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THE SECURITY ENVIRONMENT OF 2025: WORKSHOP REPORT

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EXECUTIVE SUMMARY

This is a report on a workshop convened by Long Term Strategy Group at the office of CENTRA Technology in Arlington, Virginia, on Thursday, 13 March, 2008, at the behest of the National Intelligence Council's Long Range Analysis Unit. The purpose of the workshop was to assemble a group of technical and regional subject-matter experts to assess potential components of the security environment in 2025. The report captures the key findings and uncertainties identified in the course of the workshop. The three scenarios, a baseline and two excursions, generated by the workshop will serve as the basis for two subsequent workshops that further the efforts of the convening and sponsoring organizations' analysis. All three workshops are designed to serve the NIC – Long Range Analysis Unit's 2025 project. Participants were given a brief paper examining key trends and drivers prior to the workshop. Both this read-ahead paper and the workshop agenda can be found in Appendix A of this report.

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WORKSHOP REPORT

INTRODUCTION: GOALS AND METHODOLOGY

The objective of this workshop was to set out and discuss the global trends that are likely to provide the structure within which the United States and other actors will operate in the year 2025. During the course of the workshop, those trends were combined in different ways to create a set of scenarios on which two subsequent workshops, one on the future character of war in general, and one on the future character of regional military interaction in Asia and the Middle East, will be based.

The world that would result from a straight-line continuation of currently observable trends can be referred to as a “surprise-free projection,” following Herman Kahn, or simply as a baseline projection. Because trends of major interest could deviate in the future from patterns recently displayed, attention at the workshop was also devoted to scenarios based on excursions from the currently observable trends. The causes of possible deviations, in turn, were specified such that divergences from, or discontinuities in, current trends might be better detected when they are in their early stages. These deviations or discontinuities inspired the alternative or excursion scenarios that were generated at the workshop.

At the end, the goal was to have a set of trends, and their possible discontinuities, synthetically combined into a baseline projection and alternative scenarios, in ways that made explicit our assumptions about what we thought would shape the future, what we thought could lead to deviations from that expected world, and the general character of the worlds within which the United States might operate, and for which it could be preparing. Agreements and disagreements among participants in the workshop about the important trends and the possible discontinuities were made visible, such that subsequent efforts could evaluate, update, and improve upon the judgments made about trends, discontinuities, and projections made at this workshop.

The alternative to this process would be to eschew efforts to anticipate the longer-term future, and to analyze events as they occur. While this would avoid the uncertainties associated with efforts to understand the broad character of the future environment, it could prevent the provision of adequate guidance to policy makers. For instance, incremental analysis of ongoing events might not alert policy makers to the longer-term consequences of steady trends while the policy makers still had time to take low-cost actions to respond to the problem (the problem of global warming or of the frog in the beaker of water that is gradually heated). An ad hoc approach would also not be helpful in the face of discontinuities such that incremental analysis and policy responses were functional up to the moment of the discontinuity, but added to the forces that led to the discontinuity and were dysfunctional after the discontinuity (the problem of financial markets in the run up to and aftermath of financial bubbles, for example).

TRENDS

DEMOGRAPHY

There is general agreement that demographic trends are among the most reliably forecast-able trends in the 17-year timeframe relevant to the workshop. For example, essentially all men of military age in 2025 have already been born. With some relatively weak assumptions, projections of the population size of military cohorts can be made.

The discussion at the workshop was initiated by a briefing that highlighted several major demographic trends. Key findings included the growth in the urban population relative to the rural population in China – an increase in the urban population from 27% of the total population in 1990 to 36% in 2000 to 44% today, with an urban population expected to reach 70% by 2025. In addition, the one family-one child policy has produced an unusual population distribution in China, with a larger population born before the policy followed by a smaller population born after. This will increase the dependency ratio in China that is expected to peak in 2015, at a level about 30% higher than it was in 1900. As the older population increases, demands for social security in a China with a relatively weaker network of extended families might be an issue. However, the view was expressed that this cohort in China has low expectations of help from the government, boasts high savings rates, and still lives in areas in which communal support is provided to them. The excess of men in China was also discussed. While a sex ratio imbalance clearly exists, it is imbedded in a China in which general patterns of family life are rapidly changing, with increased numbers of women working, increasing divorce rates and premarital sex. How much of this is caused by gender imbalances is difficult to determine. However, the rapid change in marriage and family practices does suggest that the role of families in maintaining social support and cohesion could change.

A less noticed but perhaps more important cohort, the membership of the Chinese Communist Party, has increased at a rate far higher than general population growth, from 50 million to 70 million in the period 1976-2007. This reflects broader recruitment, to be sure, but raises the issue of whether more Party members means a larger share of GDP going to the Party, formally and informally. The Party's expansion would in that case have implications for China's economic productivity and the efficiency of state expenditures.

This briefing led to a discussion of political dynamics and generational effects within the Chinese Communist Party. A question was raised about whether the large number of cadres born before the change in population policies, cadres who tend to stay in office for long periods of time, might create a Brezhnev era-like gerontocracy in China that will be slow to accept change. Other cohort effects in China were also discussed, such as the impact of the passing of the generation of people who lived through the Cultural Revolution or whose parents lived through it. If those cohorts prized social stability above all else, as many suggest, what will be the effect of their transition out of leadership positions?

The discussion then shifted to a discussion of demographics in the Middle East and the Islamic world. Looking first at the Islamic world, it was noted that between 1900 and today, the share of the world population that is Islamic rose from 9 to 23 percent. Of the roughly one billion young

men of military age expected in 2020, 300 million of them will be Muslim, compared with 90 million North Americans and Europeans. The main observation about the Middle East was the large number of young males (15-29) and boys (younger than 15) relative to males over 30 in Iraq, Afghanistan, and the West Bank and Gaza. If, as widely believed, this ratio, in connection with low rates of job formation, will be associated with higher levels of both social instability and entry into radical organizations, even in the absence of new political or religious ideologies those countries will be difficult to govern. Iran, in contrast, has moved toward birth rates slightly below replacement levels, and could be approaching population stability by 2025 and a maturing, middle-class society.

TECHNOLOGY DIFFUSION AND INNOVATION

The diffusion of technology, while not as predictable as demography, similarly involves the movement of phenomena that are already observable – age cohorts in the case of demography, existing technology in the case of diffusion. Technological innovation is harder to predict, since it involves things that do not exist, but innovations have, in important cases like Moore’s Law, followed regular patterns.

In the case of technological diffusion, the most important trend is the mass production of engineering students globally, which will make it possible for people all over the world to reproduce technology developed anywhere else in the world. The implication is that the technological advantage of advanced societies will be reduced, and the advantage of states over non-state actors will diminish. In addition, the availability of more sophisticated weapons that do not require large logistics support systems will also diminish the military technological edge of advanced states over other states, and of states over non-state actors. This is visible already in the case of man portable air defenses, anti-ship cruise missiles, military targeting data, and cyber warfare.

In the case of biotechnology, the movement of the biological sciences out of academic and research labs into production for mass distribution—the commoditization of biotechnology—will accelerate the rate at which useful biotech is broadly available, and will reduce costs of entry into this field. The areas in which this may affect international politics involve the increased healthy life span of humans and increased agricultural productivity. It may also increase the availability of bio-weapons for mass attacks by sub-state actors, but it is not clear how this will offer increases in military effectiveness over existing pathogens, anthrax in particular. This may be an example of a more general phenomenon in which technological advances past a certain threshold do not yield sharply increasing military or political advances. Nuclear weapons could be seen as part of this phenomenon.

The prospects for biotechnological improvements of human military performance through means other than pharmacology are harder to predict and not likely to be of material importance in the timeframe of relevance to this study. Man-machine interfaces using nano-technology for improved prosthetics and prosthetic-like extensions of human action are already in development, however.

ECONOMIC TRENDS

In the timeframe of this study, the economic rise of China, India, and certain countries of Southeast Asia; the relative decline of Japan and Europe; and the steady position of the United States – all in terms of shares of world GDP – appears to be the main message in the area of economic trends. While there will continue to be considerable expert debate about the rate of Chinese economic growth in the past, and about appropriate methods for comparing the size of the Chinese economy to the American economy going forward, there is no doubt that Chinese economic growth since the 1980s has been impressive – comparable in rate, though not scale, to the economic growth of the Republic of Korea and Japan. Chinese economic growth rates, however, are driven by the movement of workers from low-productivity agricultural jobs into higher productivity industrial jobs, both in urban and rural areas, and can be sustained for longer than was the case for Japan because of the large remaining rural populations. There is debate about the extent to which problems in China that are the result of changing demographics, corruption, inefficient state owned enterprises, and the role of CCP members in the direction of private companies will reduce Chinese growth rates in the future, but the working assumption is that, absent discontinuities, Chinese economic growth will continue at lower rates.

An important question is the relative growth of India and China. Indian GDP growth rates have increased, but the dominant question in India is whether the weaknesses in Indian rural primary school education, labor laws that restrict mobility out of less productive sectors, and Indian infrastructure can be changed in time to have a positive impact on Indian GDP growth rates in the timeframe relevant to this study. One view is that the Indian government must change its policies in order to facilitate higher rates of growth, and that this will be politically difficult and slow, given the high voter participation rates of poor Indians. The opposing view is that the necessary changes, in education and infrastructure, can be and are being addressed by the Indian private sector, without waiting for the Indian government to act. Sustained, higher rates of economic growth is emerging as an electoral issue. If incumbents are increasingly punished for not delivering higher rates of economic growth, political constraints on Indian economic growth could be rapidly reduced. Indian demographics are more favorable than in China. The disagreement on the issue of what the comparative rates of growth of India and China will be appears to range from the view that China will continue to grow at a rate that is one percent higher than that of India, on the one hand, to the view that India will catch up to Chinese growth rates, and perhaps overtake China if the Chinese economy stumbles for reasons that do not also retard Indian economic growth.

TRENDS IN CONVENTIONAL MILITARY CAPABILITIES AND TERRORISM

The most striking observation in this area was that only a small number of Islamic terrorist groups have been able to survive for more than 20 years. Al Qaeda and Hizballah have survived for 20 to 25 years. This give them opportunities that are new for terrorist organizations, including the ability to learn as organizations from experience, to put into place training programs that have long-term benefits, to adapt to counter-terrorist strategies, and to develop a worldwide information presence. The “brand name” recognition and communication skills of al Qaeda have increased such that it is no longer dependent on other media for its information warfare strategies. This increased organizational capacity suggests that such groups will be better able to acquire and

use an increasing range of technologies, including unconventional weapons technologies, specifically biological and chemical weapons. The emergence of terrorist organizations with long life spans is very recent. Their prior absence may be part of the explanation for why terrorist organizations have not used unconventional technologies to date, since developing these weapons and the skills to use them might take more time than training hijackers or building bombs. If so, the use of unconventional weapons may be expected in the near future.

SYNTHESIS: BASELINE SCENARIO AND EXCURSIONS

BASELINE SCENARIO

The review of the discussion of trends identified the following drivers that were judged to be of most importance:

Demographics

- Islamic, African youth bulge
- Rapid urbanization, social dislocation in China, India, other developing countries
- Aging in China, Japan, Western Europe: senescence, immigration
- American demographic exceptionalism

Technology Diffusion and Innovation

- Mobility through the internet and the movement of people of knowledge, information, misinformation
- Technology enables the formation of new communities
- Difficulty of differentiating between hostile and friendly
- New biotech Moore's Law?
- Commercial incentives for alternative energy

Economic Trends

- Continued economic growth in Asia; relative decline of Russia, Europe, Japan
- Extension of sustained economic growth worldwide
- Increasing intrastate levels of income inequality

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- Globalization of illicit economic activities
- Global shift in skilled labor away from government services
- Increased demand vs. increased productivity in the agriculture sector
- Possible shift away from the dollar as a global currency

Military Trends

- Increased capability and longevity of non-state actors
- Increased missile capabilities
- Increased capabilities of unmanned aerial vehicles
- Increased availability and capability of ISR
- Gradual proliferation, latent or overt, (3-7 new states) of nuclear weapons
- Declining incidence of conventional interstate war

Other Trends

- Global climate change
- Environmental degradation
- Resurgence of activist religions
- Growing cosmopolitanism among elites worldwide

Proceeding from this, a picture of the environment in 2025 was generated. This picture is our baseline scenario, what we expect the world to look like if commonly held views of key trends and their impact do shape the world as it emerges over the next 17 years.

