <u>Net-Centric Warfare</u>:

The U.S. military is increasingly relying on networked information systems to increase their war fighting ability. These systems allow few soldiers to deliver more accurate and deadly firepower to the enemy. However, they rely on a sophisticated system of integrated information systems. If either the hardware or software of these systems were to be brought down by inexpensive yet effective EMP devices, the development of a 'super computer virus', or even unexpected solar activity, the advantages to our soldiers could be lost. The loss of the networks would also have a severe effect on information economy, disrupting power, deliveries, and the communications that are needed to supply our levels of consumption. Who has what information and how it is presented is significant in the sense that governance, security and economics all directly depend on who knows what when.

II. Geopolitical Shifts and Alliances:

Future geopolitical shifts and changes in alliances may occur to balance against US military, economic, and cultural hegemony. This may occur as a result of nations finding it in their national interest to forge new alliances. New shifts and alliances may also result from internal developments within nations (a country's disintegration, a coup, civil war, etc.). Below are some examples of the major shifts and alliances that may form in the future:

A. <u>Islamic World unites and forms a front against the US</u>**:**

The Islamic world certainly is not monolithic. Furthermore, within and among Islamic countries there are rivalries, tensions, and animosities. However, the possibility that Islamic countries may put their differences aside in the future to confront a common threat (i.e. the United States) cannot be overlooked. The most radical segments within Islam have tried to portray the U.S.-led War on Terrorism as a War on Islam, and many Muslims do perceive the war in this way. To understand this, it is important to distinguish among the different varieties of terrorism that exist in the world, and the U.S. decision to focus primarily on militant Islam. If radical Islamist regimes were to come to power throughout the Islamic world, and form a united front against the U.S., the threat would, indeed, be great. In Pakistan, for instance, radical Islamic groups already control large parts of the countryside. Emergence of a charismatic leader who gains support of many radical Islamists throughout the world through effective public diplomacy and portrayal as of himself as Islam's modern Caliph / Mahdi to lead the umma, community of believers, to overthrow Western Christian-Zionist hegemony could lead to unrest throughout the so-called "arc of crisis." This front would possess nuclear weapons, since Pakistan already has a nuclear capability. Even more frightening, perhaps, is the prospect that this nuclear-armed united front would act irrationally. What options would be available to U.S.

policy makers if this Islamic front were undeterred by the threat of nuclear retaliation? A united

Islamic front will most likely have a great impact on the U.S. economy, since the price of oil will

most likely sharply increase.

B. The rise of a competitor:

The rise of a peer competitor to the United States could dramatically change the global security

environment. The U.S. may have to shift alliance structures and redistribute it global power. It

could lose much of its current freedom of action. This rise would also effect the U.S. economy,

with a significant loss of economic autonomy (i.e. lose our relative ability to direct the global

economy). Such peer competitors could be China, India, the EU or Brazil for example- each

having different implications.

III. Revolutionary Weapons Development:

Technology has augmented the capacity of a whole variety of weapons, which have subsequently

been diffused in the world to the point where there are major questions as to how security can be

ensured both with and against these weapons, whether they be computer viruses, more

conventional arms, or nuclear weapons. Governance has played and will continue to play a

significant role in deciding how weapons will be deployed, and which are not appropriate for

use. The environment and economics are then significantly affected by these choices, as

demonstrated in the example of the arms race during the Cold War. The following are new

weapons technologies that may drastically change the nature of warfare, and will have very

profound impacts on governance and security.

A. Low-Yield Nuclear Weapons:

        The development of low-yield earth-penetrating nuclear weapons will forever change the

role that nuclear weapons have traditionally played in conflict. These low-yield weapons would

not serve the purpose of deterring a conflict with another nuclear power, but would be used in conventional conflicts. The concern is that the use of such weapons will blur the distinction between conventional and nuclear warfare. Moreover, if the U.S. were to use these low-yield nuclear weapons against a non-nuclear power, it may set a precedent for other nuclear weapons states to use their arsenal against whomever they want. Indeed, the use of such weapons may lower the standard of what becomes acceptable in warfare. Perhaps India and Pakistan will find it acceptable to fight each other with low-yield nuclear weapons. The development of low-yield nuclear weapons has implications for governance, economics and science and technology policy issue areas.

B. <u>Mind-Machine Interface Technology</u>:

Technology that would make possible the integration of machine components into the human person would not only drastically change warfare, but would also challenge our conception of what we regard as "human life." For instance, if scientists succeeded in creating a robotic man (i.e. a cloned human whose functional capacity depended on the electronic equipment integrated into his body), would such a creation be considered human, and be guaranteed the same rights as every other citizen? Indeed, this has implications for governance, since the line between who may and may not demand human/civil rights becomes blurred.

C. <u>Weaponization of Space</u>**:**

The deployment of weapons into outer-space would guarantee the U.S. victory in conventional warfare. Moreover, if the U.S. were to succeed in deploying a space-based missile defense system, other countries' nuclear arsenals would be rendered obsolete. It is probable that enemies of the U.S. would seek unconventional means of guaranteeing their security. How

would the U.S. respond to threats posed by those who seek to wage asymmetric warfare? Will a space-based weapons system ultimately lessen national security?

D. <u>Nanotechnology</u>:

A report prepared for the CIA predicts that current semiconductor-manufacturing technology will have reached its developmental endpoint by 2015. Nanomanufacturing would allow us to create supercomputers at scales that are simply beyond the reach of current semiconductor-based technology. It would also allow for greater use of powerful computing devices in areas where size, cost, and energy requirements would have ruled out use of computers. For example, cheap, powerful computers could be integrated directly into soldiers' uniforms without imposing weight or movement restrictions associated with traditional computing technology. This technology could be used to assist in heat dissipation using advanced materials, to track individual soldiers for rapid friend/foe identification, and to integrate useful networking devices directly into soldier's helmets.

E. <u>Development of fully capable AI combat systems</u>:

The development of capable unmanned combat systems would change the way the U.S. approached armed conflict. It would also have an effect on policy making in that by taking casualty considerations out of the process, the U.S. may use fore more often.

