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Constructive transformation: an alternative vision of global security

Throughout history, assuring the security of citizens has been an overriding priority of most governments, and large-scale forms of deliberate aggression have been their dominant concern.¹ In response to that concern, modern states have made large investments in military force, and the resulting balance of national capability has generally been con-

sidered the principal determinant of international order.

Over the past decade, however, this traditional conception of security has been continuously eroded by circumstances that do not readily fit the assumptions. Policymakers still worry about belligerent enemies, but their number has diminished in recent years, and virtually none of them seems capable of the classic forms of massive aggression. The extensive violence that does persist is episodic, small in scale, and widely dispersed. In the United States in the aftermath of the September 11 events, the phenomenon of terrorism has been declared a global enemy, but the damage directly caused by terrorist actions has so far been only a small fraction of that resulting from civil conflicts and ordinary crime. The capacities and characteristics of the largely anonymous perpetrators seem to be less relevant than the underlying causes. At the lead-

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ing edge of practice, security officials are being driven to contend as much or more with dangerous processes as with aggressive opponents, although the distinction has yet to crystallize in the formulation of policy.

It is, of course, notoriously difficult to appreciate a fundamental shift in historical circumstance if you are caught in the middle of it. But there are some very strong indications that a major redirection is occurring in the aggregate pattern of human development. With economic growth in recent decades concentrated among the wealthier segments of all societies, and population growth concentrated in the poorer segments, the global distribution of resources appears to be too inequitable to be indefinitely sustained without generating potentially unmanageable amounts of civil violence. Although the connection between violence and economic performance is neither simple nor well understood, it is prudent, even mandatory, to assume that accumulating grievances combined with increasing access to information and destructive technology pose a major threat to the preservation of consensual order necessary to operate the global economy and to provide lasting security at an acceptable cost. Not even the most advanced military establishments could expect to cope with a general breakdown of legal order. They could not protect any major society from being infiltrated by people determined to wreak havoc, and they certainly could not identify and preemptively destroy all those who might wish to do harm.

Assuring at least minimally equitable global standards of living – and achieving the political accommodation necessary to support that objective – is a necessary foundation for security. No amount of traditional military capability will compensate for the failure

to establish those determining conditions.

The apparent requirements for this new situation are demanding: raising the standard of living for the poor to an acceptably equitable level would require an expansion of the global economy by a factor of five over the next fifty years, a doubling of food production, and something like a tripling of energy production even if efficiency gains are dramatic. In order to do all that within the limits of atmospheric tolerance, human-induced carbon gas emissions will have to be sharply restricted, and the technical basis for energy supply and consumption will have to be dramatically altered – from approximately 20 percent non-fossil fuel at the moment to better than 80 percent by 2050. In order to accomplish that transformation on the schedule required against at least the initial resistance of current energy markets, extensive public investments would have to be made globally, and extensive transfers of technology would have to occur to China and India especially. With nearly 40 percent of the total human population between them and extensive internal economic development beginning to occur, these two countries will inevitably be on the front line of the global warming problem. But they cannot reasonably be expected to meet the investment requirements with their own resources alone. Current security relationships are incompatible with the required investment process – but if this process does not occur, the destructive effects of altered climate patterns could rival or even surpass any damage that human warfare might do.

These epochal developments have not commanded much official attention. In fact, the security policies of the Bush administration emphatically defy the im-

plications. In a commencement speech at West Point in June of 2002 and in two formal documents issued subsequently, the president radically revised long-standing U.S. policy – not to address the fundamental circumstances of globalization, but to change the rules for dealing with traditional threats.

Most notably, he asserted the right and declared the intention to initiate the use of force, including nuclear weapons if necessary, to prevent the acquisition of mass-destruction technology by “rogue” states judged to be inherently belligerent.² His pronouncements were presented as a deliberate revision of established security doctrine and were received as an apparent repudiation of prominent international commitments.³ The general understanding had long been that the legitimate use of military force, and of nuclear weapons in particular, would be restricted to the prevention of imminent attack – a formulation that allows for deterrent retaliation and defensive reaction, but which does not extend to denying a potential adversary the right to possess weapons.

2 “President Bush Delivers Graduation Speech at West Point: Remarks by the President at the 2002 Graduation Exercise of the United States Military Academy, West Point, New York” (1 June 2002), available at <<http://www.whitehouse.gov/news/releases/2002/06/20020601-3.html>>; “The National Security Strategy of the United States of America” (September 2002), available at <<http://www.whitehouse.gov/nsc/nss.html>>; and “National Strategy to Combat Weapons of Mass Destruction” (December 2002), available at <<http://www.whitehouse.gov/news/releases/2002/12/WMDStrategy.pdf>>.

3 “New Agenda Coalition Working Paper: Submitted by New Zealand on behalf of Brazil, Egypt, Ireland, Mexico, South Africa, and Sweden as members of the New Agenda Coalition (NAC), NPT/CONF.2005/PC.II/15” (29 April 2003), available at <<http://www.acronym.org.uk/npt/o3doc16.htm>>.

With the invasion of Iraq in March of 2003, the Bush doctrine acquired a degree of significance that could not have been achieved by declaration alone. In retrospect it is now apparent that Iraq may have harbored an aspiration to acquire weapons of mass destruction but did not actually possess them, did not have active efforts to acquire them, and did not pose an immediate threat of use. Initiating an attack in this situation poses obvious questions as to how broadly that principle of preventive coercion might be applied and what the extended consequences of its application might be.

There are peculiar features of the Iraq situation that serve to limit the precedent. As a result of UN Security Council Resolution 687, generated after its assault on Kuwait in 1990, Iraq became the only country in the world formally denied the right to possess nuclear, chemical, and biological weapons and associated delivery vehicles.⁴ Its embargoed economy and its general defiance of international standards under the rule of Saddam Hussein rendered it perhaps the least capable and most isolated of the alleged rogue states. If Iraq were to be its only application, the Bush doctrine could be considered a qualification rather than a fundamental revision of the established international security regime.