The baseline scenario is in some ways markedly benign. The world produced by observable economic trends is a world of continued rapid economic growth in China and India, and modest relative declines in American economic capacity, and larger declines in the cases of Japan and Europe. This is a world of increased prosperity and continued peace among industrialized and industrializing states, without which the projected rates of economic growth would be less likely to continue. It is important to note, also, that this projection holds only if the increasing demand for resources of growing economies is met by the operation of global markets. It also implicitly assumes continued social and political stability in China and India that permits their continued economic growth. And it is a world that is unperturbed by a violation of the nuclear taboo.

The first-order observation emerging from the baseline scenario is that the United States and the traditional military allies of the United States will have relatively less economic influence and military power. Nuclear proliferation may increase the number of nuclear armed states, and will lead to new alignments, weapons, and hedging strategies in the neighborhoods of these new nuclear powers. These new alignments, armaments, and strategies will emerge outside the context of existing United States alliances.

The second first-order observation emerges from the part of the world that does not share in the economic growth generated by industrialization, from the demographics of the Middle East, and from the diffusion of military technology and organizational capacity. Non-state actors will be able to recruit from growing numbers of unemployed young men in Iraq, Afghanistan, and the West Bank and Gaza. Their growing information warfare capabilities will increase their influence outside these populations. The diffusion of trained engineers and the commoditization of more weapons will combine with the increased manpower available to these actors to generate more lethal capabilities. This may lead to greater non-state challenges to states from a small set of non-state actors. If so, this would mark a continuation of a recent trend to fewer acts of terrorism, but more lethal ones. It may also mark the emergence of new states, as non-state actors acquire the capabilities formerly associated only with states, and take on and take over states such as Lebanon, parts of Iraq, and Afghanistan.

SCENARIO TWO: THE US WITHDRAWS FROM THE MIDDLE EAST

But the world may not proceed in ways consistent with the continuation of the dominant trends in the baseline scenario. In many ways, the baseline scenario assumes a Middle East no more unstable than it is now, with continued flows of oil from that region, albeit at higher prices, and the maintenance of the current state system in that region. One major discontinuity could be the military withdrawal of the United States from Iraq and the Persian Gulf and its littoral. Tired of war, the United States could decide not to provide a global common good—Middle East stability—on which many projections are based. In this context, the economic decline and demographic problems of Europe and Japan would appear to preclude them from stepping in to take up existing American responsibilities in that region.

For the first time in 500 years or more, local Arab and Persian speaking states might pursue their own agendas absent great power influence. In that environment, Iran would appear to benefit by becoming the predominant power in the Persian Gulf. A balance might emerge between Iran, on the one hand, and the stronger Sunni powers on the other. But a stable balance might not emerge. Iran could be stronger than Sunni states challenged by internal demographic problems and long histories of weak states. Without British or American support, the Saudi monarchy might not be able to retain power. If so, great powers might continue to seek relationships in the region to challenge Iranian predominance. Other states external to the region, such as China, might ally with Iran.

In this world, therefore, we might see intense competition internal to the region that could produce a stable balance, or prolonged conflict within the region. If the latter, opportunities and incentives for external great powers to compete for influence would exist, possibly in an environment in which some local states have nuclear weapons.

What would be the implications for the rest of the world? If stability rapidly emerges, the shape of global politics outside the region might proceed along the lines laid out in the baseline scenario. If conflict within the region led to prolonged interruptions of oil supplies and possible nuclear weapons use, the external environment would be shaped by those shocks.

ADDITIONAL COMMENTS FROM LTSG

As discussed at the workshop, the retreat of the US from the Middle East would likely result in the short to medium term in a period of competition for influence involving states internal to the region and also external great powers, from Europe and Russia to China and India. This process might involve interstate competition or even warfare. Depending on the progress of the Iranian nuclear program by the point of the US retrenchment, and depending on the level of ambition of Israel efforts to re-assert stability in the wake of the US's departure, conflicts in this environment could feature sabotage efforts directed at, or conventional missile attacks on, local nuclear arsenals.

It may be possible to speculate about comparative advantages that certain regional powers might bring to bear in competitive interactions following a contraction in American influence in the Middle East. In terms of military-age men, as mentioned above Israel's demographic picture looks bleak relative to that of neighboring Arab populations in Gaza and the West Bank, which could produce legions of insurgents. At the same time, relative to a new nuclear state such as Iran, Israel may have a comparative advantage in establishing safeguards, concealing nuclear-related assets, and building up conventional defenses. By contrast, Iran has a history of sponsoring terrorist activities by third-party organizations and proxy groups such as Hizballah. Hizballah's increasing engagement in the Lebanese political system may afford it access to the state resources of Lebanon. The workshop group did not speculate about how this would affect Hizballah's relations with Tehran, but it is worth considering whether Hizballah is likely to be more or less responsive to Iranian prodding if its authority in Lebanon continues to grow.

SCENARIO THREE: A MORE ACTIVIST CHINA FACES INDIA AND RUSSIA

Just as American policies might shift in a major way, so might Chinese policies, either in response to the developments described in Scenario Two, or for other reasons having less to do with American choices. If continued growth in Chinese prosperity is threatened by events in the Middle East, such that the operation of the market does not provide it with adequate supplies of oil, China might take action to ensure those supplies. Or the growing economic power of India might lead existing tensions between India and China over border areas, Pakistan, Tibet, and western Burma to escalate to war, as India feels less constrained, and China feels more challenged. If shortages of oil that can be accessed through the market place are combined with shortages of water and arable land, China might have recourse to wars of territorial conquest. Such wars have largely disappeared, because the advent of industrialization reduced the value of land relative to the value of productive workers. Resources can be extracted from land, but productivity cannot be easily extracted from conquered workers. But in a world in which physical resources—oil, water, and arable land—are scarce and can be conquered, and there are large power imbalances, wars for territory may re-emerge, perhaps on the periphery of China. In

this world, China may have hostile relations with Russia and India. The United States may, in that case, have renewed or revived military relations with India and Russia and the countries of offshore Asia, the Philippines and Japan.

ADDITIONAL COMMENTS FROM LTSG

The rapid economic rise of China, accompanied by equally rapid military modernization, makes it necessary to consider a more militarily assertive China – as was done in Scenario Three. However, many of the Chinese demographic, political, economic, and socio-cultural trends mentioned at the outset – rapid urbanization, weaknesses in the provision of social welfare, the disruption of traditional Chinese family life, increasing income disparities, and the rise of a growing migrant class – render it necessary to consider the possibility of a discontinuity that would unleash discontent and expose the fragility of the current Chinese regime. This prospect suggests a third excursion from the baseline scenario.

Scenario Four: Chinese Internal Instability

The potential exists for a global economic slowdown that could spread to China. It is also possible that China could suffer a defeat in a military campaign associated with a drive for strategic resources. Such a development could create conditions for unrest within China if the Communist Party had lost stature due to corruption, geriatric leadership, or overexpansion. The Chinese population has a long history of rising up in revolt under ineffective rule. At the same time, Chinese authorities have traditionally suspected that hostile foreign forces would exploit their internal problems. These facts could lead to a situation where there is instability in China and an associated humanitarian crisis. Foreign powers like the United States would have to make difficult choices about how and whether to respond. Taiwan could seize the occasion to declare independence; Tibetans and/or Uyghurs in western China might assert autonomy claims with support from sympathizers in India and Central Asia, respectively. A problem within China could therefore be internationalized.

A final consideration is that the initial baseline scenario and the three excursions explored in this report should not necessarily be thought of as independent worlds. It is conceivable that they could occur in parallel or in succession, as, for instance, insurgent activity in the Middle East may provoke the United States to abandon its traditional role there, giving rise to ferment in the region and raising the price of oil to the point where Beijing perceives a need to militarize its energy policy. A Chinese military adventure in pursuit of strategic resources could fail, or a troubled Middle East and high oil prices might depress the world economy enough to slow or stop Chinese growth, leading to unrest in the PRC with the consequences explored in the fourth scenario.

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APPENDIX A

READ-AHEAD PAPER

In preparation for the discussion to be held at the workshop, this paper briefly examines some of the key trends or drivers that might be considered in assessing the security environment of 2025. The broad trend areas are followed by a survey of current security concerns that may endure. Finally, we have included a discussion of three sample potential future worlds – prototypes derived from a preliminary inductive analysis of how current trends and their interaction could produce alternative security environments. The purpose of this material is to facilitate discussion about the range of potential drivers and outcomes that we might see in the future. It is not meant to be limiting or prescriptive.

This workshop aims to identify the potential security challenges that will characterize the world of 2025. It will examine how current trends and potential discontinuities might interact to create alternative future security environments.

Key issues to be addressed by the workshop are:

- What trends and drivers (political, military, demographic, technological, economic, environmental) are most likely to shape the character of the future security environment?
- What will be the most important differences between today’s security environment and that of 2025?
- What are the potential sources of future conflicts?
- What are potential “wild card” developments or points of discontinuity that could have a significant impact on the trends characterizing the future security environment?

Trends That May Shape the Future Security Environment

Geopolitical shifts, new military capabilities and technologies, availability of natural resources, and demographic changes are among the key trends impacting the character of the security environment in 2025. Such trends could combine in different ways to create both new challenges and new opportunities for security interests around the world. While point predictions about the future security environment are unwise, the broad contours of that environment may be visible and the product of current trends. In other cases, it is important to identify disputes about the

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direction and character of current trends to guide future research and analysis. Historically, demographic, economic, and some technology trends have been relatively stable. Accordingly, these trends should serve as the initial point of entry into our discussion of the future security environment. Examination of the trends, and speculation about their likely interaction, will facilitate fresh thinking about the alternative worlds that could emerge by 2025. In descending order of predictability...

Demographics

- Birth rates (e.g., differential b/w Sunni and Shia in Middle East; Japanese and West European senescence barring major immigration; China getting old before getting rich?)
- Urbanization (huge social-cultural impact, effects on family structure and implications for political stability, degree and content of nationalism poorly understood, impact on resources and the potential for failed cities in states that can not cope with increasing demands)
- Religiosity rising among newly urbanized populations (e.g. in China) and within populations destabilized by globalization (e.g. in the Middle East)
- European senescence, in part attributable to downstream effects of urbanization and prosperity, associated with declining levels of patriotism – and the rise of a cosmopolitan elite

Diffusion of technology

- The special case of nuclear weapons technology
- Information-based military technologies
 - ISR
 - C³
 - Use of space platforms
- Technologies for internal security

Economics

- The intra-Asian economic balance of power: continued Indian and Chinese growth, Japanese decline
- The continued stagnation of Europe
- Russian economic growth driven by high energy prices
- Rising levels of internal inequality – Gini coefficients – in China and elsewhere

Technological innovation

- The biological sciences: growing understanding of the fundamentals of human biology
 - Cognition
 - Military performance, stamina
 - Increased useful life span
- Micro-satellites: declining costs of putting units of functional capability into orbit due to

declining weights, miniaturization

- Increased potential for reconstitution, maneuver, and survivability of space platforms

Current Military-Security Challenges

Current military-security challenges that may deserve consideration for the 2025 time frame include:

- **Defense of territorial sovereignty**, including from hostile state powers, terrorism, insurgents and separatists, and illegal immigration
- **Dealing with implications of failed or failing states**, including humanitarian crises
- **Failing energy or nuclear states**. A special class of failed or failing states that currently confronts us is states that are armed with nuclear weapons and/or sources of the world's energy production and export capacities (e.g., Pakistan, Iraq).¹ Failure of such states may prompt a military intervention to restore stability or to prevent nuclear weapons from falling into the hands of terrorists and extremists. In some cases, multiple states may seek to intervene in the situation. A collapse in North Korea, for example, may impel United States, South Korean, and Chinese forces to intervene to secure the North's nuclear arsenal and restore order. Failure for such states to cooperate in these instances could lead to a broadening of the crisis.
- **Proliferation of long-range precision strike missiles**. More states are acquiring long-range ballistic and cruise missile systems. Continuing improvements in sensor technologies, satellite navigation, and computer processing are increasing the precision of such weapons. The result is an increasing capability for states to threaten critical infrastructures within their region with missile strikes. Such missiles represent a significant increase in the threat to regional stability compared to the relatively imprecise Scud missiles that Iraq launched in the first Gulf War. This could lead to changing escalation dynamics in future conflicts as well as create new incentives for missile defenses. Tactical and short-range precision missile systems can also be passed by states to non-state terrorist groups or proxies to strike the forces, infrastructures, and population centers of adversaries.
- **Emerging anti-access/area denial strategies and capabilities**. Adversaries are

¹ *Joint Operating Environment – Trends and Challenges for the Future Joint Force Through 2030*; US Department of Defense; December 2007

increasingly attempting to limit, meter, or disrupt the access of opposing military forces to the local area of conflict.² Anti-access strategies are likely to integrate a set of military capabilities with political approaches designed to limit the ability of opposing forces to project power into the region and to build, maintain, and communicate with forces already present. Advances in long-range precision weapons and over-the-horizon targeting capabilities are enhancing some states' capabilities to target moving naval vessels at sea. In addition, developments in submarines, antiship weapons, naval mines, and underwater robotic vehicles are creating new capabilities for adversaries to target shipping in key transit areas necessary for naval force projection. Advances in long-range land attack weaponry, such as ballistic and cruise missiles, may also increase the threats to areas needed for force deployments such as ports, airfields, bases, and railways. Such anti-access capabilities may create new "tripwires" for escalation, as an opposing force in conflict is unlikely to wait for adversaries to position themselves in a region before striking. In addition, emerging anti-access capabilities could be used by hostile states or terrorist groups to threaten critical maritime "choke-points" necessary for transit of energy supplies such as the transit of oil tankers through the Strait of Hormuz.

- **A revolution in irregular warfare.** Irregular warfare tactics are being adopted by both states and non-state forces as a primary warfighting approach in countering advanced militaries. Recent Middle East conflicts—especially in Iraq and Lebanon—have featured irregular warfare tactics against superior conventional forces and probably have added to the strategy's appeal among a range of potential adversaries, including state forces, private militia groups, and warlords. The spread of advanced light weaponry and communication technologies is enhancing irregular warfare capabilities, potentially revolutionizing the threat posed by adversaries engaging in such conflicts. Of particular concern are developments in and the proliferation of improved anti-tank guided missiles and other man-portable weapon systems, advanced low altitude air defense systems, thermobaric and other advanced explosives, increased use of unmanned aerial vehicles, the spread of cheap sensors and robotics that could be used for future IEDs, ubiquitous wireless sensor and communication networks, and precision, indirect fire weapons.³ As the United States and its military allies continue to adapt to foreign irregular warfare strategies, future adversaries might feel compelled to introduce new capabilities, such as biological or chemical attacks, to increase the level of casualties and disrupt US and allied military operations.

² Joint Operating Environment – Trends and Challenges for the Future Joint Force Through 2030; US Department of Defense; December 2007

³ *Joint Operating Environment – Trends and Challenges for the Future Joint Force Through 2030*; US Department of Defense; December 2007

Suggestive Emerging Military-Security Challenges

In addition to the above current military-security challenges, new challenges might emerge between now and 2025 that will have a significant impact on the character of the future security environment. These challenges are likely to include:

- **An increasingly multipolar world.** Continued economic growth in China and India will likely translate into increased international political influence, power, and possible overseas commitments. How this increased power and influence are employed by these countries to advance their strategic interests, as well as the extent to which the rest of the world accommodates these rising powers, will have a profound influence on the character of the future security environment. In particular, China's approach to governance—a combination of state-led capitalism and foreign policies that profess the importance of state sovereignty and non-interference with other states' domestic affairs—might find growing appeal. The rise of Iran as a regional power in the Middle East also would portend a shift in the current balance of power in the region. A revitalized Russia leveraging its status as key supplier of oil and natural gas may continue to develop significant linkages, and therefore influence, into Western economies. In addition, by 2025, the European Union might also develop into a 27 state power that creates an alternative source of international political leadership to the United States. Such trends will fundamentally affect the character of the future security environment and potentially challenge the US role as *the* global leader in security matters.
- **Resource competition.** In 2025 the world may be faced with multiple, wide ranging resource-related challenges. Climate change and a shifting environment; increasing demand for natural resources, particularly food, water and fossil fuels; a growing and rapidly globalizing economy; urbanization and the emergence of health challenges will all have major impacts and unpredictable effects.⁴ Key natural resources, especially oil and minerals of strategic values will continue to be sourced from unstable areas or regions undergoing shifts in political and military power. Such trends, combined with the growing resources needs of rising powers such as China and India, may lead to increase competition for resources including efforts to secure and protect critical sources through direct military and political means. Resource scarcity may also spark future humanitarian crisis and intrastate conflicts that may require military intervention by outside powers to stabilize key areas or prevent a humanitarian disaster.
- **Mass population displacements.** A combination of resource pressures, climate change, natural disasters, political conflicts, and the pursuit of economic advantage may lead to large scale shifts in population.⁵ Such population displacements may be resisted,

⁴ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

⁵ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

resulting in increasing numbers of barricades and fences being placed around territories to prevent their accessibility. Unwanted population shifts may lead to conflicts, large numbers of refugees, and humanitarian crises.

- **Aging US allies.** Due to decade of low fertility, the populations of Europe and Japan have been aging and are projected to continue this trend indefinitely.⁶ Failure to develop policies to adjust to their changing demographics will drive Europe and Japan to spend increasingly more of its economic resources on social spending to care for their aging populations. As a result, Japanese and European priorities may shift towards internal stability and security concerns over defense spending. Such a shift may place additional security burdens on the United States as its traditional allies may become less capable and more reluctant to employ military forces outside their own territory.
- **New WMD proliferation dynamics.** Growing concerns about global warming, carbon emissions and limited availability of fossil fuels in the future may lead to increasing interest in nuclear energy. Proliferation of the nuclear fuel cycle and related technologies could in turn lead to a proliferation of nuclear-weapon capable states by 2025. The proliferation of nuclear weapons possession beyond the existing powers, particularly to weak and unstable states, will increase the risks of more uninhibited, assertive, and intemperate behavior by these polities while reducing their susceptibility to conventional methods of coercion.⁷ Such nuclear proliferation may also significantly alter the balance of power in key regions. Advances in biotechnology will lead to advances in the understanding of the building blocks of life and significant progress in genetic engineering and microbiology.⁸ Such developments in turn may lead to new agents and methods for conducting biological attacks that will spread to both hostile states and non-state terrorist groups. Similarly, advances in chemical engineering may lead to more lethal chemical weapons in the future. In addition, the proliferation of nuclear weapons may lead to new deterrence dynamics among states in which the use of other forms of WMD, such as chemical weapons, becomes more likely due to a perception that the possession of a nuclear deterrent lessens the risk that such attacks will lead to massive retaliation.
- **Critical infrastructure disruption.** Future terrorist and hostile states may seek to target the critical infrastructures of adversaries in future conflicts. Attacks on financial centers, energy production and distribution capabilities, and transportation facilities could be undertaken to disrupt the economy of an adversary. Advances in cyber capabilities may create new capabilities to attack networked and computer-dependent infrastructures that

⁶ *The Defense Implications of Demographic Trends*; Jennifer Dabbs Sclubba; Joint Forces Quarterly. Issue 48. 1st Quarter 2008

⁷ *The DCDC Global Strategic Trends Program 2007-2036*; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007

⁸ *The DCDC Global Strategic Trends Program 2007-2036*; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007

control vital transportation, energy production and distribution capacities, and financial nodes. In addition, the previously mentioned proliferation of long-range precision weapons may be used to conduct simultaneous attacks on critical infrastructures causing widespread disruption.

- **Conflicts over information.** By 2025, conflicts over information are likely to become more prevalent. In the future, information and communication networks are likely to become prime targets of adversaries seeking to influence foreign perceptions or to disrupt military operations or a state's strategic communications capabilities. States and non-state adversaries will engage in "media warfare" and seek to dominate the 24-hour news cycle for strategic gains. Advances in information and communication technologies will enhance adversaries' abilities to use various forms of mass media to spread disinformation and propaganda and as a means to conduct strategic influence campaigns. Furthermore, as future militaries become more "network-centric" there is increasing incentive to develop capabilities designed to target the "network" of opposing militaries. By 2025, some states may have deployed capabilities to destroy or disrupt space satellite systems on which many military capabilities will have become reliant. Other weapons designed to disrupt information, sensor, and communication networks – such as radio-frequency, electromagnetic pulse (EMP), and laser weapons – may also be deployed by 2025. Some adversaries may seek to corrupt networks rather than destroy them by purposely inserting false data and errors into sensor and intelligence networks and information systems. Advances in digital information technologies will also increase the capabilities of electronic warfare systems. The result will be that conflicts in 2025 are likely to take place in increasingly complex electromagnetic and information environments.
- **Networked communities and adversaries.** Information and communication advances will tend to reduce the incentives for integration and assimilation by diaspora communities, resulting in "virtual communities" that exist across continents.⁹ In addition, increasing interconnectedness will enable groups and individuals to coalesce around common interests or ideologies across traditional national boundaries.¹⁰ A potential security challenge that could be created by such "virtual communities" is that they become the medium for the transmission of social risk including inter-communal violence, terrorism, illicit trade and trafficking.¹¹ Future extremists, united perhaps by a religious ideology, may coalesce and evolve beyond loose patterns of affiliation. Such extremist communities might create a new center of political influence and may morph into a highly networked terrorist organization. Widely dispersed and near-simultaneous terrorist attacks may become a defining characteristic of such a terrorist group.

⁹ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

¹⁰ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

¹¹ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

Alternative Security Environments

The objective of the workshop is to consider how the drivers discussed above, as well as any others that participants highlight, could produce environments that present new security issues. There is room for debate about both the drivers themselves and how they will interact with each other and with potential discontinuities to shape the character of the security environment in 2025. To stimulate discussion, we advance the following scenarios as suggestions and heuristic devices.

Increasing Energy Demand: Colliding Strategic Orbits

Imagine that ... in 2025 the availability of natural resources and energy supplies does not meet the combined needs of rising and status quo powers. Energy-rich states use their resources to exert influence. Energy-dependent states seek to form alliances with energy suppliers and, in some cases, provide advanced arms and technologies while ignoring human rights abuses to ensure access to critical resources. Concerns over dwindling fossil fuels and global warming combined with the lack of an international consensus on proliferation also lead to the further spread of the nuclear fuel cycle.

In Asia, China's growing economic capacities translates into increased political influence, military power, and overseas commitments but does not lead to further political openness. Growing Chinese military power, especially sea and air power, provides China with increasing power projection capabilities, engendering regional concerns that China is seeking regional hegemony. Sino-Japanese relations turn toward rivalry as Japan feels increasingly vulnerable to growing Chinese power in the region. In addition, the simultaneous rise of China and India leads to increased strategic competition between them and others in the region where their emerging markets, sources of raw materials, and national priorities conflict. New technologies that can exploit gas and oils reserves found in the South China Sea also lead to strategic competition amongst states in the region for those resources. Competition for access to energy resources in Central Asia among China, India, Russia, and Iran also intensifies and seeks to exclude Western investments.

Competition over limited resources leads Russia's influence in and significance to Europe to increase as a result of its ability to exert direct leverage through its extensive holdings of oil and natural gas resources. Russia also seeks to exclude US and Western influence in its near abroad. Russia becomes a strategic competitor in Asia.