IV. State Disintegration:

The effects of emerging economic and military powers disintegrating will most certainly present a security dilemma to the U.S. policy makers. State disintegration may cause regional instability, and may ultimately lead to a domino effect of disintegrating states. The following are two specific examples that raise security concerns to the U.S.:

A. <u>China disintegrates</u>:

If China were to disintegrate as a single nation-state, and factionalize into different countries, the consequences would be felt globally. How would the U.S. deal with potential nuclear 'warlordism' in what was left of China. Would refugees flow into Eastern Russia and how would they react. This development would also have large effects on the global economy.

B. Indonesia disintegrates:

Aceh and Papua secessionist movements could easily lead to widespread revolts against the central Indonesian government. The resulting civil war could destabilize the entire region and threatens the critical Strait of Malacca through which much of the world's trade transits. The persistent piracy and terrorist activity in this region over the last decade suggests that even Western forces would have difficulty restoring order. The prospect of policing 240 million Indonesians (88% Muslim) over 6 thousand islands will make it politically difficult to intervene. Cutting off the sea trade through this region would produce economic problems around the globe and could cause severe local scarcity in critical energy and food supplies.

V. Surveillance:

While one often thinks only of surveillance as a means to fight crimes of all sorts and ensure the public well-being, the ability to monitor the activities of others raises important governance questions with regard to the human right to privacy and freedom. Technology is increasingly being employed in this sector, as can be seen particularly in the use of biometrics to track and identify people. While current work on neural mapping is fairly primitive, the next stage in our understanding of the workings of the human brain could produce a number of significant impacts on all aspects of our future. A perfect ability to detect lies or, less probable, read human memories without the need to gain the subject's consent could easily lead to police states and ubiquitous law enforcement. Imagine the power that authoritarian states could exercise over their

populations. If this field progresses in a manner similar to others, including genetics and chemistry, the ability to map the mind would be followed by breakthroughs that allow direct modifications. While this could have positive effects on those with mental illness, it could also be used to create nightmare scenarios including effective brainwashing.

VI. Demographic Changes within the US:

It would be dangerous for U.S. policy makers to automatically assume that while the rest of the world changes, the U.S. will remain constant. The American population is certainly changing. Growing numbers of immigrants from Latin America and Asia are exerting political power within the U.S., and increasingly demand to play a role in setting the American foreign policy agenda. Is it possible that the U.S. will ever factionalize into ethnic/religious regions? Will ethnic tensions in the U.S. ever reach such a level that we may have another civil war? Will states who feel that the federal government is too intrusive (i.e. how California might feel if there is a constitutional amendment defining marriage) make an attempt to secede?

APPENDIX D: GOVERNANCE

Authored by: Kristin Adair, Ken Fletcher, Melissa Nachatelo, Dan Nadel, and Emily Waechter

I. Introduction

"As war grows more unconventional, more often undeclared, and more asymmetrical, with the element of surprise becoming the dominant variable, there will be less and less time for democratic consultation, whether with Congress or with the UN."[19]

Challenges to democratic processes grow daily as advances in technology and communication shrink both time and space. Democracies have thus far been able to debate the evolution of these technologies and their effects on society but the debate often lags behind development. If innovations persist at the current rate, the U.S. government may find itself increasingly incapacitated by the very democratic process that defines its identity. Simultaneously, the United States, as well as other nations, will face domestic and international governance pressures related to demographic changes, the evolving concept of the social contract, the environment, and the age of innovation.

The overall question asked of policymakers will be can democratic governance handle the magnitude and velocity of change? If not, what modifications in policymaking and governance can we make now that would preserve democracy and shape a desirable future. How can the government create breathable policies that allow for flexibility and innovation as events unfold?

Often it takes years for the U.S. Congress to legislate on mundane issues, let alone the ones that have political and social implications. As progress becomes more rapid, legislators may indeed be able to move quickly; however, this can have the same damaging effect on democracy.

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[19] Robert D. Kaplan, "Supremacy by Stealth," *The Atlantic* (July/August 2003). Available at http://www.theatlantic.com/issues/2003/07/kaplan.htm; 17 February 2004.

They may not have the time to understand/research an issue they seek to shape. As we witnessed post-9/11, in the interest of responding quickly, the Patriot Act passed with little exploration of its effect on the balance of security and freedom in a democracy.

The nature of society as we know it promises to be affected by a number of future possibilities. Within this paper, we have identified FCIs which ultimately interact in areas where demographic changes cross with genetic manipulation to increase survival rates, where changes in regional balances of power interact with transformative military technologies, and where regionalism, nationalism and globalism collide. The complexities contained within each of these governance issue allows lines to be drawn and intersections to be made with the fields of science and technology, economics, and/or security, in order to create a truly comprehensive picture of where democratic governance may be headed.

II. Demographics

A. <u>Demographic "New World Order"</u>

The world order is about to change with a population explosion that will damage the West's position as a driver of the global agenda and pit the North against the South—most visibly in the Mediterranean littoral where the youth-bulging countries of the Middle East, Asia, and Africa lap against the graying shores of old Europe. The industrialized countries of Europe and Japan face a two-pronged population crisis, which within 11 years will leave the United States as the sole industrialized country on the list of the top 10 most populous countries in the world. Not only do Europe and Japan have aging populations, with their accompanying demands on social programs, but they also face lower birth rates. There are not enough young workers to replace those who are entering retirement. The West, as a unit, may not have the demographic strength or fiscal resources to dominate international institutions and

the international landscape as it once did. Meanwhile, the developing world is on the cusp of a population explosion. Global governance may be driven by the developing world should it be able to harness the potential of its human resources, although projecting from the present state of affairs, the youth bulge threatens to destabilize the developing world while simultaneously destabilizing the North. Europe and Japan could also harness the potential of the young in the developing world and thereby meet the needs of their elderly and maintain their positions as global leaders. To achieve this outcome, they will have to be comfortable accepting foreigners into societies that are becoming increasingly xenophobic.

B. The Population at Home

1. Inter-Generational Financial Conflict

The United States is expected to go through convulsing changes in the next century. Within the next decade, the retirement of the baby boomers will shock the federal entitlement system. The ability of the United States to provide for these retirees is intimately tied to its current fiscal policy and budget priorities. A $521 billion deficit in FY 2004-2005 alone inevitably threatens the viability of social security and Medicare and promises to have ramifications into the next decade and beyond. The younger population will be forced to absorb these financial burdens, which will cause discontent at home as generations vie for limited resources.[20] The social support structure of the government will falter, providing little incentive for the younger generation to pay taxes into a system they do not expect will serve them into their golden years. If the government is perceived

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[20] Jonathan Weisman, "The Budget," *The Washington Post*, 3 February 2004. Available at http://www.washingtonpost.com/wp-dyn/articles/A6296-2004Feb2.html; 15 February 2004.

as reneging on its social compact with the people, young and old, will it lose its legitimacy?