It is evident, however, that the United States is entertaining expansive aspirations that could in principle give Bush’s doctrinal revision revolutionary implications. The level of military investment it is sustaining and the capability it is acquiring go well beyond what traditional planning standards would require: the ability to defend the United States and

4 UN Security Council Resolution 687 (3 April 1991) is available at <<http://ods-dds-ny.un.org/doc/RESOLUTION/GEN/NRO/596/23/IMG/NRO59623.pdf>>.

its formal allies against contingencies of potential aggression by designated opponents at specified locations.⁵ While conceding that no other country is undertaking military preparations that present a major immediate threat to this core objective, the United States is developing advanced military capabilities using inherent feasibility rather than estimated threat as the planning standard. The stated aspirations are to be able to conduct continuous surveillance and perform high-resolution observation in any part of the world, to initiate precise attack in rapid reaction to any threat or opportunity thereby identified, and to deny these same capabilities to all other military establishments. Were those aspirations to be achieved, the United States would have decisive superiority across the entire array of potential missions: it would be capable not only of disabling any military force, but also of conducting highly coercive operations against any society. This combination of evolving capability and declared intent represents a policy of military domination that has already provoked strong reactions from the rest of the world.

International concerns about the Bush administration's military ambitions have been compounded by its accompanying assault on the pillars of international legal regulation and on the political sensitivities of traditional allies.

In June of 2002, the United States formally withdrew from the 1972 Antiballistic Missile Treaty, thereby dismantling

5 Since the type of capability the United States is developing is designed for large-scale operations, in the assessment of most other countries it cannot be explained as a rational response to an emerging threat of terrorism. As demonstrated most recently in Iraq, the decisive defeat of a military establishment does not confer the ability to stop terrorism emanating from a society that supports it.

the centerpiece of bilateral restrictions on strategic nuclear force deployments that it had negotiated with the Soviet Union and reaffirmed with the Russian Federation. The replacement arrangement – the 2002 Moscow Treaty – preserves the formal principle of legal restraint on offensive deployments, but does not prevent the United States from progressively improving its potential for disabling the Russian deterrent force. Russian military planners can still plausibly expect to fend off a decisively disarming strike, but in physical and operational terms the main source of bilateral reassurance is now more rhetorical than real, and the basis for internal confidence is relentlessly diminishing. China, as an indirect beneficiary of the bilateral arrangements, has a yet more acute version of the same problem.

In less dramatic but nonetheless significant actions, the United States has virtually repudiated the Comprehensive Test Ban Treaty (CTBT) and assertively terminated negotiations for a verification and enforcement protocol for the Biological Weapons and Toxins Convention (BWC). Since the CTBT has long been the single most prominent condition for general adherence to the Nonproliferation Treaty (NPT), its repudiation signals an unmistakable disregard for the NPT regime. The Bush administration's nonproliferation plan would replace the basic bargain between NPT nuclear- and nonnuclear-weapon states with more forceful efforts to prevent the spread of enrichment and reprocessing technology to any additional countries even for peaceful programs.⁶

6 "President Announces New Measures to Counter the Threat of WMD: Remarks by the President on Weapons of Mass Destruction Proliferation, National Defense University, Washington, D.C." (11 February 2004), available at <<http://www.whitehouse.gov/news/releases/2004/02/20040211-4.html>>.

In the context of these developments, the invasion of Iraq was undertaken in defiance of especially strong objections from France and Germany, and despite the failure to pass an authorizing resolution in the UN Security Council. To an extent that is not well appreciated in the United States, the rest of the world is drawing the conclusion that the Bush administration now rejects the provisions of legal restraint and political accommodation that the United States once actively sponsored, and does not intend either to rely on them or to be bound by them.

All this poses a serious planning problem for security bureaucracies throughout the world. The apparent contempt for international legal restraint is a radical departure from American tradition, which has long proclaimed the rule of law, both at home and abroad, to be the foundation of democracy and security. Foreign planners can reasonably doubt that the American political system will actually abandon its tradition to the extent currently being implied, but they will also have to recognize that for some indefinite period of time the U.S. government is not likely to be the architect and champion of international legal restraint that it has been for the past half century. They may be skeptical that the projected U.S. military program will actually reach the level required to establish the decisive superiority being imagined; current levels of investment and technical accomplishment do not yet match the flamboyant aspirations advanced in military planning documents. They can also question how long domestic political support for current U.S. security policies can be sustained. American public opinion has so far tolerated the doctrine of preventive coercion and its specific application in Iraq, albeit

with growing unease. But American public opinion does not appear inclined to endorse the idea of imperial domination, let alone the expansive investment of resources required to support it. It is evident, however, that the American political system is still operating under the acute sense of threat generated by the September 11 terrorist attacks, and that U.S. security policy is now under the control of a radical minority intensely dedicated to the asserted doctrine and its supportive military program.

As a result of these complex circumstances, no prudent planner can assume that economic, technical, or political constraints will prevent the United States from amassing coercive capabilities that might be used to impose its national political will. All groups affected – traditional friends as well as potential enemies – have strong reason to contemplate how they will react if the Bush administration's proposed security policy is relentlessly pursued.

There seem to be three basic options. First, in principle other countries could attempt to match the American military program. That will be a prominent instinct within those military establishments that aspire to achieve the highest performance standards, but the effort required does not appear either feasible or sensible for any other society. The scope and momentum of investment that the United States has established over several decades is simply too extensive and too multifaceted to be duplicated rapidly. Moreover, any dedicated effort to do so would further stimulate the American effort and might enable it to command the additional resources required to pursue more seriously the vision of dominance. Such an effort would also divert investment from more compelling priorities of economic performance.

Second, a threatened competitor might seek to negate the instruments of dominance rather than to replicate them. That is technically and economically more feasible and might ultimately be considered necessary. In particular, a competitor could prevent the United States from using the space-based assets required to engage in advanced forms of military coercion. But overt development of this strategy would create a pattern of confrontation that would stimulate the American program, and it is difficult to be confident the techniques of negation would reliably prevail at an acceptable cost in an extended competition.

Third, a constructive strategy might attempt to develop common interest to the point that it could contain and eventually replace the impulse for dominance. That strategy is imaginable in principle, highly desirable, and not without precedent – witness the transformation of European security relationships over the fifty years following World War II. It requires great wisdom and courage, however, for any society to pit higher forms of statesmanship against raw physical power.

None of the basic choices – replication, negation, or transformation – can easily emerge as the dominant international reaction.

The situation presents a significant problem for the American political system as well. The doctrine of preventive coercion, with its implication of imperial dominance, is largely the project of an intense political minority. Although the policy of domination resonates with some official military planning documents, its hard-edged assertion of willingness to initiate military attack has not emerged from professional military channels – and certainly not from majority political opinion. The shock of the

September 11 terrorist attacks and the exigencies of the Bush administration's open-ended war on terrorism have been used to silence criticism of the announced doctrine, of its application to Iraq, of the denigration of allies, and of the repudiation of international legal instruments. For the United States to remain a democracy worthy of the name, fundamental questions must be asked about whether coercive prevention and imperial dominance will bring greater security or growing violence and disastrous political isolation. The single-minded pursuit of national advantage would generate new threats the United States could not absolutely defeat. It would assuredly undermine the legitimacy of U.S. military operations throughout the world – a vital if insufficiently acknowledged ingredient of practical capability.