Iran rises to a nuclear-capable regional power in the Middle East and acts more assertively. Iran is able to use its energy relationships with external powers, such as Russia and China, to increase its influence and obtain modern weapon and missile systems. The Gulf Arab states also seek to modernize their military systems in response to Iran's growing power leading to an arms race in the Middle East. Israel perceives its position as becoming more vulnerable in reaction to these events and to the increasingly unfavorable demographic balance within Israel.

India's rise leads to growing regional influence in the region. Tensions with Pakistan remain high out of concern over potential state failure there. Occasional crises between the two states

continue to foster concerns over the potential for a conflict in South Asia to escalate to a nuclear exchange.

Strategic competition also occurs in Latin American as states pursue relationships to preserve their access to energy resources. Some states, such as China, are willing to forge alliances with energy-rich but authoritarian regimes in Latin America and elsewhere where the United States and other powers have shunned relationships because of human rights abuses.

The US security focus is primarily on contending with the strategic competition posed by China, Iran, and Russia and a new post Cold War balance of power emerges. The United States is seen as primary security provider by many states seeking to offset the rising power of China and Iran. As a result, in 2025 the United States remains committed to maintaining security in East Asia and the Middle East. The shifting of US security interests toward Asia, though, threatens to decouple US strategic actions from those of European powers whose interests become increasingly focused on domestic stability.

Economic Growth & Reversal of Current Income Inequality Trends: Coinciding Strategic Orbits

Imagine that ... China maintains a pragmatic approach to international relations, guided primarily by a desire to sustain its economic growth. Greater economic integration leads to a China-Taiwan rapprochement. Regime change in North Korea and successful implementation of Six Party Talks agreements leads to increased North-South economic and political integration. Sino-Japanese relations also evolve peacefully, and Japan remains a key investor in the region. The regional economy becomes more prosperous and integrated globally. Regional multilateralism leads to the establishment of cooperative East Asian security mechanisms.

Russia is primarily focused on coping with its own internal problems rather than playing a spoiler role in international relations. By 2025, Russia has evolved into a key strategic partner with Europe through its continued energy ties. The EU coalesces into a 27-state power that is an important political force in international relations.

Regime changes in the Middle East lead to greater political openness. Foreign investment in the region fosters job creation that compensates for the region's growing youth population. Political transition in Iran leads to greater political openness there as well, and Iran seeks greater integration in the region. The Middle East peace process is advanced through a new Israel-Syria peace agreement that Syria views as a critical step toward further economic development through increased openness and investment from the West. Greater global cooperation on countering terrorism and increased regional integration and prosperity in the Middle East result in a decline in transnational terrorism.

India uses its economic and political influence to play a positive role in the Middle East. The India-Pakistan relationship remains stable, and India and China find common areas for cooperation on energy security and in emerging markets.

Favorable demographic trends in Latin America lead to increased economic prosperity there. Governments in Latin America invest in health, education, and job creation, which results in economic gains that improve the quality of life for much of the population.

Growing concerns about climate change leads to a global consensus to deal with environmental issues. For example, there are international agreements on providing “clean coal” technologies to India and China to lower their carbon emissions. New energy technologies help to mitigate concerns about dwindling fossil fuel resources. There is also new international cooperation in providing “proliferation safe” nuclear energy to meet the energy needs of developing countries.

The traditional US role as security provider in East Asia is replaced by regional security mechanisms. In addition, greater regional integration in the Middle East and reduced competition for oil resources transforms the US security role in that region as well. The US security role in 2025 therefore transitions to that of an “out of area” security provider and a partner with other powers in protecting the “global commons”.

Internally Oriented PRC & Destabilized Middle East: Coexisting Strategic Orbits

Imagine that ... China’s economic rise stumbles leading to internal political reforms and a slowdown in its military modernization efforts. China continues to work with partners such as Russia to push for increasing multipolarity in international affairs and to constrain U.S. power. However, China is seen as less of a military threat in the region than had been feared because of its limited power projection capabilities. Aging Japan shifts its priorities toward social spending and away from defense.

Russia continues to exert influence over the regions in its periphery that were once part of the Soviet empire. It also seeks to maintain its leverage on Europe through extensive energy ties. Europe itself is focused on its own internal stability as it tries to assimilate its growing Muslim populations. Income and political inequalities have led to a backlash by angry youth in several European countries, creating increased concerns over social instability and terrorism.

India is mired in domestic political turmoil and preoccupied by its relations with its neighbors. India faces instability arising out of dramatic internal income inequality, environmental challenges, and rising energy demands. Interactions with Pakistan and Bangladesh remain tense.

Middle East security becomes internationalized as states in the region seek security and economic relationships with external powers such as the United States, Europe, Russia, China, and India. Growing foreign involvement in the region fosters continued push-back from extremists, leading to new terrorist attacks both within and outside the region. In addition, states in the region continue to deal inadequately with their growing youth populations, leading to rising unemployment, economic stress, and resentment, further radicalizing the youth. Terrorist and radical groups become highly networked and dispersed geographically. In addition, advances in biotechnology create new concerns over the threat of a biological terrorist attack, heightening a sense of insecurity within potential target societies. State-backed proxies armed with advanced weapons supplied by their sponsors remain a constant threat to security in the region.

Traditional institutions are challenged to deal with the myriad of problems facing the world of 2025. As a result, there is only mixed progress on issues such as climate change, resource competition, income inequalities, proliferation, and terrorism. There is a growing divide between North and South in economic prosperity. Many of the security challenges arise from failed or failing states, intrastate conflicts, and humanitarian crises. The challenge that many states confront in maintaining a modern military creates increased reliance on long-range missiles and WMD. These missiles and WMD are integrated into doctrine as tools for deterrence and as a means to force a halt to hostilities by threatening to escalate and impose untenable costs on an adversary. As a result, a key security challenge in 2025 is containing the escalation or expansion of future crises.

In this world U.S. capabilities are called upon to address many security issues. However, the United States finds that it is often a necessary but not sufficient power in dealing with these problems. As a result, security challenges are most often addressed through ad-hoc international coalitions and institutions.

AGENDA

2025 Agenda

0800: **Introduction: Workshop Goals and Methodology**

0815: **Strategic Trends and Discontinuities**

- **Demographics and Societal Issues:** What are the demographic and social trends that will affect the security environment in 2025?

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- **Diffusing and Emerging Technologies:** How is technology diffusing and proliferating in ways that will affect the 2025 security environment, and what new technologies may come on line?

1000-1015 -- BREAK --

1015

- **Economic Issues:** What are the economic trends and resource issues that will affect the 2025 security environment?
- **Other Trends Relevant to the 2025 Security Environment:** What trends that do not fit into the above categories are likely to affect the 2025 security environment?
- **Potential Discontinuities**

1200-1245 -- LUNCH --

1245: **Identification of Key Drivers, Trends, and Potential Discontinuities**

Construction of Scenarios

1315-1400

- Scenario One

1400-1445

- Scenario Two

1445-1500 -- BREAK --

1500-1545

- Scenario Three

1545: **Emergent Issues** (from the scenarios)

- Common Requirements
- Difficult Trade-offs

1615: **Wrap-Up**

- Future Military Research Questions

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APPENDIX B

POST-WORKSHOP THOUGHTS

The following points (1 through 6) were submitted to Long Term Strategy Group by a workshop participant following the workshop. The participant, a professor at Princeton University, provided some expanded thoughts on several of the workshops key points of contention.

1. Purchasing Power Parity (PPP) versus currency conversion exchange rates: How to think about the relationship between Chinese economic and international power

The issue of which exchange rate is appropriate can be answered in different ways. The most narrow question is what military power China can afford and what financial heft it commands internationally. It seems to me that PPP captures some of the former since soldiers and buildings are purchased domestically and are cheaper than currency conversion rates would suggest. The costs of imported weaponry are clearly better captured by the exchange rate conversions, but China is producing more of its weaponry domestically, and purchasing less abroad, so PPP may be increasingly significant on this dimension. Financial heft in the outside world is clearly related to what China can buy in foreign markets, and so is captured by currency conversion rates.

So neither number is sufficient but both capture some portion of the truth.

The question of whether the PPP computations of economist Robert Fogel's projections that show China outpacing the rest of the world in economic growth are meaningless is complicated. My own feeling was that nominal GDP growth rates could look even more rapid due to currency appreciation (which another participant did factor into his analysis) but of course they reduce the baseline amount today.

2. Middle East balance after a hypothesized U.S. withdrawal

One key question could be what happens to the oil rents in the Gulf after the United States withdraws. Would a major regional actor (Iran, Iraq, or both) feel tempted to grab oil producing territory or oil revenue from the GCC countries? What would happen to Iraq - would it fragment with a Shia-Sunni frontier dividing it?

In a benign scenario the oil states would cooperate to maintain their cash flows. In a malign scenario Iraq might unravel and a Shia-Sunni balance could emerge with Israel and Turkey aligned with the Sunni states. I am impressed by the argument made by Bernard Haykel that Saudi Arabia is more stable than it looks. As a result, it could be the case that the Saudis, with either explicit support from Turkey and/or with implicit (air) support from Israel, could hold off the Iranians, especially if the Iranians remain a non-nuclear power. Another option for the Saudis would be a Pakistani-Chinese umbrella, perhaps strengthened by a transfer of nuclear weapons - if the Iranians have already gone nuclear. Under those circumstances it would also be reasonable

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to expect the Chinese to move some naval forces to Gwadar and perhaps some troops into Pakistan.

As of now the Turks seem reluctant to go back into the Middle East but if the U.S. leaves the temptation will surely reassert itself.

3. Biotech

I think that it is fairly safe to claim that biotech will not revolutionize the strategic scenario in the time frame up to 2025. It is a mere 17 years away and the revolutionary potential of tinkering with human biology will not take a little while to debug. Drugs, yes, but even those take a little while to develop. This is very different from saying that revolutionary developments in biotech will take place over the next 17 years - surely. By contrast Moore's law is a statement about observed mass-market trends in IT. It seems highly likely to me that man plus much smarter machines are much more likely to have an impact than much smarter men. As for nanotech - I have yet to see a killer app but more a steady accumulation of techniques for working at the nano-scale. However, to the extent that this is inanimate stuff, the potential for rapid use is much greater. Still I'm not sure how it will affect international military competitions.

4. Globalization

The outsourcing of personal services overseas along with elite cosmopolitanism will have important consequences. If the person who prepares your income taxes sits in India you are a cosmopolitan. The same is true if you are consulting for an Indian firm. In short, globalization can excite fear in the U.S., it also has the potential to expand personal globalization beyond the narrow elite that engages in it now.

5. Iran

While Iranian oil production has stopped dropping, the Iranian NOC will remain inefficient for political reasons. Also, thanks to their large population, they really cannot support a welfare state on rents alone. It is also possible that a drop in the price of oil, in five or ten years from now, could precipitate an economic crisis in Iran and thus force a substantial opening up of their economic system. As they already have a limited competitive system, such an opening could be accomplished without blood flowing in the streets. While this might produce benefits in the long term, there would be an intermediate period preceding it which is very hard to predict, and about which it is easy to be pessimistic. The current Iranian leadership will probably not change course as they feel things are going their way. If they miscalculate and provoke a war then all bets are off.

6. U.S. inequality levels

Even with U.S. trends held constant, I think we have to worry about income inequality in the U.S. Apparently, and plausibly (as argued by Harvard economists Katz and Goldin), this stems from a failure to improve educational levels in the U.S. If that continues for another 17 years the associated political polarization may prove to be an even more substantial handicap to the conduct of U.S. policy abroad and a challenge to tranquility at home.

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THE SECURITY ENVIRONMENT OF 2025: WORKSHOP REPORT

**LONG TERM STRATEGY GROUP
JACQUELINE NEWMYER AND STEPHEN ROSEN**

The views, opinions and/or findings contained in this report are those of the author(s), and should not be construed as official National Intelligence Council position, policy or decision.