2. Islam

With its current "demographic explosion" and status as the fastest growing religion in the

United States and the world, Islam has the potential to become the most populous religion in

the country and thus infuse the United States, part of "Christiandom," with Islamic

civilization. This would alter the identity of the United States as a Judeo-Christian country

and could change the future national dialogue. The Muslim lobby could emerge as a

powerful new voice in the democratic process and may influence the congressional decision-

making processes and recast U.S. involvement in the Middle East. The United States could

emerge from a radical shift in the underlying religion of country by becoming stronger; the

unique strength of the United States is its ability to assimilate those of different cultures,

ethnicities, and religions. The secularist creed may prevail and the robustness and diversity of

the population may indeed strengthen the country and its processes through the virtue of

including more voices in the policy debate, proving that Islam and democracy can co-exist. If

the Muslim population grows and participates in the political system, it could showcase the

dynamism and opportunity of liberal democracy, elevating the U.S. once again to "a beacon

on the hill." To achieve this outcome, a national dialogue regarding the true nature of Islam,

as distinct from militant Islam would have to start sooner rather than later. The

misunderstandings of Islam in the United States are rampant and promise to become more

damaging to the fabric of the society should another terrorist attack occur at the hand of

radical Islamists. Misunderstandings could lead to stark sectarian rivalries within the United

States—a phenomenon which Americans have not experienced firsthand and which would

threaten our institutions, values, and security. Current practice of the United States in

prosecuting the war on terror, including immigration measures that target Islamic

immigrants, if followed to their conclusion, could yield conflict rather than peace in the country.

3. Multiculturalism

By the middle of the 21st century, the United States is expected to have morphed into a majority-minority state.[21] The fastest growing "minority" group includes those of Hispanic descent; however, importantly, many in this group have chosen not to identify themselves by this "pan-ethnic" term, but rather by their country of origin or as "white" or "Caucasian."[22] In addition, the continued rise of interracial marriage has resulting in a growing percentage of America's children having not just two different racial backgrounds, but several (like golfer Tiger Woods, who identifies himself as black, Thai, Chinese, Caucasian, and American Indian). Many argue that this phenomenon has the potential to blur or "soften" racial lines and thereby increase national unity.[23] At the same time, however, some efforts towards forming broad, "minority" political coalitions have reemerged and the prospects for racial disunity are also significant. Particularly divisive issues in the near future will include the conduct of the census and racial identification in general: must the growing multiracial population continue to check the box marked "other," or will a new designation be created? Additionally, how will affirmative action policies—and the racially-heated debates over them—change to conform to the shifting ethnic and racial composition of the nation; as whites verge on being in the minority, will the racial roles in educational and employment

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[21] "U.S. Census Bureau Report: 'The Hispanic Population: Census 2000 Brief.'" *CQ Public Affairs Collection* (10 May 2001). Available at http://library.cqpress.com/cqpac/hsdc01-93-3613-181335. [CQ Electronic Library, CQ Public Affairs Collection; 15 February 2004.]

[22] Amitai Etzioni, *Inventing Hispanics: a Diverse Minority Resists Being Labeled*, Brookings Review, Jan. 1, 2002, 10.

[23] Jack E. White et al, *"I'm Just Who I Am": White, Black Asian, Other, Race is No Longer as Simple as Black or White*, Time Magazine, May 5, 1997, 32.

hiring programs be reversed? As the racial composition of American families change, implications for many other areas of domestic policy will also become apparent. For example, how will the health system address questions regarding bone-marrow matching and the treatment of race-specific diseases (like Tay-Sachs)?[24] What languages will children speak at home and what languages will be used in public schools, particularly if a majority of the population are Spanish-speakers? And how will civil rights and hate crime legislation and policies be altered to encompass the racial dynamics of a country where racial and ethnic distinctions are no longer simply black and white?

III. New Order

A. Global Competitors to Democracy

Democracy will be tested in the coming century as it faces the inevitable onslaught of rapid modernization that has already altered voting practices, political campaigning, privacy, etc. The confluence of human, technological, and environmental changes in the offing will have the capacity to redefine good governance as populations and governments confront challenges and opportunities never before imagined. These forces may compel people to reconsider democracy as the most effective, most free, most representative, and most secure form of government, especially if democratic systems are unable to respond to the quickening pace of change. Democratic regimes may experience the last two stages of life-span Ibn Khaldun ascribed to any regime—"it is born, grows, matures, declines, and dies."[25] Transformative events—everything from natural disasters, to the discovery of the undeniable existence of God (remnants of Noah's Arc are found on Mount Ararat), or the visit of intelligent life from another planet—may cause

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[24] Id.

[25] Bernard Lewis, "I'm Right, You're Wrong, Go To Hell," *The Atlantic* (May 2003). Available at http://www.theatlantic.com/issues/2003/05/lewis.htm; 20 February 2004.

the abandon of democracy. What will the position of the United States be if an alternative to democracy arises? The American belief in our system takes the form of a civic religion. We worship the Founders as demigods. Could America and Americans handle the displacement of our system?

B. <u>Sovereignty Rights of Nation-States Resigned to Regional Organization</u>

Complexity arises once a former country-to-country interaction over sovereignty-claims is now forced into a country-to-region negotiation, where the full might of the regional organization works to sway the country towards its settlement. In light of trade disputes, military deterrence, or extradition laws, most issues are resolved between the two or more countries at hand. Furthermore, once a country resigns aspects of its sovereignty to another organizational level, the combined powers of the whole becomes greater than the sum of the parts. In conclusion, the power politics that was primarily nation-state to nation-state will be no more, and New World Order nation-state power will reside in which organizations hold the timely and important national decision-making powers of each country. On the other hand, countries could become weaker as regions could be poor decision makers when it comes to issues that one country is used to making on its own. Finally, adding in the third dimension of global organization could leave the issue of sovereign powers complex enough that a reorganization of standard rule resignation might be in order for timely solutions to pressing matters.