Ironically, however, the provocation and apparent misdirection of American policy also create a constructive opportunity. If the circumstances of globalization are indeed as relentless as they appear to be, leadership will predictably gravitate to those who come to understand the implications. Correspondingly, it is very likely that principles of equity and methods of accommodation will prove to be of much greater significance than traditional forms of military confrontation. All this implies that a constructive response to the provocation emanating from the U.S. military program is feasible in principle – one that would subordinate the divisive practice of confrontation to inherently more efficient methods of direct collaboration.

Collaboration is possible when fundamental interests are aligned, and becomes imperative when those interests cannot be reliably protected by coercive means alone. There are compelling circumstances of that sort in the emerging

situation – most notably, in the control of biotechnology and nuclear explosive material and in the management of space activities. These possibilities are worth exploration – especially if we hope to make progress in achieving the political accommodation that appears to be the foundation for viable security within our increasingly globalized world.

The burden of strategic reaction to the Bush administration's security policy primarily falls on Russia and China, but with different timing and different global implications in each case. For an indefinite period of time, Russia will be the only country capable of counterbalancing the U.S. nuclear force, thereby assuring the basic condition of mutual deterrence. Although advocates of the new American doctrine like to claim that mutual deterrence is now an irrelevant relic of cold war history, the enduring fact is that it protects against a dangerous concentration of power – the international equivalent of the checks and balances fundamental to the U.S. Constitution. Since the corrupting effects of excessive power must prudently be assumed to be generic – not peculiar to any individual, government, culture, or historical era – the protective balancing of mass-destruction capability is as relevant and vital as it ever was, and will remain so, as long as that capability is preserved in any form. So it is in the interest of all nations, even of the United States, that Russia's burden be safely and successfully carried.

For China the immediate burden involves a more narrowly defined national security interest stemming principally from the Taiwan situation, but the manner in which China develops its security policy has very important global implications. Of all the nuclear weapon

states, China has maintained by far the most restrained pattern of military deployment. Its deterrent force is the smallest and has never been put on alert status. Its conventional forces do not have power-projection capability. Its security policy has been explicitly based on principles of equitable accommodation rather than active confrontation. If China preserves this historical pattern of restraint and develops the practice of accommodation, it might be able to give strong constructive impulse to general international security arrangements. If, however, China adopts a strategy of immediate negation or ultimate emulation in reaction to projected U.S. military development, another lengthy episode of global confrontation might well ensue.

The extent to which the general features of globalization will shape these strategic choices must be considered an open question at the moment, but it seems apparent that the specific fear of terrorism will have substantial influence on relevant aspects of policy. In particular, the possibility that terrorist organizations might attempt to inflict massive social damage gives all societies a strong incentive to establish much higher standards of control over the two principal technologies that would enable a small clandestine operation to have truly catastrophic effects – namely, nuclear explosives and lethally contagious biological pathogens. Since large issues of policy are usually worked out first in some specific context, it is reasonable to anticipate that new security relationships of global significance will be forged in the process of managing those two technologies.

Although they share catastrophic potential and therefore present a common managerial problem, nuclear explosives and biological pathogens have starkly

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different characteristics and historical legacies. So far it has required large industrial facilities to extract or create the radioactive isotopes that can generate nuclear explosions. Access to those facilities and their products has been actively controlled from the outset, and fabricated nuclear weapons have long been the most elaborately protected of all human commodities. The prevailing arrangements are not impenetrable, especially not within the extensive network of facilities that Russia inherited from the Soviet Union. Higher standards of protection are currently being pursued, and significantly higher ones are feasible. Nonetheless, the physical and procedural barriers to any unauthorized use of nuclear explosives currently define the most advanced standard of active control.

In contrast, the process of extracting and producing biological pathogens, which are spontaneously generated in nature, is not nearly as demanding. The facilities required are not large or distinctive, and access to them is not as carefully restricted. Until very recently, biological pathogens were freely exchanged for purposes of scientific exploration, epidemiological investigation, and medical diagnosis even between otherwise antagonistic societies. Scientific understanding of these pathogens emerges from a globally dispersed biomedical research community whose activities are conducted for compellingly legitimate reasons. In that context it has been neither practical nor appropriate to sequester information or materials to the extent that nuclear explosives have been isolated. Indeed, the barriers to hostile use of biotechnology have been primarily attitudinal in character – a form of passive control more significant than is commonly appreciated.

In general the destructive application of nuclear technology has been legiti-

mized by the practice of mutual deterrence but elaborately restricted. Offensive application of biotechnology, on the other hand, is the least legitimate and least developed of the mass-destruction technologies – yet access has not been as restricted. Somehow out of these nearly antipodal situations a coherent policy of managerial control will have to be fashioned.

The thought naturally arises that the methods of control devised for nuclear explosives might simply be extended to dangerous areas of biotechnology. Not surprisingly that has been the prevailing inclination in the United States following the anthrax letters that were mailed to politicians and media figures shortly after the September 11 terrorist attacks. Under legislation passed in response to those mailings, all stocks of live pathogens and toxins deemed to be dangerous must be registered with the federal government, and access to the listed agents must be restricted to persons who have cleared background checks. National identity is henceforth to be used as a criterion for access. In addition, several billion dollars have been allocated to initiate protective research efforts, a significant portion of which is to be directed to so-called threat assessment. The term refers to the exploration of potentially destructive applications of biotechnology in order to anticipate and prepare a response to possible future threats. Work of that sort is to be subject to security classification that will prevent potential terrorists from learning about it.

Natural and perhaps inevitable as those measures may be, however, the attempt to impose traditional national security controls on biotechnology is virtually certain to be ineffective and is very likely to have overwhelmingly perverse consequences.

The results of research in critical areas of molecular biology are shared globally

for unquestionably compelling reasons. The investigation of basic life processes that has been gathering momentum for several decades is now delivering results of enormous consequence for public health and medical therapy. With the improved understanding of the dynamics of life at the molecular level, the eradication or mitigation of many historical diseases will be possible. The enhancement of basic cognitive, emotional, and reproductive functions will probably also become possible. Great scientific achievements are in prospect, and vast fortunes are to be made. No national security bureaucracy citing the uncertain threat of catastrophic terrorism will be able to justify the imposition of secretive authority over this momentous, inherently open process. The attempt to do so would predictably incite resentment, suspicion, evasion, and emulation.

