



Multilateral Cooperation on Nonproliferation

Jeffrey W. Knopf

*Monterey Institute of
International Studies*

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For further information, please contact:

The Center on Contemporary Conflict

Naval Postgraduate School
1411 Cunningham Road
Monterey, CA 93943

ccc@nps.edu

or

OSRDInfo@dtra.mil

TABLE OF CONTENTS

Executive Summary	
Introduction	1
Methodology	3
Nonproliferation Cooperation: The Project Framework	3
<i>The Increasingly Collaborative Nature of Cooperation</i>	4
<i>The Stages of Cooperation</i>	7
<i>Explaining Cooperation: Potentially Relevant Factors</i>	8
<i>Assessing Effectiveness</i>	11
Workshop Summary	12
<i>Panel I</i>	12
<i>Panel II</i>	13
<i>Panel III</i>	15
<i>Panel IV</i>	17
Key Findings	19
<i>Observations re Cooperation</i>	19
<i>Explaining Cooperation</i>	19
<i>Evaluating Effectiveness</i>	22
Policy Recommendations.....	25
Conclusions: Building Cooperation	29
Appendix: Workshop Agenda.....	31
Appendix: Workshop Participants	33

EXECUTIVE SUMMARY

Global efforts to prevent the spread of weapons of mass destruction (WMD) have given rise to international regimes that cover nuclear, biological, and chemical weapons, respectively. These regimes each have at their core a global treaty: the Nuclear Non-Proliferation Treaty (NPT), the Biological and Toxin Weapons Convention (BWC), and the Chemical Weapons Convention (CWC). Over time, a number of other initiatives have sprung up alongside these treaties. Yet, while a tremendous amount of cooperative activity takes place beyond the core nonproliferation treaties, there is very little research dedicated to a comparative analysis of these efforts. This project addresses this gap in our knowledge by providing the first systematic comparative analysis of cooperative nonproliferation activities beyond the core treaties. It has two goals: to identify sources of cooperative nonproliferation activities and to assess the effectiveness of such endeavors.

Much of the nonproliferation cooperation that has emerged has a practical, operational component. This places a premium on working-level relationships. As a consequence, transnational connections among professional experts have an important influence on the implementation of cooperation. The initial motivations for attempting cooperation, however, often lie elsewhere. The project finds that cooperation has been shaped by states' own self-interests and by U.S. leadership. Neither of these factors, however, operates in a completely straightforward way. Interests can be reinterpreted, and U.S. leadership can backfire when it is exercised in a heavy-handed manner. Other factors that help explain patterns of cooperation include the spread of norms, the national capacities of different states to carry out required activities, and the presence or absence of domestic political constraints on cooperation.

Assessing effectiveness proved difficult. Although it is often not feasible to estimate an overall success level, for many of the initiatives studied it is possible to point to clear examples of successful implementation of program objectives. On balance, cooperative nonproliferation activities make a positive contribution to nonproliferation and problems would likely be worse without them. Several policy recommendations follow in this report. In particular, there is a need to improve coherence and integration among the multiple cooperative endeavors. In addition, many initiatives place burdens on developing countries that can accentuate their concerns about gaps between "haves" and "have-nots." Efforts to provide assistance and to re-frame nonproliferation measures as part of broader efforts to achieve collective security can help alleviate these problems. Finally, it can be helpful to separate nonproliferation from ideological debates about the pros and cons of "multilateralism" in general. Both informal small group efforts and more institutionalized global measures can have a positive impact. The pursuit of cooperative approaches to dealing with proliferation risks remains worthwhile; it will most likely involve an ongoing process of building cooperation one step and one participant at a time.

INTRODUCTION

Global efforts to prevent the spread of weapons of mass destruction (WMD) have given rise to international regimes that cover nuclear, biological, and chemical weapons, respectively. These regimes each have at their core a global treaty: the Nuclear Non-Proliferation Treaty (NPT), the Biological and Toxin Weapons Convention (BWC), and the Chemical Weapons Convention (CWC). Although these treaties are important, they do not exhaust the full range of global nonproliferation efforts. A number of other initiatives have sprung up alongside the core nonproliferation treaties.

These efforts began in the 1970s and 1980s with the creation of multilateral export control regimes such as the Nuclear Suppliers Group (NSG) and the Australia Group, which seek to control exports that could be useful in nuclear, chemical, or biological weapons programs. There have also been regional initiatives. In 1991, for example, Argentina and Brazil created the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) to verify, at a time when neither country had yet signed the NPT, that each was complying with full-scope safeguards on its nuclear activities.

The collapse of the Soviet Union spurred new efforts, such as the Nunn-Lugar Cooperative Threat Reduction (CTR) program to help former Soviet republics secure and dismantle nuclear, biological, and chemical weapons. Subsequent initiatives that complement the CTR program include the Group of 8 (G-8) Global Partnership Against the Spread of Weapons and Materials of Mass Destruction and the U.S. Department of Energy's (DOE) Global Threat Reduction Initiative (GTRI). The September 11, 2001 (9/11) attacks and the discovery of the A.Q. Khan network stimulated further cooperative endeavors such as the Proliferation Security Initiative (PSI) and UN Security Council Resolution (UNSCR) 1540, both of which aim to reduce trafficking in WMD-related materials. More recently, President Barack Obama attempted to build on these efforts by launching a series of nuclear security summits starting in 2010.