C. <u>Asian Economic Giants Challenge American Political Dominance</u>

Both China and India have experienced dramatic growth over the past few decades. During the same period, the relationship between these neighbors has been tense. There are signs, however, that the bonds between these two Asian rivals are strengthening. By 2005, trade between the two nations is expected to surpass the $10 billion mark. Negotiations to settle

mutual border disputes are ongoing, and both sides are optimistic that a settlement is within reach.

Together, China and India represent 37 percent of the world's population. In the coming years, the unipolar world may evolve to include four superpowers: the United States, Europe, India and China. But can Asia accommodate two superpowers? Particularly with the presence of Pakistan as a wild card, can these two huge nuclear powers remain at peace? If not, the economic and political implications for the region and the world are grave, as our dependence upon these markets for goods and services grows exponentially.

Another possibility is that India and China, despite their differences in form of government, manage to create some type of Asian alliance, and seek to jointly challenge the United States for global economic dominance. According to a recent report in *The Wall Street Journal*, "the rapid growth of China and India, eager participants in the US-dominated global economy, could eventually yield rivals to American economic might." These states could focus economic expansion throughout the developing world, and begin to chip away at America's share of the market in these areas.

D. <u>Normalization of National Legal Systems toward Universal Commercial Law</u>

Over the past decades, international trade has exploded. Despite the presence of some holdouts, it appears that the global economy is on an unstoppable march towards a future of even freer movement of goods (and even labor) across national borders, as if those borders did not exist. Due to the incredible strength of market forces, numerous countries have changed their laws in order to gain more effective access to global markets. In the United States, increased interstate trade in the early- to mid-20th century became the driving force behind the adoption of a "Uniform Commercial Code" by 49 of the 50 American states.

While individual states still retain different laws in almost all other areas, practically every American state recognized the necessity (and huge benefit to their citizens) of normalizing commercial law. It is likely that this template for uniformity will eventually be copied on the international arena. While people often assume that such drastic legal changes could only take place under the auspices of an international organization like the WTO, it is just as likely that states themselves will see the benefits of such action, and undertake changes themselves.

IV. Mass Privatization

A. Multinational Corporations and Global Governance

Large multi-national corporations (MNCs) will be one of the most significant actors in the international system as the twenty-first century unfolds. In parts of the developing world, where undemocratic regimes are failing or failed or where governments are weak in rural regions, corporations are becoming de facto ruling authorities. Large corporations like Shell, Exxon-Mobil and British Petroleum (BP) enter into agreements with governments to shoulder principle responsibility for massive development and resource extraction projects. They often help to fund local schools and businesses, hire employees from the community, monitor the environment, hold town-hall meetings to gauge public opinion on project developments, and provide energy and other resources to residents. On this basis, however, corporations are being challenged and attacked, much like states, for their human rights and environmental practices. If indeed the nation-state is to fall out of existence in the coming century, will the corporation replace it? Corporations remain, by definition, profit-seeking entities. But responsible governance, too, is becoming a profit-maximizing tool. The universalization of liberal democratic values that many argue is a necessary corollary to the growth of the global economy will merge the two. Consumers in the developed world, the shareholders and stakeholders of

MNCs, will increasingly make their investment decisions by judging the full character of a corporation, from its profit potential to its policies on the use of sweatshop labor and chemical solvents. The United Nations has taken the first steps towards instituting a binding system of regulation for private entities operating, like states, on a global scale.[26] Corporations' participation in the daily lives of so many of the world's people arguably necessitates relinquishing some power to the international legal system with a view towards protecting and promoting human rights and ensuring public participation and the spread of democratic values. It might not be too long before states will have to move their chairs aside and give BP and its counterparts a seat at the supranational table.

B. Privatization of Traditional Government Functions

In the United States over the last 20 years, financial crises and ideological opposition to big government have led some states to privatize many traditional public functions. In Texas in particular, recent legislation to farm out to private corporations the administration of welfare, social, and family services is currently being implemented; the state has already experimented with private operation of prisons.[27] On the national level, the drive from conservative groups and the Bush administration to fund religious charities and organizations has largely been founded on a desire to push responsibilities for public welfare-related services into the private sector. In addition, much of the scientific research previously the responsibility of public universities with the help of government grants has been out-sourced to private organizations; genetic research in particular carries immense profit-making capability but also forbodes misuse and consequences

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[26] *UN Draft Norms on the Responsibilities of Transnational Corporations and Other Business Enterprises with Regard to Human Rights*, E/CN.4/Sub.2/2003/12 (2003)

[27] Kim Phillips-Fein, *Texas, Inc.: Taking Privatization to Extremes, a New Law Ends the Public Sector as We Knew It*, The Nation, Jan. 5, 2004, 18.

for public health where important discoveries are privately patented and inaccessible for potentially life-saving public use.[28]

It is arguably true that local, state, and national budgets, badly in need of better management, will benefit from privatization. But social policy will likely suffer much greater harm. Corporate control removes public accountability from functions previously overseen by elected representatives; in the future, the "public" employees who teach the nation's children, manage and distribute vital welfare and social security funds, and punish dangerous criminals will be responsible not to the people, but to their bosses. Corporate profit-maximization considerations could lead to greater efficiency without the individualized consideration required for public benefit decision-making. Prisons in Texas have been severely mismanaged, for example, with prisoners being denied adequate food and medical care and guard staffs cut in order that the private management corporation cuts its costs and keeps its state contract. Additionally, the ethnic and racially diverse makeup of employees generally associated with the government workforce will fall to the traditional homogeneity of corporate America.[29]

V. Internet Age

A. Internet Governance

The Internet, a rapid development only over the last decade, has been said to "threaten[] the government's ability to control power, wealth, and moral within its territory"[30] because of its lack of borders and defined property rights and its frontal challenge to traditional regulatory and enforcement mechanisms. Self-government of the Internet, currently emerging in the most

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[28] Edward M. Welch, *The Church Was Right About Capitalism*, America, 1 Dec. 2003, 17.
[29] Phillips, 2004.
[30] Henry H. Perritt, Jr., *The Internet as a Threat to Sovereignty? Thoughts on the Internet's Role in Strengthening National and Global Governance*, 5 IND. J. GLOBAL LEGAL STUD. 423, 427-28 (1998).

rudimentary form in the e-commerce arena, is arguably one of the greatest mounting threats to established democratic government. Internet-only corporations already exist, as do schools and every type of informal group and association. Peaceful networks of Internet users have become increasingly organized and motivated through "blogs,"[31] file-sharing, and more traditional networking in the form of online friendships, romantic relationships, and business deals. But as activist and political movements—whether young and liberal or conventional and conservative—increasingly go online, and as the Internet itself becomes more and more politicized, warring factions of Internet users might surface. Contenders in the race to cyber-governance will inevitably compete one another to gain cyber-supporters and virtual "territory"—the number of websites that flaunt their personal message.