All societies caught up in this momentum of discovery – in effect, the entire human species – will have to contend in some manner with the dangers associated with it. These dangers can arise as easily from inadvertence as from deliberate manipulation, so any system to prevent the misuse of biotechnology must not focus solely on potential terrorists, but should also include legitimate researchers whose work could have unintended social consequences. Exactly the same basic research that identifies opportunity for constructive intervention in basic life processes also identifies destructive opportunity. And unfortunately it is easier to produce a single destructive effect than to defend against all destructive possibilities. Infectious diseases significantly more lethal than those that have naturally evolved could in principal be created – a supposition widely thought to be impossible as little as a decade ago. Nefarious manipulations of thoughts, feelings, and repro-

ductive capability are much more speculative at this point but appear to be a serious possibility. The scope of application of biotechnology is so broad, and the potential consequence so large, that innovative methods of protective management responsive to its distinctive characteristics will almost certainly have to be devised. Over the longer term, one can reasonably surmise, the speculative problem of catastrophic terrorism will likely be assimilated to the much larger and more immediately pressing problem of managing biotechnology generally.

Although many of the anticipated consequences of biotechnology have yet to be realized, at least three determining features of the situation can be discerned. First, since the relevant research process is highly developed and globally distributed, managerial oversight will have to be global in scope, that is, universally accepted as reasonable and equitable. Second, since no categorical distinctions can be made at the level of fundamental research between potentially protective and potentially threatening lines of inquiry, prudential judgments will have to be made in detailed context by intimately informed scientists, not by government bureaucrats or distant regulators of any sort. But, third, since the potential consequences of molecular biology extend far beyond what even the leading research scientists can be expected to comprehend, and since inadvertently destructive consequences are at least as worrisome as deliberately destructive ones, protective oversight must involve representative social judgment as well as scientific review and must be appropriately comprehensive. If there is no categorical distinction in biotechnology between beneficial and destructive knowledge, there is no categorical distinction between wise and foolish or good and evil people either.

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Taken together, these circumstances imply a managerial process that is based on universally accepted principles of independent peer review. But such a process would have to be broader in scope and jurisdiction, more actively organized, and more refined in legal terms than any of the precedents that might be cited. And, arguably, it would have to operate at an overall level of fidelity well beyond any that has yet been demonstrated by existing regulatory processes.

Obviously, the development of a global oversight arrangement that meets these conditions will face a multitude of practical difficulties, many of which will be cited by skeptics as grounds for summary rejection of the entire idea. At the moment, there does not appear to be any official consideration of such an arrangement, and the United States' recent rejection of the effort to negotiate a verification and enforcement protocol for the BWC has demoralized the diplomatic community that supports active consideration. Notably, however, a special committee of the National Academy of Sciences recently concluded that the potential for catastrophic misuse of biotechnology research was grave enough to warrant an expanded, strengthened, and more integrated national oversight system. The committee's report also conceded that any regulatory system would have to be adopted internationally to be effective.⁷ It is reasonable to expect that governments will ultimately be driven to examine global protective oversight procedures for biotechnology, and in the course of doing so will be induced to contend with the implications for security practices generally.

Some important implications arise from inherent tensions between individ-

7 Committee on Research Standards and Practices to Prevent the Destructive Application of

ually important strategic objectives. The problem presented by emerging biotechnology is that of promoting vital benefits while simultaneously preventing applications that could put the entire human species at risk. Because the principal source of threat is either inadvertent or clandestine, the entire apparatus of confrontational deterrence is essentially inapplicable. Defensive reaction – all that is involved in diagnosing, treating, and containing a disease outbreak – is not reliable enough to be the primary basis for protection against the more extreme forms of imaginable danger. Preventing the creation of catastrophically destructive pathogens must become the predominant concern. Significant tension arises because the scientific inquiry necessary to support defensive measures against known infectious diseases will also provide the basis for generating yet more lethal variations. The challenge is to pursue inherently more difficult defensive applications while restricting offensive applications of biotechnology – a reversal of the strategic principle long associated with the prevailing practice of mutual deterrence. That reversal would have to be accomplished, moreover, not only in interaction among separately organized societies, but also in increasingly consequential interaction with the natural process of evolution, a process which presumably neither guarantees nor precludes the survival of the human species.

Those who are more familiar with the history of war than with the history of public health are likely to conclude that the offensive application will eventually come to predominate for biotechnology as it did for the technology of nuclear

Biotechnology, *Biotechnology Research in the Age of Terrorism: Confronting the Dual Use Dilemma* (Washington, D.C.: National Academies Press, 2004).

explosives. That cannot be considered an inevitable outcome, however. Not only are the incentives and the circumstances substantially different, but so are the available methods.

There is an important advantage in the fact that the remarkable momentum of molecular biology has been established on the basis of a predominantly open process. Systematic transparency has allowed a collective process of scientific discovery to develop that is far more powerful than one segmented and sequestered by security classification, and the same process offers far more powerful regulation as well. Human societies spontaneously generate standards of behavior that are both equitable and protective, and can enforce them very effectively if relevant information is readily available. Criminals must hide in order to succeed, as must anyone violating strongly established social norms. The norms against destructive application of biotechnology that exist in the global biomedical community are among the most powerful of all social standards. They prevail across national and cultural differences, essentially without exception. A regulatory system that reinforced the deeply ingrained abhorrence of infectious disease with disclosure rules and active oversight would be powerfully consequential, so much so that the practical impediments to such a system have more to do with fears of misuse than fears of ineffectiveness. In principle the actively organized practice of transparency and independent scrutiny (the same basic practice that enables financial systems to function despite the eternal temptation to steal) could provide much more advanced protection against the offensive use of biotechnology. Presumably that would forever fall short of absolute assurance, but the degree of protection that could be accomplished is

potentially meaningful enough to shape the evolution of international security generally.