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EXECUTIVE SUMMARY

This is a report on a workshop convened by Long Term Strategy Group at the office of CENTRA Technology in Arlington, Virginia, on Thursday, 13 March, 2008, at the behest of the National Intelligence Council's Long Range Analysis Unit. The purpose of the workshop was to assemble a group of technical and regional subject-matter experts to assess potential components of the security environment in 2025. The report captures the key findings and uncertainties identified in the course of the workshop. The three scenarios, a baseline and two excursions, generated by the workshop will serve as the basis for two subsequent workshops that further the efforts of the convening and sponsoring organizations' analysis. All three workshops are designed to serve the NIC – Long Range Analysis Unit's 2025 project. Participants were given a brief paper examining key trends and drivers prior to the workshop. Both this read-ahead paper and the workshop agenda can be found in Appendix A of this report.

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WORKSHOP REPORT

INTRODUCTION: GOALS AND METHODOLOGY

The objective of this workshop was to set out and discuss the global trends that are likely to provide the structure within which the United States and other actors will operate in the year 2025. During the course of the workshop, those trends were combined in different ways to create a set of scenarios on which two subsequent workshops, one on the future character of war in general, and one on the future character of regional military interaction in Asia and the Middle East, will be based.

The world that would result from a straight-line continuation of currently observable trends can be referred to as a “surprise-free projection,” following Herman Kahn, or simply as a baseline projection. Because trends of major interest could deviate in the future from patterns recently displayed, attention at the workshop was also devoted to scenarios based on excursions from the currently observable trends. The causes of possible deviations, in turn, were specified such that divergences from, or discontinuities in, current trends might be better detected when they are in their early stages. These deviations or discontinuities inspired the alternative or excursion scenarios that were generated at the workshop.

At the end, the goal was to have a set of trends, and their possible discontinuities, synthetically combined into a baseline projection and alternative scenarios, in ways that made explicit our assumptions about what we thought would shape the future, what we thought could lead to deviations from that expected world, and the general character of the worlds within which the United States might operate, and for which it could be preparing. Agreements and disagreements among participants in the workshop about the important trends and the possible discontinuities were made visible, such that subsequent efforts could evaluate, update, and improve upon the judgments made about trends, discontinuities, and projections made at this workshop.

The alternative to this process would be to eschew efforts to anticipate the longer-term future, and to analyze events as they occur. While this would avoid the uncertainties associated with efforts to understand the broad character of the future environment, it could prevent the provision of adequate guidance to policy makers. For instance, incremental analysis of ongoing events might not alert policy makers to the longer-term consequences of steady trends while the policy makers still had time to take low-cost actions to respond to the problem (the problem of global warming or of the frog in the beaker of water that is gradually heated). An ad hoc approach would also not be helpful in the face of discontinuities such that incremental analysis and policy responses were functional up to the moment of the discontinuity, but added to the forces that led to the discontinuity and were dysfunctional after the discontinuity (the problem of financial markets in the run up to and aftermath of financial bubbles, for example).

TRENDS

DEMOGRAPHY

There is general agreement that demographic trends are among the most reliably forecast-able trends in the 17-year timeframe relevant to the workshop. For example, essentially all men of military age in 2025 have already been born. With some relatively weak assumptions, projections of the population size of military cohorts can be made.

The discussion at the workshop was initiated by a briefing that highlighted several major demographic trends. Key findings included the growth in the urban population relative to the rural population in China – an increase in the urban population from 27% of the total population in 1990 to 36% in 2000 to 44% today, with an urban population expected to reach 70% by 2025. In addition, the one family-one child policy has produced an unusual population distribution in China, with a larger population born before the policy followed by a smaller population born after. This will increase the dependency ratio in China that is expected to peak in 2015, at a level about 30% higher than it was in 1900. As the older population increases, demands for social security in a China with a relatively weaker network of extended families might be an issue. However, the view was expressed that this cohort in China has low expectations of help from the government, boasts high savings rates, and still lives in areas in which communal support is provided to them. The excess of men in China was also discussed. While a sex ratio imbalance clearly exists, it is imbedded in a China in which general patterns of family life are rapidly changing, with increased numbers of women working, increasing divorce rates and premarital sex. How much of this is caused by gender imbalances is difficult to determine. However, the rapid change in marriage and family practices does suggest that the role of families in maintaining social support and cohesion could change.

A less noticed but perhaps more important cohort, the membership of the Chinese Communist Party, has increased at a rate far higher than general population growth, from 50 million to 70 million in the period 1976-2007. This reflects broader recruitment, to be sure, but raises the issue of whether more Party members means a larger share of GDP going to the Party, formally and informally. The Party's expansion would in that case have implications for China's economic productivity and the efficiency of state expenditures.

This briefing led to a discussion of political dynamics and generational effects within the Chinese Communist Party. A question was raised about whether the large number of cadres born before the change in population policies, cadres who tend to stay in office for long periods of time, might create a Brezhnev era-like gerontocracy in China that will be slow to accept change. Other cohort effects in China were also discussed, such as the impact of the passing of the generation of people who lived through the Cultural Revolution or whose parents lived through it. If those cohorts prized social stability above all else, as many suggest, what will be the effect of their transition out of leadership positions?

The discussion then shifted to a discussion of demographics in the Middle East and the Islamic world. Looking first at the Islamic world, it was noted that between 1900 and today, the share of the world population that is Islamic rose from 9 to 23 percent. Of the roughly one billion young

men of military age expected in 2020, 300 million of them will be Muslim, compared with 90 million North Americans and Europeans. The main observation about the Middle East was the large number of young males (15-29) and boys (younger than 15) relative to males over 30 in Iraq, Afghanistan, and the West Bank and Gaza. If, as widely believed, this ratio, in connection with low rates of job formation, will be associated with higher levels of both social instability and entry into radical organizations, even in the absence of new political or religious ideologies those countries will be difficult to govern. Iran, in contrast, has moved toward birth rates slightly below replacement levels, and could be approaching population stability by 2025 and a maturing, middle-class society.

TECHNOLOGY DIFFUSION AND INNOVATION

The diffusion of technology, while not as predictable as demography, similarly involves the movement of phenomena that are already observable – age cohorts in the case of demography, existing technology in the case of diffusion. Technological innovation is harder to predict, since it involves things that do not exist, but innovations have, in important cases like Moore’s Law, followed regular patterns.

In the case of technological diffusion, the most important trend is the mass production of engineering students globally, which will make it possible for people all over the world to reproduce technology developed anywhere else in the world. The implication is that the technological advantage of advanced societies will be reduced, and the advantage of states over non-state actors will diminish. In addition, the availability of more sophisticated weapons that do not require large logistics support systems will also diminish the military technological edge of advanced states over other states, and of states over non-state actors. This is visible already in the case of man portable air defenses, anti-ship cruise missiles, military targeting data, and cyber warfare.

In the case of biotechnology, the movement of the biological sciences out of academic and research labs into production for mass distribution—the commoditization of biotechnology—will accelerate the rate at which useful biotech is broadly available, and will reduce costs of entry into this field. The areas in which this may affect international politics involve the increased healthy life span of humans and increased agricultural productivity. It may also increase the availability of bio-weapons for mass attacks by sub-state actors, but it is not clear how this will offer increases in military effectiveness over existing pathogens, anthrax in particular. This may be an example of a more general phenomenon in which technological advances past a certain threshold do not yield sharply increasing military or political advances. Nuclear weapons could be seen as part of this phenomenon.

The prospects for biotechnological improvements of human military performance through means other than pharmacology are harder to predict and not likely to be of material importance in the timeframe of relevance to this study. Man-machine interfaces using nano-technology for improved prosthetics and prosthetic-like extensions of human action are already in development, however.

ECONOMIC TRENDS

In the timeframe of this study, the economic rise of China, India, and certain countries of Southeast Asia; the relative decline of Japan and Europe; and the steady position of the United States – all in terms of shares of world GDP – appears to be the main message in the area of economic trends. While there will continue to be considerable expert debate about the rate of Chinese economic growth in the past, and about appropriate methods for comparing the size of the Chinese economy to the American economy going forward, there is no doubt that Chinese economic growth since the 1980s has been impressive – comparable in rate, though not scale, to the economic growth of the Republic of Korea and Japan. Chinese economic growth rates, however, are driven by the movement of workers from low-productivity agricultural jobs into higher productivity industrial jobs, both in urban and rural areas, and can be sustained for longer than was the case for Japan because of the large remaining rural populations. There is debate about the extent to which problems in China that are the result of changing demographics, corruption, inefficient state owned enterprises, and the role of CCP members in the direction of private companies will reduce Chinese growth rates in the future, but the working assumption is that, absent discontinuities, Chinese economic growth will continue at lower rates.

An important question is the relative growth of India and China. Indian GDP growth rates have increased, but the dominant question in India is whether the weaknesses in Indian rural primary school education, labor laws that restrict mobility out of less productive sectors, and Indian infrastructure can be changed in time to have a positive impact on Indian GDP growth rates in the timeframe relevant to this study. One view is that the Indian government must change its policies in order to facilitate higher rates of growth, and that this will be politically difficult and slow, given the high voter participation rates of poor Indians. The opposing view is that the necessary changes, in education and infrastructure, can be and are being addressed by the Indian private sector, without waiting for the Indian government to act. Sustained, higher rates of economic growth is emerging as an electoral issue. If incumbents are increasingly punished for not delivering higher rates of economic growth, political constraints on Indian economic growth could be rapidly reduced. Indian demographics are more favorable than in China. The disagreement on the issue of what the comparative rates of growth of India and China will be appears to range from the view that China will continue to grow at a rate that is one percent higher than that of India, on the one hand, to the view that India will catch up to Chinese growth rates, and perhaps overtake China if the Chinese economy stumbles for reasons that do not also retard Indian economic growth.

TRENDS IN CONVENTIONAL MILITARY CAPABILITIES AND TERRORISM

The most striking observation in this area was that only a small number of Islamic terrorist groups have been able to survive for more than 20 years. Al Qaeda and Hizballah have survived for 20 to 25 years. This give them opportunities that are new for terrorist organizations, including the ability to learn as organizations from experience, to put into place training programs that have long-term benefits, to adapt to counter-terrorist strategies, and to develop a worldwide information presence. The “brand name” recognition and communication skills of al Qaeda have increased such that it is no longer dependent on other media for its information warfare strategies. This increased organizational capacity suggests that such groups will be better able to acquire and

use an increasing range of technologies, including unconventional weapons technologies, specifically biological and chemical weapons. The emergence of terrorist organizations with long life spans is very recent. Their prior absence may be part of the explanation for why terrorist organizations have not used unconventional technologies to date, since developing these weapons and the skills to use them might take more time than training hijackers or building bombs. If so, the use of unconventional weapons may be expected in the near future.

SYNTHESIS: BASELINE SCENARIO AND EXCURSIONS

BASELINE SCENARIO

The review of the discussion of trends identified the following drivers that were judged to be of most importance:

Demographics

- Islamic, African youth bulge
- Rapid urbanization, social dislocation in China, India, other developing countries
- Aging in China, Japan, Western Europe: senescence, immigration
- American demographic exceptionalism

Technology Diffusion and Innovation

- Mobility through the internet and the movement of people of knowledge, information, misinformation
- Technology enables the formation of new communities
- Difficulty of differentiating between hostile and friendly
- New biotech Moore's Law?
- Commercial incentives for alternative energy

Economic Trends

- Continued economic growth in Asia; relative decline of Russia, Europe, Japan
- Extension of sustained economic growth worldwide
- Increasing intrastate levels of income inequality

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- Globalization of illicit economic activities
- Global shift in skilled labor away from government services
- Increased demand vs. increased productivity in the agriculture sector
- Possible shift away from the dollar as a global currency

Military Trends

- Increased capability and longevity of non-state actors
- Increased missile capabilities
- Increased capabilities of unmanned aerial vehicles
- Increased availability and capability of ISR
- Gradual proliferation, latent or overt, (3-7 new states) of nuclear weapons
- Declining incidence of conventional interstate war

Other Trends

- Global climate change
- Environmental degradation
- Resurgence of activist religions
- Growing cosmopolitanism among elites worldwide

Proceeding from this, a picture of the environment in 2025 was generated. This picture is our baseline scenario, what we expect the world to look like if commonly held views of key trends and their impact do shape the world as it emerges over the next 17 years.