One commercially-oriented site, E-Bay, exhibits several of the factors traditionally associated with states or governments—including the propagation of rules that are accepted and followed by "citizens" (regulations applicable to all E-Bay users), control over a "territory" (the E-Bay site, and consequently all transactions that take place there), and an established rule of law designed to maintain order and settle disputes. Internet users can currently seek settlement of commercial disputes through a wholly online system providing a direct negotiation forum as well as professional mediation. This model can form the basis for a future system by which common administrative functions—like the issuance of marriage licenses—for online societies could be performed, a broad range of civil disputes could be resolved, and criminal activity could be investigated, adjudicated and punished.

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[31] A blog is a website of chronological postings, like a journal, that can be published publicly or privately by an individual or group. When maintained by a formal or informal organization, "a blog can help keep everyone in the loop, promote cohesiveness and group culture, and provide an informal "voice" of a project or department to outsiders." Accessed at http://www.blogger.com/about.pyra.

B. <u>The Internet and Traditional Politics</u>

While the Internet has been creeping towards self-contained governance, the conventional political process has taken hold of the Internet for its own purposes. During the 2003-2004 democratic primary season, commentators have pronounced "a new form of intimacy between campaigns and their far-flung supporters, the creation of virtual political communities powered by people devoted to the candidates."[32] The Internet has the potential to help candidates and political parties build networks of supporters, raise money from untapped grassroots sources, and receive instant feedback on campaign decision-making. But for all the benefits of instantaneous communication offered by the Internet, unchecked rumors and brewing scandals can reach thousands if not millions of voters with unprecedented speed, even compared to modern media outlets, in some cases. Previously, the campaign process itself served as a filter; a candidate would release damaging information about his or her opponent at the opportune moment. With the growing centrality of the Internet, an individual with knowledge of an opponent's indiscretion (or with the creativity to invent a story of indiscretion) might skew the outcome of the election as a whole, simply by confessing online.

Perhaps the United States system, however democratic it appears, was not designed for Aristotle's concept of democracy—characterized by full participation of the citizenry (or at least of all adult males). Online voting is a concept in the earliest stages of development, but the idea that each voter will in the future have constant access to the Internet such that government decisions could be made based on an immediate, universal poll threatens the foundations of representative democracy as we know it. It may subvert the responsible governance the Founding Fathers envisioned when they created the Republic of the United States of America.

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[32] Matea Gold, *Where Political Influence is Only a Keyboard Away,* LA Times, Dec. 21, 2003, A41.

VI. The Environment

A. <u>Global Warming</u>

      The pace of global climate change in the past few decades "has been too fast for species to adapt."[33] Scientists project that over this century, there will be an increase in global warming of 2.5ºF to 10.4ºF. Even higher global warming rates are expected to afflict the United States. "This warming will have real consequences for the United States and the world, for with that warming will also come additional sea-level rise that will gradually inundate coastal areas, changes in precipitation patterns, increased risk of droughts and floods, threats to biodiversity, and a number of potential challenges for public health."[34] Resulting changes in migration patterns, extinction of species, and overall global environmental instability will lead to global political instability. The impact on democracy will be palpable, as people look more and more to their government for health and economic assistance, which the government will probably not have the resources to provide. In fact, governance worldwide may be threatened. Fear of human extinction may breed either anarchy or tighter government controls. Humans may work together using technological advances to overcome the global transformation, or it may set in motion a war of all against all.

B. <u>Water Scarcity and its Implications for National and International Governance</u>

      With world population increasing exponentially and major industrialization and natural resource development reaching even the poorest countries, the stress on the global water supply will soon reach a critical level. "By 2015, nearly 3 billion people—40 percent of the projected world population—are expected to live in countries that find it difficult or impossible to mobilize

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[33] Jonathan Amos, "Action Needed to Save Coral Reefs," *BBC News*, 13 February 2004. Accessed at
http://news.bbc.co.uk/1/hi/sci/tech/3487869.stm; 20 February 2004.
[34] See Pew Center on Global Climate Change at http://www.pewclimate.org/global-warming-basics/; 20 February 2004.

enough water to satisfy the food, industrial, and domestic needs of their citizens."[35] The most

serious concern is with the availability of water for irrigation, particularly in Asia, where rising

population levels and changing diets in China and South Asia continue to boost demand for food

supplies.[36] Now and in the future, water scarcity may generate protest and violence among

farmers and rural people whose water is being appropriated for urban and industrial use; rural

unrest in turn often leads to migration to overstressed cities and neighboring countries.[37] In

addition to possibly generating internal conflict and exacerbating humanitarian crises in

countries where foreign exchange necessary to import grain is limited, water shortages may

become the newest cause of major regional and international conflict in the near future.

During the second half of the twentieth century, hostilities erupted in the Jordan and Nile

River basins, as well as in the Ganges River area between India and Bangladesh, over "unilateral

actions to construct a dam or river diversion in the absence of a treaty or institutional

mechanisms that safeguard the interests of other countries in the basin."[38] The ongoing

breakdown of stable governments—for example in the most arid parts of Southern Africa and the

Middle East and in the region of the former Soviet Union bordering the environmentally-stressed

Aral Sea—will contribute to growing water conflicts and weaken channels for resolving disputes

over shared water resources. How will the United Nations and regional supranational bodies

ensure democratic intranational and international resolution of transboundary water issues, even

where the governing regimes involved are anything but democracies? Without effective

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[35] Sandra L. Postel and Aaron T. Wolf, *Dehydrating Conflict: Possible Wars over Water*, Foreign Policy, Sept. 1, 2001, 60.
[36] Tushaar Shah, *More Crop Per Drop*, UN Chronicle, Mar. 1, 2003, 36.
[37] Postel and Wolf, 2001.
[38] Id.

international regulation not only of water use, but also of environmental factors affecting the quality of water supplies, the risk of future crises and, perhaps major war, is very high.