It is not difficult to visualize how a protective oversight arrangement would work.⁸ The central objective would be preventing the deliberate or inadvertent creation of pathogens more lethal than those that have naturally evolved. The basic method of ensuring this would be a set of procedural rules designed to bring independent, informed scrutiny to bear on all fundamental research activities that could create catastrophically destructive pathogens. Those activities would be distinguished in terms of the intrinsic transmissibility, infectivity, and lethality of the pathogens in question, with greater levels of risk associated with higher level oversight and more intense scrutiny. People and facilities engaged in such activities would be licensed according to internationally determined standards. Proposed research would require informed peer review and approval at the local, national, or international level, depending on the degree of risk involved. The conduct of approved projects would be monitored and the dissemination of results would be managed according to internationally determined rules. Access to especially sensitive information would be restricted to those participating in the oversight arrangements, and the fact of access would be documented. Any violation of the licensing and approval requirements or of the associated disclosure and information handling rules

8 For a fuller description, see John Steinbruner, Elisa D. Harris, Nancy Gallagher, and Stacy Gunther, "Controlling Dangerous Pathogens: A Prototype Protective Oversight System," Center for International and Security Studies at Maryland Working Paper (September 2003), <<http://www.cissm.umd.edu/documents/pathogensmonograph.pdf>>.

would be subject to criminal prosecution in any jurisdiction.

If the legitimate scientific community were to engage comprehensively in an oversight arrangement of this sort, there would be direct protection against individual misjudgment and indirect protection against deliberate malfeasance. Any attempt to evade systematic scrutiny would run a substantial risk of detection, and any detected violation would be subject to extremely assertive enforcement. However the practicalities of such an arrangement are judged, the fundamental point is that the degree of protection against the destructive application of biotechnology depends primarily on the degree of global transparency that is achieved. The only way for defenses against infectious disease to outrun offensive misapplication is for the legitimate researchers to combine their efforts through the free flow of information and ideas.

The same principle of systematic disclosure of information for mutual protection applies as well to the management of nuclear explosive material, drug trafficking, political corruption, tax evasion, and many other familiar maladies, but in most of those instances it encounters more resistance from the relevant historical legacy. Standards of behavior are generally not as well established in most of these areas as they are with regard to infectious disease, and the right to official secrecy and personal privacy is better established. But it is reasonable to expect that some significant revision of historical practice might be considered for nuclear explosive materials as the possibility of catastrophic terrorism is taken more seriously. In fact, it seems doubtful that an overriding commitment to defensive application could be established for emerging biotechnology while preparation for offensive attack remains the primary basis for nuclear security.

In principle, significantly higher standards for the accounting and physical protection of nuclear explosive material could be organized on a global scale while sensitive details about the design and location of individual weapons were restricted to the states that possess them. Techniques of information management could create a common accounting system that achieves greater aggregate accuracy while controlling access to individual entries with complete assurance. Monitoring techniques could continuously determine the status of control over fabricated nuclear weapons and material containers while obscuring which weapons were stored at which locations in the system, if that latter provision were considered to be a vital national interest. Deterrent capability would hardly be affected, and overall managerial control would be substantially improved. As in the case of biotechnology, albeit to a lesser extent, the degree of protection here depends substantially on the degree of transparency that is achieved. Any physical barrier to a nuclear weapon or a cache of nuclear material can be breached if there is sufficient time to do so, but as a practical matter that could not be done if monitoring were active and continuous.

To the extent that the threat of catastrophic terrorism is taken seriously, and meaningful protection against it is accepted as a priority, the major security establishments will be driven to develop protective monitoring techniques to assure managerial control over nuclear explosive material and prudential oversight over critical areas of biological research. Developing such protective regulation would require dramatic revision of the operational principles associated with the prevailing practice of mutual deterrence. Procedures for the organized sharing of detailed information docu-

menting continuous compliance with agreed standards of behavior would necessarily subordinate traditional practices of secrecy to an overriding interest in systematic transparency. Preventive efforts to ensure that the potential threats are never realized would necessarily dominate traditional preparations for contingency reaction. Security relationships would necessarily elevate interest in protective collaboration over the legacy of confrontation.

It remains to be seen, of course, whether the major governments – the United States in particular – are capable of undertaking such adjustments, which could fairly be considered revolutionary in character. It is evident, however, that they are being subjected to potentially compelling incentives to do so.

As the possibility of catastrophic terrorism is pondered and the implications assessed, international security arrangements will simultaneously be shaped by an emerging problem of a very different character. Sensing and information management technologies are providing the basis for military operations that are increasingly precise, rapid, and stealthy. These technologies allow large-scale traditional missions to be performed more efficiently and with greater confidence, thereby reducing the self-detering effect that has served to restrain the use of military force. At the same time, precision technology is enabling extremely intrusive small-scale missions to be undertaken.

Since the capability for small-scale coercive intrusion is still not fully developed, there is relatively little precedent to demonstrate how it might be used and what its implications might be, but technical projections are sufficiently robust to energize the imaginations of the military planners and security bureaucrats who do threat assessment. Preci-

sion technology, for instance, could be directed against critical social assets that normal terrorists could not easily reach – cars or planes transporting heads of state, or critical power system transformers. The ability to undertake coercive action at long range without warning, and possibly even without indisputable attribution, would confer an ability to impose political demands in a high-tech form of blackmail. The U.S. military has by far the most advanced military information technology systems; that emerging capability connected to the proclaimed doctrine of preventive coercion is, to put it mildly, an alarming prospect to any country with reason to believe it is a potential target. American security planners are already concerned that hostile states might use their nascent information warfare capabilities in asymmetrical attacks, and these planners would be especially alarmed should any other country acquire the level of precision-strike capability that the United States already possesses. When the implications are better appreciated, precision-strike capability is likely, indeed virtually certain, to be considered an urgent topic for protective regulation – a central strategic consideration intimately related to all the others.

The capability in question is being generated by such a broad array of specific technologies and practical applications that the focus of effective regulation is a significant question. Since various support functions performed from space are essential elements of precision-strike capability, however, it is reasonable to expect that space activities will play a major role. If the capacity for direct attack within, from, and through space were developed as the United States proposes, space would clearly become the primary venue for coercive intrusion and military dominance. Because of the inherent physical and legal

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vulnerability of space assets, however, it is also the natural venue for countervailing reaction. For these reasons, the evolution of space policy is likely to shape the evolution of security relationships generally.

Up to this point, space activities have been regulated by a mixture of formal legal provisions and customary operational practices, most of which were developed primarily to support the mutual deterrence arrangement. Nuclear force operations provided the original impetus for sensing, tracking, optical observation, electronic intercept, navigation, communications relay, and weather assessment. Those central purposes dominated the evolution of rules. Scientific exploration and manned space programs introduced competing considerations from the outset, and those have been reinforced in recent decades by commercial utilization. Support for conventional force operations, including precision-strike capability, has also been an increasingly important and somewhat competitive military concern in recent decades. In general, however, the rules have not been adjusted to reflect the changing security context and pattern of space utilization.