The baseline scenario is in some ways markedly benign. The world produced by observable economic trends is a world of continued rapid economic growth in China and India, and modest relative declines in American economic capacity, and larger declines in the cases of Japan and Europe. This is a world of increased prosperity and continued peace among industrialized and industrializing states, without which the projected rates of economic growth would be less likely to continue. It is important to note, also, that this projection holds only if the increasing demand for resources of growing economies is met by the operation of global markets. It also implicitly assumes continued social and political stability in China and India that permits their continued economic growth. And it is a world that is unperturbed by a violation of the nuclear taboo.

The first-order observation emerging from the baseline scenario is that the United States and the traditional military allies of the United States will have relatively less economic influence and military power. Nuclear proliferation may increase the number of nuclear armed states, and will lead to new alignments, weapons, and hedging strategies in the neighborhoods of these new nuclear powers. These new alignments, armaments, and strategies will emerge outside the context of existing United States alliances.

The second first-order observation emerges from the part of the world that does not share in the economic growth generated by industrialization, from the demographics of the Middle East, and from the diffusion of military technology and organizational capacity. Non-state actors will be able to recruit from growing numbers of unemployed young men in Iraq, Afghanistan, and the West Bank and Gaza. Their growing information warfare capabilities will increase their influence outside these populations. The diffusion of trained engineers and the commoditization of more weapons will combine with the increased manpower available to these actors to generate more lethal capabilities. This may lead to greater non-state challenges to states from a small set of non-state actors. If so, this would mark a continuation of a recent trend to fewer acts of terrorism, but more lethal ones. It may also mark the emergence of new states, as non-state actors acquire the capabilities formerly associated only with states, and take on and take over states such as Lebanon, parts of Iraq, and Afghanistan.

SCENARIO TWO: THE US WITHDRAWS FROM THE MIDDLE EAST

But the world may not proceed in ways consistent with the continuation of the dominant trends in the baseline scenario. In many ways, the baseline scenario assumes a Middle East no more unstable than it is now, with continued flows of oil from that region, albeit at higher prices, and the maintenance of the current state system in that region. One major discontinuity could be the military withdrawal of the United States from Iraq and the Persian Gulf and its littoral. Tired of war, the United States could decide not to provide a global common good—Middle East stability—on which many projections are based. In this context, the economic decline and demographic problems of Europe and Japan would appear to preclude them from stepping in to take up existing American responsibilities in that region.

For the first time in 500 years or more, local Arab and Persian speaking states might pursue their own agendas absent great power influence. In that environment, Iran would appear to benefit by becoming the predominant power in the Persian Gulf. A balance might emerge between Iran, on the one hand, and the stronger Sunni powers on the other. But a stable balance might not emerge. Iran could be stronger than Sunni states challenged by internal demographic problems and long histories of weak states. Without British or American support, the Saudi monarchy might not be able to retain power. If so, great powers might continue to seek relationships in the region to challenge Iranian predominance. Other states external to the region, such as China, might ally with Iran.

In this world, therefore, we might see intense competition internal to the region that could produce a stable balance, or prolonged conflict within the region. If the latter, opportunities and incentives for external great powers to compete for influence would exist, possibly in an environment in which some local states have nuclear weapons.

What would be the implications for the rest of the world? If stability rapidly emerges, the shape of global politics outside the region might proceed along the lines laid out in the baseline scenario. If conflict within the region led to prolonged interruptions of oil supplies and possible nuclear weapons use, the external environment would be shaped by those shocks.

ADDITIONAL COMMENTS FROM LTSG

As discussed at the workshop, the retreat of the US from the Middle East would likely result in the short to medium term in a period of competition for influence involving states internal to the region and also external great powers, from Europe and Russia to China and India. This process might involve interstate competition or even warfare. Depending on the progress of the Iranian nuclear program by the point of the US retrenchment, and depending on the level of ambition of Israel efforts to re-assert stability in the wake of the US's departure, conflicts in this environment could feature sabotage efforts directed at, or conventional missile attacks on, local nuclear arsenals.

It may be possible to speculate about comparative advantages that certain regional powers might bring to bear in competitive interactions following a contraction in American influence in the Middle East. In terms of military-age men, as mentioned above Israel's demographic picture looks bleak relative to that of neighboring Arab populations in Gaza and the West Bank, which could produce legions of insurgents. At the same time, relative to a new nuclear state such as Iran, Israel may have a comparative advantage in establishing safeguards, concealing nuclear-related assets, and building up conventional defenses. By contrast, Iran has a history of sponsoring terrorist activities by third-party organizations and proxy groups such as Hizballah. Hizballah's increasing engagement in the Lebanese political system may afford it access to the state resources of Lebanon. The workshop group did not speculate about how this would affect Hizballah's relations with Tehran, but it is worth considering whether Hizballah is likely to be more or less responsive to Iranian prodding if its authority in Lebanon continues to grow.

SCENARIO THREE: A MORE ACTIVIST CHINA FACES INDIA AND RUSSIA

Just as American policies might shift in a major way, so might Chinese policies, either in response to the developments described in Scenario Two, or for other reasons having less to do with American choices. If continued growth in Chinese prosperity is threatened by events in the Middle East, such that the operation of the market does not provide it with adequate supplies of oil, China might take action to ensure those supplies. Or the growing economic power of India might lead existing tensions between India and China over border areas, Pakistan, Tibet, and western Burma to escalate to war, as India feels less constrained, and China feels more challenged. If shortages of oil that can be accessed through the market place are combined with shortages of water and arable land, China might have recourse to wars of territorial conquest. Such wars have largely disappeared, because the advent of industrialization reduced the value of land relative to the value of productive workers. Resources can be extracted from land, but productivity cannot be easily extracted from conquered workers. But in a world in which physical resources—oil, water, and arable land—are scarce and can be conquered, and there are large power imbalances, wars for territory may re-emerge, perhaps on the periphery of China. In

this world, China may have hostile relations with Russia and India. The United States may, in that case, have renewed or revived military relations with India and Russia and the countries of offshore Asia, the Philippines and Japan.

ADDITIONAL COMMENTS FROM LTSG

The rapid economic rise of China, accompanied by equally rapid military modernization, makes it necessary to consider a more militarily assertive China – as was done in Scenario Three. However, many of the Chinese demographic, political, economic, and socio-cultural trends mentioned at the outset – rapid urbanization, weaknesses in the provision of social welfare, the disruption of traditional Chinese family life, increasing income disparities, and the rise of a growing migrant class – render it necessary to consider the possibility of a discontinuity that would unleash discontent and expose the fragility of the current Chinese regime. This prospect suggests a third excursion from the baseline scenario.

Scenario Four: Chinese Internal Instability

The potential exists for a global economic slowdown that could spread to China. It is also possible that China could suffer a defeat in a military campaign associated with a drive for strategic resources. Such a development could create conditions for unrest within China if the Communist Party had lost stature due to corruption, geriatric leadership, or overexpansion. The Chinese population has a long history of rising up in revolt under ineffective rule. At the same time, Chinese authorities have traditionally suspected that hostile foreign forces would exploit their internal problems. These facts could lead to a situation where there is instability in China and an associated humanitarian crisis. Foreign powers like the United States would have to make difficult choices about how and whether to respond. Taiwan could seize the occasion to declare independence; Tibetans and/or Uyghurs in western China might assert autonomy claims with support from sympathizers in India and Central Asia, respectively. A problem within China could therefore be internationalized.

A final consideration is that the initial baseline scenario and the three excursions explored in this report should not necessarily be thought of as independent worlds. It is conceivable that they could occur in parallel or in succession, as, for instance, insurgent activity in the Middle East may provoke the United States to abandon its traditional role there, giving rise to ferment in the region and raising the price of oil to the point where Beijing perceives a need to militarize its energy policy. A Chinese military adventure in pursuit of strategic resources could fail, or a troubled Middle East and high oil prices might depress the world economy enough to slow or stop Chinese growth, leading to unrest in the PRC with the consequences explored in the fourth scenario.

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APPENDIX A

READ-AHEAD PAPER

In preparation for the discussion to be held at the workshop, this paper briefly examines some of the key trends or drivers that might be considered in assessing the security environment of 2025. The broad trend areas are followed by a survey of current security concerns that may endure. Finally, we have included a discussion of three sample potential future worlds – prototypes derived from a preliminary inductive analysis of how current trends and their interaction could produce alternative security environments. The purpose of this material is to facilitate discussion about the range of potential drivers and outcomes that we might see in the future. It is not meant to be limiting or prescriptive.

This workshop aims to identify the potential security challenges that will characterize the world of 2025. It will examine how current trends and potential discontinuities might interact to create alternative future security environments.

Key issues to be addressed by the workshop are:

- What trends and drivers (political, military, demographic, technological, economic, environmental) are most likely to shape the character of the future security environment?
- What will be the most important differences between today’s security environment and that of 2025?
- What are the potential sources of future conflicts?
- What are potential “wild card” developments or points of discontinuity that could have a significant impact on the trends characterizing the future security environment?

Trends That May Shape the Future Security Environment

Geopolitical shifts, new military capabilities and technologies, availability of natural resources, and demographic changes are among the key trends impacting the character of the security environment in 2025. Such trends could combine in different ways to create both new challenges and new opportunities for security interests around the world. While point predictions about the future security environment are unwise, the broad contours of that environment may be visible and the product of current trends. In other cases, it is important to identify disputes about the

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direction and character of current trends to guide future research and analysis. Historically, demographic, economic, and some technology trends have been relatively stable. Accordingly, these trends should serve as the initial point of entry into our discussion of the future security environment. Examination of the trends, and speculation about their likely interaction, will facilitate fresh thinking about the alternative worlds that could emerge by 2025. In descending order of predictability...

Demographics

- Birth rates (e.g., differential b/w Sunni and Shia in Middle East; Japanese and West European senescence barring major immigration; China getting old before getting rich?)
- Urbanization (huge social-cultural impact, effects on family structure and implications for political stability, degree and content of nationalism poorly understood, impact on resources and the potential for failed cities in states that can not cope with increasing demands)
- Religiosity rising among newly urbanized populations (e.g. in China) and within populations destabilized by globalization (e.g. in the Middle East)
- European senescence, in part attributable to downstream effects of urbanization and prosperity, associated with declining levels of patriotism – and the rise of a cosmopolitan elite

Diffusion of technology

- The special case of nuclear weapons technology
- Information-based military technologies
 - ISR
 - C³
 - Use of space platforms
- Technologies for internal security

Economics

- The intra-Asian economic balance of power: continued Indian and Chinese growth, Japanese decline
- The continued stagnation of Europe
- Russian economic growth driven by high energy prices
- Rising levels of internal inequality – Gini coefficients – in China and elsewhere

Technological innovation

- The biological sciences: growing understanding of the fundamentals of human biology
 - Cognition
 - Military performance, stamina
 - Increased useful life span
- Micro-satellites: declining costs of putting units of functional capability into orbit due to

declining weights, miniaturization

- Increased potential for reconstitution, maneuver, and survivability of space platforms

Current Military-Security Challenges

Current military-security challenges that may deserve consideration for the 2025 time frame include:

- **Defense of territorial sovereignty**, including from hostile state powers, terrorism, insurgents and separatists, and illegal immigration
- **Dealing with implications of failed or failing states**, including humanitarian crises
- **Failing energy or nuclear states**. A special class of failed or failing states that currently confronts us is states that are armed with nuclear weapons and/or sources of the world's energy production and export capacities (e.g., Pakistan, Iraq).¹ Failure of such states may prompt a military intervention to restore stability or to prevent nuclear weapons from falling into the hands of terrorists and extremists. In some cases, multiple states may seek to intervene in the situation. A collapse in North Korea, for example, may impel United States, South Korean, and Chinese forces to intervene to secure the North's nuclear arsenal and restore order. Failure for such states to cooperate in these instances could lead to a broadening of the crisis.
- **Proliferation of long-range precision strike missiles**. More states are acquiring long-range ballistic and cruise missile systems. Continuing improvements in sensor technologies, satellite navigation, and computer processing are increasing the precision of such weapons. The result is an increasing capability for states to threaten critical infrastructures within their region with missile strikes. Such missiles represent a significant increase in the threat to regional stability compared to the relatively imprecise Scud missiles that Iraq launched in the first Gulf War. This could lead to changing escalation dynamics in future conflicts as well as create new incentives for missile defenses. Tactical and short-range precision missile systems can also be passed by states to non-state terrorist groups or proxies to strike the forces, infrastructures, and population centers of adversaries.
- **Emerging anti-access/area denial strategies and capabilities**. Adversaries are

¹ *Joint Operating Environment – Trends and Challenges for the Future Joint Force Through 2030*; US Department of Defense; December 2007

increasingly attempting to limit, meter, or disrupt the access of opposing military forces to the local area of conflict.² Anti-access strategies are likely to integrate a set of military capabilities with political approaches designed to limit the ability of opposing forces to project power into the region and to build, maintain, and communicate with forces already present. Advances in long-range precision weapons and over-the-horizon targeting capabilities are enhancing some states' capabilities to target moving naval vessels at sea. In addition, developments in submarines, antiship weapons, naval mines, and underwater robotic vehicles are creating new capabilities for adversaries to target shipping in key transit areas necessary for naval force projection. Advances in long-range land attack weaponry, such as ballistic and cruise missiles, may also increase the threats to areas needed for force deployments such as ports, airfields, bases, and railways. Such anti-access capabilities may create new "tripwires" for escalation, as an opposing force in conflict is unlikely to wait for adversaries to position themselves in a region before striking. In addition, emerging anti-access capabilities could be used by hostile states or terrorist groups to threaten critical maritime "choke-points" necessary for transit of energy supplies such as the transit of oil tankers through the Strait of Hormuz.

- **A revolution in irregular warfare.** Irregular warfare tactics are being adopted by both states and non-state forces as a primary warfighting approach in countering advanced militaries. Recent Middle East conflicts—especially in Iraq and Lebanon—have featured irregular warfare tactics against superior conventional forces and probably have added to the strategy's appeal among a range of potential adversaries, including state forces, private militia groups, and warlords. The spread of advanced light weaponry and communication technologies is enhancing irregular warfare capabilities, potentially revolutionizing the threat posed by adversaries engaging in such conflicts. Of particular concern are developments in and the proliferation of improved anti-tank guided missiles and other man-portable weapon systems, advanced low altitude air defense systems, thermobaric and other advanced explosives, increased use of unmanned aerial vehicles, the spread of cheap sensors and robotics that could be used for future IEDs, ubiquitous wireless sensor and communication networks, and precision, indirect fire weapons.³ As the United States and its military allies continue to adapt to foreign irregular warfare strategies, future adversaries might feel compelled to introduce new capabilities, such as biological or chemical attacks, to increase the level of casualties and disrupt US and allied military operations.

² Joint Operating Environment – Trends and Challenges for the Future Joint Force Through 2030; US Department of Defense; December 2007

³ *Joint Operating Environment – Trends and Challenges for the Future Joint Force Through 2030*; US Department of Defense; December 2007

Suggestive Emerging Military-Security Challenges

In addition to the above current military-security challenges, new challenges might emerge between now and 2025 that will have a significant impact on the character of the future security environment. These challenges are likely to include:

- **An increasingly multipolar world.** Continued economic growth in China and India will likely translate into increased international political influence, power, and possible overseas commitments. How this increased power and influence are employed by these countries to advance their strategic interests, as well as the extent to which the rest of the world accommodates these rising powers, will have a profound influence on the character of the future security environment. In particular, China's approach to governance—a combination of state-led capitalism and foreign policies that profess the importance of state sovereignty and non-interference with other states' domestic affairs—might find growing appeal. The rise of Iran as a regional power in the Middle East also would portend a shift in the current balance of power in the region. A revitalized Russia leveraging its status as key supplier of oil and natural gas may continue to develop significant linkages, and therefore influence, into Western economies. In addition, by 2025, the European Union might also develop into a 27 state power that creates an alternative source of international political leadership to the United States. Such trends will fundamentally affect the character of the future security environment and potentially challenge the US role as *the* global leader in security matters.
- **Resource competition.** In 2025 the world may be faced with multiple, wide ranging resource-related challenges. Climate change and a shifting environment; increasing demand for natural resources, particularly food, water and fossil fuels; a growing and rapidly globalizing economy; urbanization and the emergence of health challenges will all have major impacts and unpredictable effects.⁴ Key natural resources, especially oil and minerals of strategic values will continue to be sourced from unstable areas or regions undergoing shifts in political and military power. Such trends, combined with the growing resources needs of rising powers such as China and India, may lead to increase competition for resources including efforts to secure and protect critical sources through direct military and political means. Resource scarcity may also spark future humanitarian crisis and intrastate conflicts that may require military intervention by outside powers to stabilize key areas or prevent a humanitarian disaster.
- **Mass population displacements.** A combination of resource pressures, climate change, natural disasters, political conflicts, and the pursuit of economic advantage may lead to large scale shifts in population.⁵ Such population displacements may be resisted,

⁴ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

⁵ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

resulting in increasing numbers of barricades and fences being placed around territories to prevent their accessibility. Unwanted population shifts may lead to conflicts, large numbers of refugees, and humanitarian crises.

- **Aging US allies.** Due to decade of low fertility, the populations of Europe and Japan have been aging and are projected to continue this trend indefinitely.⁶ Failure to develop policies to adjust to their changing demographics will drive Europe and Japan to spend increasingly more of its economic resources on social spending to care for their aging populations. As a result, Japanese and European priorities may shift towards internal stability and security concerns over defense spending. Such a shift may place additional security burdens on the United States as its traditional allies may become less capable and more reluctant to employ military forces outside their own territory.
- **New WMD proliferation dynamics.** Growing concerns about global warming, carbon emissions and limited availability of fossil fuels in the future may lead to increasing interest in nuclear energy. Proliferation of the nuclear fuel cycle and related technologies could in turn lead to a proliferation of nuclear-weapon capable states by 2025. The proliferation of nuclear weapons possession beyond the existing powers, particularly to weak and unstable states, will increase the risks of more uninhibited, assertive, and intemperate behavior by these polities while reducing their susceptibility to conventional methods of coercion.⁷ Such nuclear proliferation may also significantly alter the balance of power in key regions. Advances in biotechnology will lead to advances in the understanding of the building blocks of life and significant progress in genetic engineering and microbiology.⁸ Such developments in turn may lead to new agents and methods for conducting biological attacks that will spread to both hostile states and non-state terrorist groups. Similarly, advances in chemical engineering may lead to more lethal chemical weapons in the future. In addition, the proliferation of nuclear weapons may lead to new deterrence dynamics among states in which the use of other forms of WMD, such as chemical weapons, becomes more likely due to a perception that the possession of a nuclear deterrent lessens the risk that such attacks will lead to massive retaliation.
- **Critical infrastructure disruption.** Future terrorist and hostile states may seek to target the critical infrastructures of adversaries in future conflicts. Attacks on financial centers, energy production and distribution capabilities, and transportation facilities could be undertaken to disrupt the economy of an adversary. Advances in cyber capabilities may create new capabilities to attack networked and computer-dependent infrastructures that

⁶ *The Defense Implications of Demographic Trends*; Jennifer Dabbs Sclubba; Joint Forces Quarterly. Issue 48. 1st Quarter 2008

⁷ *The DCDC Global Strategic Trends Program 2007-2036*; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007

⁸ *The DCDC Global Strategic Trends Program 2007-2036*; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007

control vital transportation, energy production and distribution capacities, and financial nodes. In addition, the previously mentioned proliferation of long-range precision weapons may be used to conduct simultaneous attacks on critical infrastructures causing widespread disruption.

- **Conflicts over information.** By 2025, conflicts over information are likely to become more prevalent. In the future, information and communication networks are likely to become prime targets of adversaries seeking to influence foreign perceptions or to disrupt military operations or a state's strategic communications capabilities. States and non-state adversaries will engage in "media warfare" and seek to dominate the 24-hour news cycle for strategic gains. Advances in information and communication technologies will enhance adversaries' abilities to use various forms of mass media to spread disinformation and propaganda and as a means to conduct strategic influence campaigns. Furthermore, as future militaries become more "network-centric" there is increasing incentive to develop capabilities designed to target the "network" of opposing militaries. By 2025, some states may have deployed capabilities to destroy or disrupt space satellite systems on which many military capabilities will have become reliant. Other weapons designed to disrupt information, sensor, and communication networks – such as radio-frequency, electromagnetic pulse (EMP), and laser weapons – may also be deployed by 2025. Some adversaries may seek to corrupt networks rather than destroy them by purposely inserting false data and errors into sensor and intelligence networks and information systems. Advances in digital information technologies will also increase the capabilities of electronic warfare systems. The result will be that conflicts in 2025 are likely to take place in increasingly complex electromagnetic and information environments.
- **Networked communities and adversaries.** Information and communication advances will tend to reduce the incentives for integration and assimilation by diaspora communities, resulting in "virtual communities" that exist across continents.⁹ In addition, increasing interconnectedness will enable groups and individuals to coalesce around common interests or ideologies across traditional national boundaries.¹⁰ A potential security challenge that could be created by such "virtual communities" is that they become the medium for the transmission of social risk including inter-communal violence, terrorism, illicit trade and trafficking.¹¹ Future extremists, united perhaps by a religious ideology, may coalesce and evolve beyond loose patterns of affiliation. Such extremist communities might create a new center of political influence and may morph into a highly networked terrorist organization. Widely dispersed and near-simultaneous terrorist attacks may become a defining characteristic of such a terrorist group.

⁹ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

¹⁰ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

¹¹ *The DCDC Global Strategic Trends Program 2007-2036; The Development Concepts and Doctrine Centre, Ministry of Defense, United Kingdom, January 2007*

Alternative Security Environments

The objective of the workshop is to consider how the drivers discussed above, as well as any others that participants highlight, could produce environments that present new security issues. There is room for debate about both the drivers themselves and how they will interact with each other and with potential discontinuities to shape the character of the security environment in 2025. To stimulate discussion, we advance the following scenarios as suggestions and heuristic devices.

Increasing Energy Demand: Colliding Strategic Orbits

Imagine that ... in 2025 the availability of natural resources and energy supplies does not meet the combined needs of rising and status quo powers. Energy-rich states use their resources to exert influence. Energy-dependent states seek to form alliances with energy suppliers and, in some cases, provide advanced arms and technologies while ignoring human rights abuses to ensure access to critical resources. Concerns over dwindling fossil fuels and global warming combined with the lack of an international consensus on proliferation also lead to the further spread of the nuclear fuel cycle.

In Asia, China's growing economic capacities translates into increased political influence, military power, and overseas commitments but does not lead to further political openness. Growing Chinese military power, especially sea and air power, provides China with increasing power projection capabilities, engendering regional concerns that China is seeking regional hegemony. Sino-Japanese relations turn toward rivalry as Japan feels increasingly vulnerable to growing Chinese power in the region. In addition, the simultaneous rise of China and India leads to increased strategic competition between them and others in the region where their emerging markets, sources of raw materials, and national priorities conflict. New technologies that can exploit gas and oils reserves found in the South China Sea also lead to strategic competition amongst states in the region for those resources. Competition for access to energy resources in Central Asia among China, India, Russia, and Iran also intensifies and seeks to exclude Western investments.

Competition over limited resources leads Russia's influence in and significance to Europe to increase as a result of its ability to exert direct leverage through its extensive holdings of oil and natural gas resources. Russia also seeks to exclude US and Western influence in its near abroad. Russia becomes a strategic competitor in Asia.