C. <u>Government Responsibility in Environmental Manipulation</u>

"Until we, as a society, insist that the manufactured chemicals we use are rigorously evaluated, we will continue to be the subject of a large-scale experiment."[39]

1. Food Manipulation

In an effort to feed the world and fix nature's disasters, man is manipulating the global food supply through chemical additives, antibiotics, and genetically modified organisms (GMOs). Science claims these manipulations provide safe, healthy, and necessary sustainable food supplies. But researchers agree that long-term proof does not yet exist to support this claim, fueling a debate between European and U.S. consumers over the exportation of GMO foods abroad. In fact, some African countries, which desperately require food assistance to feed its hungry, have refused GMO-grown corn from the United States despite the possibility of feeding thousands of its citizens.

The U.S. Department of Agriculture currently governs what U.S. school children eat in daily lunches and what products U.S. society is exposed to for general consumption. Congress directly affects the health of its citizens by passing legislation allowing the manipulation of our food products. If science's claim that GMOs and these additives are harmless proves false, would the U.S. government pay the cost for the consequences of its food products reaching millions of people in Africa, Asia, Europe, and the United States? Fixing past mistakes will significantly load Congress and delay the process of governance drastically.

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[39] See Enviornmental Defense website. Accessed at www.environmentaldefense.org/system/templates/page/focus.cfm?focus=4.

2. Water Pollution

More than a decade ago, German scientists discovered trace amounts of cholesterol-lowering drugs in German rivers, sparking research by some employees of the Environmental Protection Agency to explore what may be happening in the United States. Investigations yielded trace amounts of cholesterol-controlling drugs, blood-thinning medications, birth control pills, and other Pharmaceuticals and Personal Care Products (PPCPs)[40] in U.S. rivers and lakes as well. These PPCPs are now raising concerns for their potential to harm individuals' health and deteriorate America's waterways.

Pollution is not a new issue. But Congress often does not follow legislation with strong enforcement for cleanup methods by private companies. Congress would need to reevaluate the effects on society as a whole when these trace amounts of medicines become greater and have a more visible affect on human and environmental health. Currently water treatment centers cannot manage these PPCPs in our systems. Legislators must rival their pharmaceutical counterparts and oversee a cleanup of necessary waterways in order to manage the environmental hazard. Can Congress look ahead to legislate this issue before it blows up and becomes the next health disaster for American citizens and the next environmental disaster for industries dependent on these waterways (i.e. fresh water fishing) or will the system run per status quo and wait for a surprise?

VII. Technological Advances

A. <u>Governance by Machine</u>

As technology continues advancing, futurists claim that it is only a matter of time before the machines that human beings create begin to exceed human intelligence. Should this

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[40] Environmental Protection Agency website. Accessed at www.epa.gov/nerlesd1/chemistry/pharma/faq.htm#Whatdoes.

eventuality occur, then, does it make sense for humans – with our finitely limited intellectual capacity – to continue to govern ourselves? Would it not make more sense to turn over governance wholesale to a race of machines that is smarter than we are, and more effective than we are at organizing our own affairs?

We already employ machines in performance of a host of task that humans did just a generation ago. As computers improve, it seems logical to turn over more and more complex decision-making to the computers. Eventually, there would be no reason why computers would not take over all aspects of our governance. We could design our caretakers with all of the qualities that we admire most in our leaders but free of our human flaws. We could give them all human knowledge, and allow them to develop this body of thought further than any human would ever be capable.

B. Space Colonization Becomes Reality

The United Nations estimates that world population will climb between eight to 11 million persons in the year 2050. As this population surge occurs and inhabitable locations on Earth become overcrowded, it can be assumed that human beings will begin to look elsewhere for living alternatives. Already the newest frontier, space, has been beckoning to explorers; the International Space Station serves as an experiment to test how humans can exist in space, and scientists are now investigating Mars to determine if life can survive or did survive on this planet at one time. Looking toward the future of 2050 and beyond, it is not inconceivable to imagine man's colonization of space. Two scenarios could play out: In the first, explorers discover an inhabitable planet and are able to transport human life there due to advances in space technologies. In the second, space technology develops the capability to create Space Stations for 1,000 or more persons. In both scenarios, questions regarding who will govern this new colony

to how will governance exist arise. Unlike the days of New World Discoveries where the British, Danish, French, and Spaniards divided continents, no sovereign nation can lay claim to a celestial body, according to the Outer Space Treaty of 1967. So in the case of a planet colony, an international governorship from Earth is possible. As time passes, the colonies on the new planet could potentially move to separate themselves from the mother country, especially if the capability to survive is not dependent upon Earth for supplies. Or what if a private company funded the exploration into space, would they be responsible, similar to the Dutch East India Company in the 17th and 18th centuries, for developing a system of governance?

Under a space station scenario, which we can assume would be more dependent upon Earth for survival needs, such as plant seeds and fuel, the inhabitants may identify with their home nations, much as the International Space Station currently does. The concept of a more international system in space is conceivable in this scenario, leaving the question: would it be democratic governance or another form? Would it mimic Earth's systems or, because of the different life demands, would society change and find a new way to govern itself?

C. <u>Security Identification Technology Promotes Biases</u>

Security trends in the United States have led to face recognition programs that can scan individuals in casinos and other establishments, allowing owners to refuse service to potential criminals.[41] As the war on terrorism increases in intensity, the technology of these systems will advance and information about individuals will be more comprehensive. Rather than simple prior arrest records, police, guards, business owners, and other officials will have free access to a person's medical records, family records, schooling, previous employment, as well as any personal matter that may be filed away on a computer. While some say this would certainly cut

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[41] J.C. Herz, "Seen City," *Wired*, December 2001, 161.

down on crime—which every U.S. administration would support—the serious infringement on individuals' rights would be raised by civil right activists. The potential for biases to form from one scan of a face would provide business owners and public officials the immediate power to secure their interests and deny a questionable individual entry into a building or access to a service based on their psychiatric records or the fact that their uncle committed a heinous crime. As the availability of information becomes more common, from social security numbers now to the above mentioned, how will Congress work to protect the rights of individuals for equal access under the law and the right to "innocent until proven guilty?" It requires Congress enacting new legislation to evaluate these systems of security or limit the security measures taken and avoid a Big Brother scenario of governance and enforcement.