The need to make these adjustments has been widely recognized – by the UN’s Committee on the Peaceful Uses of Outer Space (COPUS), the UN General Assembly, and the Conference on Disarmament (CD), the UN’s independent multilateral arms control negotiation body. In 1994, the CD convened its most recent ad hoc committee on Prevention of an Arms Race in Outer Space (PAROS). Since then, China has been the most active champion of the effort to secure a negotiating mandate for PAROS, the United States its principal antagonist. Despite nearly universal interna-

tional support for active negotiations, the United States has utilized CD procedural rules to prevent the issuing of an enabling mandate.⁹

The core issue in contention has to do with weapons in space as distinct from military support activities. The 1967 Outer Space Treaty (OST) unambiguously prohibits stationing weapons of mass destruction in space and using the Moon and other celestial bodies for non-peaceful purposes, including military installations and weapons testing. The treaty, however, does not mention the transiting through space of such weapons as warheads on a non-orbiting ballistic missile trajectory, nor does it make any determination about the utilization of conventional explosives or other technologies not traditionally placed in the mass-destruction category. Under China’s interpretation, the treaty extends legal protection to all other space activities, including those providing support for military operations under the provision stated in Article III that such activities are peaceful in character – that is, confined to the right of self-defense conferred by the UN Charter. With that understanding, sovereign jurisdiction exercised over land, sea approaches, and in the atmosphere cannot be extended into space. Article II declares that outer space is not subject to national appropriation, which means that satellites can orbit over national territory without permission and, by extension, without any legitimate grounds for interference. Un-

9 In 2002, the annual UN General Assembly resolution urging steps to reinforce and expand the legal regime for outer space (including the establishment of an ad hoc committee on PAROS in the CD) was supported by 159 countries, with no opposition, and abstentions only by the United States, Israel, and Micronesia. The 2002 New Agenda Coalition Resolution also expressed for the first time concern about space weaponization.

der official U.S. interpretation, a general prohibition on interference with satellites is now firmly established in customary law, and thus neither rests solely on the legal foundation of the OST nor is subject to its peaceful-use qualification.¹⁰ China maintains that the provisions of the OST must be explicitly extended to prohibit the utilization of all weapons in space, and suggests, without detailed elaboration, that some constraint on military support activity is necessary as well. China further suggests that the systematic development of space weapons being projected by the United States would violate the terms of the OST and thereby remove the legal protection it provides. The implication, reasonably inferred but so far not explicitly stated, is that China or any other country would then be free to interfere with satellite transit over national territory in exercise of its own right of self-defense.

This impasse over PAROS in the Conference on Disarmament can reasonably be seen as an inchoate and slowly developing policy confrontation with ominous implications – analogous, perhaps, to a malignant tumor in its earliest stages. Any country that believes itself compelled to defend against coercive threat with a strategy of negation would almost certainly focus on space assets as the most promising target.

The idea that satellites can be defended with superior technical virtuosity or in Wild West gunslinger style might be appealing in Hollywood, but not to any-

¹⁰ “Speech on Outer Space by Eric M. Javits, US Ambassador to the Conference on Disarmament (CD), to the ‘Conference on Future Security in Space,’ organized by the Monterey Institute of International Studies and the Mountbatten Centre of International Studies, Southampton, England” (28 May 2002), available at <<http://www.acronym.org.uk/docs/0205/doc17.htm>>.

one in the business of operating satellites. The unavoidable fact, largely determined by the laws of physics, is that all space services can be disrupted at a small fraction of the cost required to perform them. With some effort, satellites can be observed and their movements can be predicted. The velocity required to maintain their orbits and the energy required to achieve that velocity make satellites structurally vulnerable to collision with any object of any appreciable size. In addition, their internal functions are vulnerable to many forms of hostile electromagnetic radiation. It is vastly easier to arrange for direct collisions than to avoid them or to protect against their consequences. Electromagnetic interference is somewhat more demanding but still confers an advantage to the attacker. Standard methods of protection (hardening, camouflage, evasive maneuver, and active defense) can be attempted, but all of these are substantially less effective and more expensive than they are in other environments.

Space is an environment so dependent on protective rules that a threat to those rules becomes a threat to the viability of all space activity well before any subtle acts of interference, let alone blatant acts of destruction, actually occur. As the most immediately apparent symptom of an incipient strategic confrontation between the United States and China, the impasse in Geneva is evidence of the ill health of the existing system of rules for space. Any doctor who ignored a comparably ominous symptom in a patient would be subject to a ruinous lawsuit.

If China or any other country were actually to undertake a strategy of negation in space, and were to do so skillfully, presumably it would begin with low-level acts of interference intended to

warn rather than provoke. Precisely because of the importance and fragility of the regulatory rules, this strategy of negation would be dangerous to the initiator as well as the target, even in its earliest detectable stages, and would become much more mutually dangerous if it were played out to some decisive conclusion. An adroit negation strategy would be designed to achieve early accommodation and would absolutely have to establish broadly accepted justification. Otherwise the actions designed to exert countervailing pressure could result in political disaster. The problem, of course, is that subtle warnings are often discounted or not recognized at all, whereas acts of provocation stark enough to command attention tend to induce belligerent reaction. Getting the balance right is something like walking a tightrope in a variable wind. Since there are few indications in the public record that acts of interference against satellites have yet been specifically threatened or actually undertaken, it is reasonable to conclude that the strategy of negation is perhaps an option but not yet a commitment for any major country.¹¹ Thus, there is time to consider a more constructive approach.

If the incipient collision of policy is to be gracefully avoided, existing space regulations would have to be elaborated and formalized to accomplish two related purposes: 1) categorical prohibition of the destruction of space assets or di-

11 Much has been made recently of Iraqi efforts to jam GPS receivers during the war and of allegations that Cuba has been jamming expatriate satellite television broadcasts into Iran, but these are isolated, relatively low-tech acts of interference. See David A. Fulgham, "War Shapes New Products," *Aviation Week and Space Technology* 158 (24) (16 June 2003): 152; and Henry Hamman, "Jamming of Satellite Broadcasts puts Spotlight on Cuban-Iranian Ties," *Financial Times*, 21 July 2003, 6.

rect interference with their legitimate functions; and 2) more refined specification of the limits of permissible activity. That latter provision would be especially controversial in the United States, but basic common sense suggests that tolerance of space activities will ultimately depend on credible assurance that they are not unacceptably intrusive. Presumably, current levels of capability can be accommodated indefinitely, and in some areas, such as communication relay, there is no reason to anticipate imposed limitations. With regard to multi-spectrum observation and perhaps electronic intercept, however, one can project the evolution of capability to levels that would require some regulatory limitation. If navigation services are to be protected, moreover, some understanding will have to be reached about their utilization in precision-attack operations. Over the longer term, assets that are as consequential and as vulnerable as those in space will have to be broadly legitimized to be sustained – and national dominance will not constitute a viable basis for international legitimacy. In the end, a more inclusive formulation of purpose and a more equitable distribution of the benefits of space services will have to be devised.