Iran rises to a nuclear-capable regional power in the Middle East and acts more assertively. Iran is able to use its energy relationships with external powers, such as Russia and China, to increase its influence and obtain modern weapon and missile systems. The Gulf Arab states also seek to modernize their military systems in response to Iran's growing power leading to an arms race in the Middle East. Israel perceives its position as becoming more vulnerable in reaction to these events and to the increasingly unfavorable demographic balance within Israel.

India's rise leads to growing regional influence in the region. Tensions with Pakistan remain high out of concern over potential state failure there. Occasional crises between the two states

continue to foster concerns over the potential for a conflict in South Asia to escalate to a nuclear exchange.

Strategic competition also occurs in Latin American as states pursue relationships to preserve their access to energy resources. Some states, such as China, are willing to forge alliances with energy-rich but authoritarian regimes in Latin America and elsewhere where the United States and other powers have shunned relationships because of human rights abuses.

The US security focus is primarily on contending with the strategic competition posed by China, Iran, and Russia and a new post Cold War balance of power emerges. The United States is seen as primary security provider by many states seeking to offset the rising power of China and Iran. As a result, in 2025 the United States remains committed to maintaining security in East Asia and the Middle East. The shifting of US security interests toward Asia, though, threatens to decouple US strategic actions from those of European powers whose interests become increasingly focused on domestic stability.

Economic Growth & Reversal of Current Income Inequality Trends: Coinciding Strategic Orbits

Imagine that ... China maintains a pragmatic approach to international relations, guided primarily by a desire to sustain its economic growth. Greater economic integration leads to a China-Taiwan rapprochement. Regime change in North Korea and successful implementation of Six Party Talks agreements leads to increased North-South economic and political integration. Sino-Japanese relations also evolve peacefully, and Japan remains a key investor in the region. The regional economy becomes more prosperous and integrated globally. Regional multilateralism leads to the establishment of cooperative East Asian security mechanisms.

Russia is primarily focused on coping with its own internal problems rather than playing a spoiler role in international relations. By 2025, Russia has evolved into a key strategic partner with Europe through its continued energy ties. The EU coalesces into a 27-state power that is an important political force in international relations.

Regime changes in the Middle East lead to greater political openness. Foreign investment in the region fosters job creation that compensates for the region's growing youth population. Political transition in Iran leads to greater political openness there as well, and Iran seeks greater integration in the region. The Middle East peace process is advanced through a new Israel-Syria peace agreement that Syria views as a critical step toward further economic development through increased openness and investment from the West. Greater global cooperation on countering terrorism and increased regional integration and prosperity in the Middle East result in a decline in transnational terrorism.

India uses its economic and political influence to play a positive role in the Middle East. The India-Pakistan relationship remains stable, and India and China find common areas for cooperation on energy security and in emerging markets.

Favorable demographic trends in Latin America lead to increased economic prosperity there. Governments in Latin America invest in health, education, and job creation, which results in economic gains that improve the quality of life for much of the population.

Growing concerns about climate change leads to a global consensus to deal with environmental issues. For example, there are international agreements on providing “clean coal” technologies to India and China to lower their carbon emissions. New energy technologies help to mitigate concerns about dwindling fossil fuel resources. There is also new international cooperation in providing “proliferation safe” nuclear energy to meet the energy needs of developing countries.

The traditional US role as security provider in East Asia is replaced by regional security mechanisms. In addition, greater regional integration in the Middle East and reduced competition for oil resources transforms the US security role in that region as well. The US security role in 2025 therefore transitions to that of an “out of area” security provider and a partner with other powers in protecting the “global commons”.

Internally Oriented PRC & Destabilized Middle East: Coexisting Strategic Orbits

Imagine that ... China’s economic rise stumbles leading to internal political reforms and a slowdown in its military modernization efforts. China continues to work with partners such as Russia to push for increasing multipolarity in international affairs and to constrain U.S. power. However, China is seen as less of a military threat in the region than had been feared because of its limited power projection capabilities. Aging Japan shifts its priorities toward social spending and away from defense.

Russia continues to exert influence over the regions in its periphery that were once part of the Soviet empire. It also seeks to maintain its leverage on Europe through extensive energy ties. Europe itself is focused on its own internal stability as it tries to assimilate its growing Muslim populations. Income and political inequalities have led to a backlash by angry youth in several European countries, creating increased concerns over social instability and terrorism.

India is mired in domestic political turmoil and preoccupied by its relations with its neighbors. India faces instability arising out of dramatic internal income inequality, environmental challenges, and rising energy demands. Interactions with Pakistan and Bangladesh remain tense.

Middle East security becomes internationalized as states in the region seek security and economic relationships with external powers such as the United States, Europe, Russia, China, and India. Growing foreign involvement in the region fosters continued push-back from extremists, leading to new terrorist attacks both within and outside the region. In addition, states in the region continue to deal inadequately with their growing youth populations, leading to rising unemployment, economic stress, and resentment, further radicalizing the youth. Terrorist and radical groups become highly networked and dispersed geographically. In addition, advances in biotechnology create new concerns over the threat of a biological terrorist attack, heightening a sense of insecurity within potential target societies. State-backed proxies armed with advanced weapons supplied by their sponsors remain a constant threat to security in the region.

Traditional institutions are challenged to deal with the myriad of problems facing the world of 2025. As a result, there is only mixed progress on issues such as climate change, resource competition, income inequalities, proliferation, and terrorism. There is a growing divide between North and South in economic prosperity. Many of the security challenges arise from failed or failing states, intrastate conflicts, and humanitarian crises. The challenge that many states confront in maintaining a modern military creates increased reliance on long-range missiles and WMD. These missiles and WMD are integrated into doctrine as tools for deterrence and as a means to force a halt to hostilities by threatening to escalate and impose untenable costs on an adversary. As a result, a key security challenge in 2025 is containing the escalation or expansion of future crises.

In this world U.S. capabilities are called upon to address many security issues. However, the United States finds that it is often a necessary but not sufficient power in dealing with these problems. As a result, security challenges are most often addressed through ad-hoc international coalitions and institutions.

AGENDA

2025 Agenda

0800: **Introduction: Workshop Goals and Methodology**

0815: **Strategic Trends and Discontinuities**

- **Demographics and Societal Issues:** What are the demographic and social trends that will affect the security environment in 2025?

Discussion paper -- does not represent the views of the US Government

- **Diffusing and Emerging Technologies:** How is technology diffusing and proliferating in ways that will affect the 2025 security environment, and what new technologies may come on line?

1000-1015 -- BREAK --

1015

- **Economic Issues:** What are the economic trends and resource issues that will affect the 2025 security environment?
- **Other Trends Relevant to the 2025 Security Environment:** What trends that do not fit into the above categories are likely to affect the 2025 security environment?
- **Potential Discontinuities**

1200-1245 -- LUNCH --

1245: **Identification of Key Drivers, Trends, and Potential Discontinuities**

Construction of Scenarios

1315-1400

- Scenario One

1400-1445

- Scenario Two

1445-1500 -- BREAK --

1500-1545

- Scenario Three

1545: **Emergent Issues** (from the scenarios)

- Common Requirements
- Difficult Trade-offs

1615: **Wrap-Up**

- Future Military Research Questions

Discussion paper -- does not represent the views of the US Government

Discussion paper -- does not represent the views of the US Government

Discussion paper -- does not represent the views of the US Government

Discussion paper -- does not represent the views of the US Government

APPENDIX B

POST-WORKSHOP THOUGHTS

The following points (1 through 6) were submitted to Long Term Strategy Group by a workshop participant following the workshop. The participant, a professor at Princeton University, provided some expanded thoughts on several of the workshops key points of contention.

1. Purchasing Power Parity (PPP) versus currency conversion exchange rates: How to think about the relationship between Chinese economic and international power

The issue of which exchange rate is appropriate can be answered in different ways. The most narrow question is what military power China can afford and what financial heft it commands internationally. It seems to me that PPP captures some of the former since soldiers and buildings are purchased domestically and are cheaper than currency conversion rates would suggest. The costs of imported weaponry are clearly better captured by the exchange rate conversions, but China is producing more of its weaponry domestically, and purchasing less abroad, so PPP may be increasingly significant on this dimension. Financial heft in the outside world is clearly related to what China can buy in foreign markets, and so is captured by currency conversion rates.

So neither number is sufficient but both capture some portion of the truth.

The question of whether the PPP computations of economist Robert Fogel's projections that show China outpacing the rest of the world in economic growth are meaningless is complicated. My own feeling was that nominal GDP growth rates could look even more rapid due to currency appreciation (which another participant did factor into his analysis) but of course they reduce the baseline amount today.

2. Middle East balance after a hypothesized U.S. withdrawal

One key question could be what happens to the oil rents in the Gulf after the United States withdraws. Would a major regional actor (Iran, Iraq, or both) feel tempted to grab oil producing territory or oil revenue from the GCC countries? What would happen to Iraq - would it fragment with a Shia-Sunni frontier dividing it?

In a benign scenario the oil states would cooperate to maintain their cash flows. In a malign scenario Iraq might unravel and a Shia-Sunni balance could emerge with Israel and Turkey aligned with the Sunni states. I am impressed by the argument made by Bernard Haykel that Saudi Arabia is more stable than it looks. As a result, it could be the case that the Saudis, with either explicit support from Turkey and/or with implicit (air) support from Israel, could hold off the Iranians, especially if the Iranians remain a non-nuclear power. Another option for the Saudis would be a Pakistani-Chinese umbrella, perhaps strengthened by a transfer of nuclear weapons - if the Iranians have already gone nuclear. Under those circumstances it would also be reasonable

Discussion paper -- does not represent the views of the US Government

to expect the Chinese to move some naval forces to Gwadar and perhaps some troops into Pakistan.

As of now the Turks seem reluctant to go back into the Middle East but if the U.S. leaves the temptation will surely reassert itself.

3. Biotech

I think that it is fairly safe to claim that biotech will not revolutionize the strategic scenario in the time frame up to 2025. It is a mere 17 years away and the revolutionary potential of tinkering with human biology will not take a little while to debug. Drugs, yes, but even those take a little while to develop. This is very different from saying that revolutionary developments in biotech will take place over the next 17 years - surely. By contrast Moore's law is a statement about observed mass-market trends in IT. It seems highly likely to me that man plus much smarter machines are much more likely to have an impact than much smarter men. As for nanotech - I have yet to see a killer app but more a steady accumulation of techniques for working at the nano-scale. However, to the extent that this is inanimate stuff, the potential for rapid use is much greater. Still I'm not sure how it will affect international military competitions.

4. Globalization

The outsourcing of personal services overseas along with elite cosmopolitanism will have important consequences. If the person who prepares your income taxes sits in India you are a cosmopolitan. The same is true if you are consulting for an Indian firm. In short, globalization can excite fear in the U.S., it also has the potential to expand personal globalization beyond the narrow elite that engages in it now.

5. Iran

While Iranian oil production has stopped dropping, the Iranian NOC will remain inefficient for political reasons. Also, thanks to their large population, they really cannot support a welfare state on rents alone. It is also possible that a drop in the price of oil, in five or ten years from now, could precipitate an economic crisis in Iran and thus force a substantial opening up of their economic system. As they already have a limited competitive system, such an opening could be accomplished without blood flowing in the streets. While this might produce benefits in the long term, there would be an intermediate period preceding it which is very hard to predict, and about which it is easy to be pessimistic. The current Iranian leadership will probably not change course as they feel things are going their way. If they miscalculate and provoke a war then all bets are off.

6. U.S. inequality levels

Even with U.S. trends held constant, I think we have to worry about income inequality in the U.S. Apparently, and plausibly (as argued by Harvard economists Katz and Goldin), this stems from a failure to improve educational levels in the U.S. If that continues for another 17 years the associated political polarization may prove to be an even more substantial handicap to the conduct of U.S. policy abroad and a challenge to tranquility at home.