D. <u>New Technology Innovation on Global Military Balance of Power</u>

In 2004, the U.S. military has the might of nearly all the world's military technology and manpower combined. On the other hand, a country such as New Zealand or Taiwan (or Country XYZ) has little to no military power other than diplomatic strength in regional and world organizations. As the holder of the last two to three decade's preponderance of power and the projected next century's, the United States plays the unquestionable role of global policeman and big brother to crimes of humanity and peacemaking. (Most recently it overthrew Islamic totalitarian regimes in the Middle East and South Asia with little to no assistance.) However, this power could wane in the circumstance that a technological device is invented that would allow Country XYZ to become even more powerful when it comes to any military exercise given the new technology's purpose and usage.

New military technologies are invented and innovated every day, and every year handfuls of them make it to the manufacturing plants. However, as long as such new devices are owned

and operated by an already hegemonic power, then the result is more powerful (and hopefully, moral) military operations. If however, such a revolutionary technology is created in another country, that might, per se, have different ideas as to what is a human rights abuse or a rogue state, then there would be one more country that could take it upon themselves to cross nation-state lines for successful intervention by force. Even though there are global treaties for such interventions, there is an underlying understanding amongst advanced industrial societies that there is such a thing as a reason for utilizing force to assure a specific outcome." In the recent past, the sources of interventions have been led by the United States with other advanced countries either assisting with tangible force or monetary donations.

Without going into much detail as to how such a technology would work, what is more important is the timeframe for which the country of ownership would obtain the new power. For starters, a patent would not hold much credibility for countries with national security concerns. In sum, the new tech device would have to have the ability of being protected and not being replicated by another country for the most extreme effects to occur for global decision makers regarding the action Country XYZ. A good historical parallel is the Soviet invention of nuclear weapons in the mid 1950s. The United States followed suit within two years with its own bomb. What I hope to purport is a scenario, where such a window of power would be held for one decade or more.

Lets take for instance that an uprising in a sleepy African state results in a division in tribal organization, mass murder, and genocide according to the Geneva Convention. The world is made aware of the situation through mass media, and lobbying efforts commence for country to regional peace-making forces to mobilize to intervene. For whatever reason, the usual actors that lead such peacemaking efforts decide to remain in a holding pattern due to conflicts of

interest. For Country XYZ, however, the world political is just the reason that it funded the stealth development of its new military technology in the first place. Country XYZ, henceforth, invades, and the warring tribes cease to fight. The typical resulting "blue helmeted" UN forces arrive and food and shelter aid is doled to the refugees and citizens. In sum, the job of the global policeman is limited to a first-come first-serve basis for reconstruction and democratization contracts, and there are now competitors. Furthermore, there is now competition as to what is "intervene-able". What if for instance, a race riot in Los Angeles is viewed as a human rights atrocity and we are left defending ourselves against a stronger military force. Or, if it is deemed that the Palestinians or Kurds only need security to build themselves their own sovereign state. Many delicate issues such as these would need a modicum for debate so that conflicts are not created between the conflict settlers.

VIII. Human Beings and Society

A. Alteration of Human Nature in a Wired Generation

Some contend that human nature is constant. However, people interact with their environment and are often a product of that environment. The implications of modernization lead one to envision a world, which is partially in existence, where people interface through computers, PDAs, cell phones, etc. Ironically, while we can be connected to many more people, the intimacy of our encounters is diminishing. Can human nature change as personal contact diminishes? As the world becomes wide with possibilities, it is also shrinking in terms of space. The vast interconnectedness of the future world could cause the withdrawal of people into their own electronic universes rendering us less social animals.

With this phenomenon continuing (and possibly accelerating), it is likely that the nature of our government will soon come to reflect such changes. Rather than having to travel to

Washington, will Congress begin to meet in a virtual space? Will leaders campaign for elective office completely through Internet town-hall meetings, and never need to travel? With the vast majority of Americans telecommuting from home, will there be anyone left outside?

B. <u>Genetic Modification and Governance</u>

Tremendous leaps forward in the manipulation of human genetics now makes techniques such as gender selection a reality, and parents can now detect a host of congenital defects at increasingly early stages of pregnancy. Within the next few years, scientists predict that parents will be able to choose eye and hair color of their children as well. One can imagine a future not too far off that includes parents custom-designing all aspects of their children, from physical traits to intelligence and mental capacity. Someday, it will be possible to "edit" out undesirable traits. But once this capacity exists, how would governments react? Would they seek to limit its use? Or conversely, would they seek to employ it to create "better" citizens? Imagine a government editing out citizens' propensities for criminal behavior, antisocial behavior, or subversive behavior. This would be a fantastic (and frightening) tool to ensure compliance, and what would the long-term effects be on democratic governance?

Even if this powerful tool was only used by parents in manufacturing their children, would we be depriving society of the future's greatest minds? Some of the greatest innovators in human history have been different in some substantial way. By eliminating those differences, are we putting innovation in doubt?

C. <u>Human Cloning in "One Nation, Under God"</u>

This month, scientists in South Korea reportedly took the lead in the ability to clone a human embryo, causing many to wonder where science may take us next.[42] Despite the U.S. Congress' ban on cloning, it is only a matter of time before a human being is cloned. When this occurs, U.S. legislators must contend with the questions: Is a clone a human being that holds the same natural rights given to other citizens? And how will cloning practices be governed?

Legislators will need to determine if a cap on the number of clones developed in one year is necessary due to population overgrowth concerns. Eventually, in the same vein that genetic manipulation opens options for "designing" a person, the U.S. Congress would have to become a forward thinking government as they map out the next century of citizens based on immediate cloning laws. The government system will certainly need to oversee the technological strides of cloning companies. But the system will need to govern and oversee itself to remain true to its principles and values of a democratic society as religion and ethics lead the debate of how to manage this new age of man playing God.

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[42] Gina Kolata, "Cloning Creates Human Embryos," *The New York Times*, 12 February 2004. Accessed at www.nytimes.com on 20 February 2004.