The term 'transformation,' as it is used in U.S. military planning documents, generally refers to all that is involved in making military operations more effective – the application of advanced technology certainly, but also the evolution of doctrine, training, and mission conception to produce more decisive capability. The implicit assumption is that more decisive capability, as measured against the capacities of potential adversaries, will assure greater security for the United States and for those to whom we choose to extend protection. In that ap-

plication, 'transformation' is not a comprehensively inclusive term, and it poses the question how the security of the United States and its allies relates to international security generally. Since those formally included in the U.S. alliance system are a declining fraction of the world population (no more than 30 percent at the moment), that is a serious question for everyone involved. The current military planning presumption is that the United States can and must preserve a competitive edge indefinitely, and that the security of anyone outside the U.S. alliance system is not a vital national concern. That is said to be a realistic perspective. The possibility that transformation so conceived might stimulate major threats that might otherwise be avoided is not currently being considered. The possibility that the security of the United States ultimately depends on the security of everyone else is essentially ignored. Such a thought is said to be unrealistic.

The currently proclaimed standards of realism will eventually have to be adjusted. Over time, technology developed in the United States will assuredly diffuse to the rest of the world. If the context for that diffusion is competition in intimidation, the inherent vulnerability of the United States will be a rising danger, potentially an unmanageable one. Transformation as currently practiced carries an appreciable risk of ultimate doom. If the U.S. political system does not ultimately recognize that risk and confront the implications, its viability will be threatened. All of which is to say that the exploration of alternatives can fairly be considered a vital obligation, and that exploration might usefully begin with a broader notion of transformation.

If it is to be globally constructive, transformation would have to be applied in the first instance not to the instru-

ments of coercion, but rather to the central purpose of security and to the fundamental principles on which the conduct of security is based. The spontaneously integrating character of the global economy, the issues of equity and social coherence generated by the pattern of economic activity, the environmental implications of aggregate human activity, and the momentum of technology and of biotechnology in particular all suggest that global security will have to become the dominant objective and that security policy will necessarily have to be comprehensively inclusive. That further implies that policy will have to be based on principles that can inspire something approaching global consensus, and can manage the emerging threats of smaller-scale violence as well as the traditional ones of larger-scale aggression.

For some indefinite period, the U.S. military will be able to prevent large-scale forms of aggression on a global basis. If that capability is to be accepted as legitimate and preserved at a reasonable cost, however, the scope of application and the basis for justification will have to be altered. Protection against hostile invasion would have to be generally extended. Such protection could not be exclusively provided for the current alliance system. Principles of active confrontation, designed to assure that a strong deterrent is preserved and that effective preparations are made for predictable conventional force contingencies, would have to be subordinated to principles of reassurance whereby inherently superior U.S. forces conveyed confidence that they would not initiate attack as long as international standards of behavior were upheld. In order to convey that assurance convincingly, the United States would have to engage with all significant military establishments in the cooperative manner that it currently

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does only with formal allies. If that is to happen, the U.S. political system would have to alter its traditional practice of justifying its military effort in terms of designated threats, and would have to accept the burden of providing general protection. In doing so it would have to acknowledge that the United States is the dominant source of potential threat for everyone else, and that reassurance is as important as deterrence. Those are difficult but ultimately necessary conceptual and political adjustments to sustain the traditional commitment to preventing major war.

The problem of dealing with civil violence and clandestine terrorism is yet more demanding, since deterrence and defensive reaction are more difficult, making prevention all the more important. Effective prevention in these areas requires not merely conveying reassurance, but also direct collaboration in the control of what is broadly determined to be intolerably criminal activity. The first step in this is to define fundamental and universal standards of behavior widely enough accepted that powerful methods of mandatory transparency and enforced compliance could be globally applied without exception. The necessary accompanying step is to devise appropriate limitations and other forms of legal protection sufficient to ensure that those methods of prevention do not themselves become a menace.

The standard of behavior most likely to achieve universal adherence would be the prohibition of preparation for acts of truly massive destruction. That rule might be primarily directed against the speculative possibility of catastrophic terrorism, but it presumably would also have to be applied to the legacy practice of deterrence. It is also prudent to assume that the capability of precise coercion, which might be necessary to en-

force a preventive regime, would have to be globally regulated.

The situation in North Korea presents the most critical immediate test of those broad principles and of the process of transformation generally. The currently declared intention of the Democratic People's Republic of Korea to proceed with the production of plutonium is the first explicit challenge to the American policy of preventive coercion, and the eventual outcome will determine whether that is an operational policy or a lesser political exercise largely confined to Iraq. Since the declared North Korean intention has also been accompanied by a stated willingness to contemplate the negotiated dismantlement of the country's nuclear materials production complex, however, there also appears to be a constructive opportunity. Whatever happens on the Korean peninsula – a preventive attack, successful defiance of that threat, negotiated dismantlement, or some change in the political regime – the conditions of global security will be generally affected. An image of constructive transformation reasonably, and perhaps necessarily, will begin with an outcome in North Korea that demonstrates the underlying principles.

Such an outcome would involve a comprehensive settlement under which North Korea would dismantle its nuclear materials production facilities; terminate its ballistic missile development and export programs; redeploy its conventional forces (its artillery in particular) away from the DMZ and out of immediate range of Seoul; and submit to verification procedures to document compliance with these provisions. In exchange, the North Korean government would gain full political normalization, an end to all economic sanctions, substantial assistance for economic regener-

ation, and security guarantees credibly issued and actively practiced by the United States. That arrangement would be endorsed and implemented not only by the six states currently involved in diplomatic discussions – China, Japan, Russia, and South Korea in addition to the United States and North Korea – but also by all parties to the Nonproliferation Treaty and by the international financial institutions. In the event that the nuclear reactors promised under the 1994 Agreed Framework are ever completed, the fuel would be under direct international control at all times, and that requirement would become the new standard for all new nuclear reactors worldwide.¹²

Such a comprehensive settlement would go well beyond what has been considered in any documented official discussion – and would be considered unrealistic by most of those who have participated in those discussions. The grounds for objection have much more to do with prevailing political attitudes, however, than with real interest. It seems evident that security for all parties would be substantially improved under such an arrangement. The provisions are less fanciful than the United States's imagining it could conduct a preventive war against North Korea at

12 It is reasonable to speculate that as part of a comprehensive settlement of this sort, North Korea would be provided, as a form of economic assistance, a modernized power grid that could be built much more rapidly than a reactor. Even if such a settlement were made, however, the North Korean government might in principle insist on the right to the reactors, in which case the provisions for international control of the fuel cycle would be relevant. Internationalizing control of the nuclear fuel cycle would be a much higher standard than current NPT rules, and that fact would be at least part of the answer to those who contend that any compensation for North Korea is unacceptable acquiescence to blackmail.

an acceptable cost, or North Korea's imagining it could safely prosper by exporting nuclear materials and ballistic missiles while fending off the United States with nuclear threats, or anyone's imagining North Korean society will undergo a felicitous internal transformation unassisted. Nonetheless, with current policy dominated more by political attitude than by real interest, a comprehensive arrangement is not likely to emerge from either the United States or North Korea.

Exploration of a general settlement would have to be initiated by a third party, most plausibly China. With the breakdown of the Agreed Framework, China has already become procedurally more active in promoting and organizing official dialogue among what is coming to be called the group of six. It is admittedly a stretch, but not an inconceivable one, that China, concerned about the implications of an unraveling situation, might become substantively more venturesome as well.

Whatever the outcome in North Korea, its global implications will be affected by the handling of Iran's nuclear material production activities. A strategy for constructive transformation would reasonably aspire to make that situation a reinforcing precedent. In a report issued in November of 2003, the director general of the International Atomic Energy Agency (IAEA) detailed Iran's violations of its disclosure obligations under the NPT.¹³ The report determined that dating back to 1985, and in some instances back to 1981, Iran had conducted technical explorations of "practically

13 "Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran: Report by the Director General," IAEA (GOV/2003/71), (10 November 2003), <<http://www.iaea.org/Publications/Documents/Board/2004/gov2004-21.pdf>>.

a complete front end of a nuclear fuel cycle, including uranium mining and milling, conversion, enrichment, fuel fabrication, heavy water production, a light water reactor, a heavy water research reactor and associated research and development activities” – all of which should have been reported but was not.¹⁴ Small amounts of enriched uranium had been produced in prototype gas centrifuges and laser enrichment facilities. Small amounts of separated plutonium had been produced in experimental facilities as well. A prototype uranium enrichment plant and a much larger production facility were revealed to be under construction at Natanz. Although the effort had not yet produced enough material for a single nuclear weapon, completion and operation of the observed facilities would in principle provide the capacity for producing enough material for many weapons.

Caught in the subterfuge, Iran officially committed itself to full disclosure, announcing acceptance of the additional IAEA inspection protocol (INFCIRC 540) it had resisted up to that point. Under pressure from Russia, France, Germany, and Britain, Iran also temporarily suspended its uranium enrichment and plutonium separation activities by implication until the details of the IAEA inspection could be worked out. While admitting its violation of disclosure rules, the Iranian government nonetheless insisted that its activities were designed for nuclear power generation only and did not constitute a nuclear weapons program. The United States forcefully alleged the contrary, however, and attempted, unsuccessfully, to have the IAEA Governing Board refer the matter to the UN Security Council for the imposition of sanc-

¹⁴ Ibid., 9.

tions. Eventually, the United States compromised with the Europeans and Iran on an IAEA resolution that “strongly deplores Iran’s past failures and breaches,” welcomes its new policy of disclosure, and warns that the IAEA Governing Board will respond quickly and strongly if any further violations are discovered. None of the parties involved, however, yet seems fully satisfied.

The Iranian admission of disclosure violations and apparent acceptance of more intrusive inspections clearly indicate a change of policy, but do not resolve the question of underlying intention. Under current NPT provisions it would be legally permissible for Iran to accumulate separated plutonium under full IAEA safeguards, as Japan has done, thereby producing a material stockpile that in principle could be rapidly converted into a nuclear weapons arsenal. If that possibility is to be prevented, Iran would have to forgo the independent production of enriched uranium and plutonium and to accept international control of the fuel for any of the nuclear reactors it constructs and operates – the higher standard of control envisaged for North Korea. In accepting that higher standard, Iran might reasonably demand specific security guarantees from the United States. Because Iran’s inherent economic prospects are much better than North Korea’s, a general settlement package might rely more exclusively on security provisions, but the underlying principle of accommodation would be similar. Were fundamental accommodation to be achieved in both instances, the troublesome concept of ‘rogue state’ might be retired – and that would be a significant practical accomplishment. Such accommodation is even less likely to emerge from any bilateral interaction than it is from the North Korean case, but the potential mediators are at least

as readily identified and already more active. It is evident that the EU and Russia together could play that role, and the substantive terms of accommodation would be a natural evolution of their current policies.

The other opportunities for constructive transformation are less immediately urgent but more directly global in character. The impasse over a negotiating mandate for PAROS and the failed effort to devise a verification and enforcement protocol for the BWC have already engaged the general diplomatic community in a struggle with the United States over basic security principles. In both instances the United States, acting essentially alone, has blocked widely supported efforts to devise protective regulation, and those actions are now interpreted to be a diplomatic extension of its preventive coercion doctrine. Recognizing that unusually powerful common interests are engaged in both instances, strategists for constructive transformation could plausibly seek to mobilize frustrated international sentiment and could eventually expect to induce resonance within the United States as well. In more mature phases of such an effort, there would have to be active official champions urging protective oversight provisions for biotechnology and offering candidate schemes for space regulation. However, such efforts usually originate with less formal, more spontaneous discussions of the sort that are occurring among like-minded countries and in track-two meetings of professional societies. One can reasonably imagine a constructive program with general conceptual coherence emerging from the quiet exploratory efforts currently being undertaken on both topics.

It is certainly true, nonetheless, that very prominent and presumably very extensive public discussion would be

required if constructive transformation were actually to be accomplished or even seriously attempted. The idea would have to be put into circulation in engaging detail if security policy is to be meaningfully affected, and that would require official advocates who are forceful, consequential, and adroit enough to command global attention. By virtue both of incentive and apparent inclination, China would be the most plausible source of such an initiative, but it is not reasonable to impose the burden of global leadership entirely on China. It is more reasonable to imagine a productive collaboration between China and the members of the EU and the OSCE. The basic principles of constructive collaboration for mutual protection have been most significantly developed in Europe over the course of the cold war and thereafter. It is that legacy, adapted by China and extended to Asia, that offers the most promising prospect for improving security through a process of constructive transformation.

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