APPENDIX 2:

FURTHER DISCUSSION OF NODES

By Paul Snow

Considerable discussion took place among the framers of this document about the concept of nodes, a concept in complexity theory which was introduced by our Professor, Leon Fuerth. All agreed that nodes in some way expressed the interconnectivity of events in today's world, but it was difficult to form a consensus on just what constituted a node and what did not.

One part of the explanation of our difficulty surely lies in the definition of the word itself. From the dictionary's designation of nodes as "points at which several lines come together," can surely come multiple interpretations which would all have a certain justification. The application of this concept to systems of human interaction with which government policy-making is concerned only somewhat limits the range of possible meanings.

Being interested in systematic examination of FCI within government, though, it was necessary to specify what nodes were in order to solidify our case for a new government entity which would take them into account in its assessments (the elimination of the term altogether to avoid confusion was also brought up, but its presence was thought necessary to maintain coherence within the paper, specifically with the appendices). In the end, "points of interconnectedness at which the various spheres of human interaction come together" (p. 3) was the agreed-upon phrasing for nodes.

No such agreement was reached for specific examples, though. "Demographics," "environment," "technology," "health," "multipolarity," "energy," "the North-South Divide," and "space colonization and weaponization" were all put forth as nodes, while economics, security, governance, science and technology, and public health were seen as "realms" across which these nodes played out (p. 6). The latter node was eventually eliminated in the final draft, however, since we considered space colonization and weaponization more of a future contingency than a node.

In the end, what is lacking is rigor in holding to a definition. The fact that both technology and health appear as nodes as well as "realms" (albeit paired with science and qualified as "public" respectively under the realm label) shows the uncertainty that existed over what qualifies as what. Furthermore, multipolarity survived the cut even despite the fact that, in its traditional international politics connotation, it could easily be argued that this distribution of power does not currently exist—so it should be understood as a future contingency of interest rather than a node. A "North-South divide," on the other hand, does exist, but might be seen more as a situation that in and of itself contains many different nodes rather than being a node itself.

Returning to technology and health, to determine whether these are nodes are not, we must come back to the idea of conceiving nodes as *points* that show the interconnectivity of our existence. If these two can be seen as points, or I would hazard to say, distinct concepts that can be grasped intellectually, then they could qualify as nodes. Both encounter some difficulty, however, if one examines each at its core. It can be argued that each is a fundamental part of what it means to be human: we need to be healthy and our needs drive us to create tools. Accepting this argument, technology and health are too elemental to be understood as points; they are better labeled as

drivers that affect all of our interactions. Points, if overly broad, cease to be points, and a point cannot be said to *drive* anything either.

The following are a list of still very general nodes which hold more tightly to this definition of nodes as points, or concepts. More region- or field-specific nodes are certainly possible:

Surveillance: While principally a security concern, the ability to monitor the activities of others raises important governance questions. Namely, one has to decide who is best fitted to do the surveillance and when rights of privacy and freedom are being infringed upon. Technology is increasingly being employed in this sector, as can be seen particularly in the use of biometrics to track and identify people.

Weapons Development: Technology has augmented the capacity of a whole variety of weapons, which have subsequently been diffused in the world to the point where there are major questions as to how security can be ensured both with and against these weapons, whether they be computer viruses, nuclear weapons, or more conventional arms. Governance has played and will continue to play a huge role in deciding how weapons will be deployed and which are not appropriate for use. The environment and economics are then significantly affected by these choices, as demonstrated in the example of the arms race during the Cold War.

Search for Alternate Energy Sources: So much of industrial society is dependent on machines that any slight differences in what it takes to run those machines can have drastic consequences for all aspects of human interaction. Questions of self-sustainability are huge both in governance and security since the level of trust one can give to foreign sources is constantly under debate. Technology will be the driving factor here, of course, and both environment and economics stand to be drastically affected by any new developments.

Information Sharing and Diffusion: Who has what information and how it is presented is an important node in the sense that governance, security, and economics all directly depend on who knows what and when. The ability to prevent or control the diffusion of information has long been a preoccupation for those who wish to keep certain systems (government intelligence, weapons specifications, insider information) insulated from unfriendly forces that would exploit any knowledge gained. Presentation of the information via media channels can be key to influencing public perception, with which governance and security are particularly interested. Technology works on both sides, both to help spread information (the Internet) and in the attempt to stop its diffusion (firewalls, encoding).

International Trade: Governance is frequently called upon to regulate the flow of this economic activity, which can in turn lead to trade disputes and imbalances that put governance to the test. If disputes are not resolved, security risks are created—which can in any case be true if the trade involves arms or other dangerous substances.

Foreign Capital Investment: The transfer of economic capital across borders entails very interesting questions for governance: one must determine which laws govern the company's assets abroad and to what point the assets are allowed to integrate into the foreign economy. In

cases of conflicts of interest or questions of government stability, security issues can also play a major role, as witnessed by the influence of oil corporations' investments abroad on those responsible for ensuring U.S. national security.

Economic Development: Whether technology can help bridge the vast differences between trends between the developed and the developing world will no doubt depend on governance and security questions. The more peaceful and well-governed the world is, the more likely that the poor environmental conditions and past histories of governance that have led to underdevelopment can be overcome to provide proper standards of living for everyone. What standards of living are sustainable—given the earth's capacities to provide us with resources— puts additional strains on governance.

Pollution: Often created by economic activity, the various forms of pollution can raise major governance concerns in the effort to regulate its spread, which can in turn involve security inasmuch as the sources of pollution are seen as vital to the security of the nation. This can take place at all levels of government, though the international efforts are perhaps the most tendentious.

Resource Distribution: Most resources that we use can become scarce through one way or another; therefore governance is nearly always involved in order to ensure that resources are distributed in the most effective way. As scarcities become extreme, security is usually at stake. How well these aspects are managed in any particular country will determine the success of their economy as well as the health of the environment.

Religion: Religion is an alternate form of governance that has a variety of relationships to the state form that either serve to strengthen or weaken it. Those forms that create internal strife or strive directly to diminish state authority raise security issues. Religion in general can also have a significant impact on peoples' views of economics and technology, affecting progression in these fields. Catholicism's opposition to various theories of astronomy is one easy example.

Citizenship and Country of Origin: The sorting and labeling of people, animals, and things according to borders is an aspect of governance that has many implications for economics and security as well as technology.