In short, there is a tremendous amount of cooperative activity that takes place beyond the core nonproliferation treaties. Many of these initiatives have attracted the attention of analysts, and there are now multiple studies of several of them, such as CTR,¹ PSI,² and UNSCR 1540.³ Each

¹ For example, John M. Shields and William C. Potter, eds., *Dismantling the Cold War: U.S. and NIS Perspectives on the Nunn-Lugar Cooperative Threat Reduction Program* (Cambridge, MA: MIT Press, 1997); Jason D. Ellis, *Defense by Other Means: The Politics of U.S.-NIS Threat Reduction and Nuclear Security Cooperation* (Westport, CT: Praeger, 2001); Togzhan Kassenova, *From Antagonism to Partnership: The Uneasy Path of U.S.-Russian Cooperative Threat Reduction* (Stuttgart: ibidem-Verlag, 2007); Sharon K. Weiner, *Our Own Worst Enemy? Institutional Interests and the Proliferation of Nuclear Weapons Expertise* (Cambridge, MA: MIT Press, 2011).

² For example, Andrew C. Winner, "The Proliferation Security Initiative: The New Face of Interdiction," *Washington Quarterly* 28, no. 2 (Spring 2005), 129-43; Mark R. Shulman, "The Proliferation Security Initiative as a New Paradigm for Peace and Security," Strategic Studies Institute, U.S. Army War College, April 2006; Emma Belcher, "The Proliferation

initiative, however, is typically studied in isolation. There is very little research dedicated to a comparative analysis⁴ from which one might draw broader lessons about the sources and effectiveness of international cooperation to promote nonproliferation. This project addresses this gap in our knowledge by providing the first systematic comparative analysis of cooperative nonproliferation activities beyond the core nonproliferation treaties.

This project has two goals: to identify sources of cooperative nonproliferation activities and to assess the effectiveness of such endeavors. First, this project examines the activities listed above as instances of international cooperation. It seeks to understand the origins of these efforts and why key states either do or do not cooperate with the various initiatives. To assist in this process, the Principal Investigator (PI) carried out a review of existing literature on international cooperation to identify factors that could prove relevant in explaining cooperation on nonproliferation.

Based on this review, it appears that reality has moved beyond existing theory. Some of the activities taking place in the nonproliferation realm are not easy to describe and explain within the existing analytical frameworks for discussing cooperation. Since the core treaties were signed, cooperation in practice has gradually become less about negotiating formal international agreements and more about building new forms of cooperation, many of which are operationally oriented. Treaties have not ceased to be a goal – the Comprehensive Test Ban Treaty (CTBT) and several regional nuclear-weapon-free zones have been negotiated, and there is still interest in a fissile material cutoff treaty (FMCT). But with most of the key treaties established, cooperation has become more a matter of doing additional things that cannot necessarily be accomplished through a signature on a treaty. International cooperation theory has focused mainly on whether states reach or comply with agreements, or if they create or sustain international organizations. Much of nonproliferation activity today does not look like this. Important elements of nonproliferation involve building and expanding cooperative arrangements, often through working-level relationships, and sometimes, though not always, this does not require reaching new formal agreements. If this is the case, our frameworks for analyzing cooperation need to consider not only how agreements to cooperate are reached but also how they are made operational.

Security Initiative: Lessons for Using Nonbinding Agreements,” Working Paper, International Institutions and Global Governance Program, Council on Foreign Relations, July 2011; David A. Cooper, “Challenging Contemporary Notions of Middle Power Influence: Implications of the Proliferation Security Initiative for ‘Middle Power Theory,’” *Foreign Policy Analysis* 7, no. 3 (July 2011).

³ For example, Olivia Bosch and Peter van Ham, eds., *Global Non-Proliferation and Counter-Terrorism: The Impact of UNSCR 1540* (London: Chatham House, 2007); Lawrence Scheinman, ed., *Implementing Resolution 1540: The Role of Regional Organizations* (Geneva: UNIDIR, 2008).

⁴ There are two partial exceptions, but neither has the same focus as this project: Nathan E. Busch and Daniel H. Joyner, eds., *Combating Weapons of Mass Destruction: The Future of International Nonproliferation Policy* (Athens, GA: University of Georgia Press, 2009); Christopher Daase and Oliver Meier, eds., *Arms Control in the 21st Century: Between Coercion and Cooperation* (London: Routledge, 2012).

As a second goal, this project seeks to evaluate the effectiveness of various multilateral measures in contributing to nonproliferation. The project does not aspire to the kind of precisely quantified assessment a government agency responsible for program evaluation might report, as this level of detail is not necessary for the project's purposes. Rather, the goal is a rough, preliminary assessment of each initiative examined here. The focus is not on labeling any individual program an unmitigated success or failure, but rather on estimating relative effectiveness across the different types of activities. If some initiatives have performed better than others, then comparison should make is possible to draw policy-relevant lessons about factors that make international cooperation more or less effective in achieving nonproliferation objectives.

METHODOLOGY

This study utilizes the comparative case study method. Subject matter experts were recruited to write analyses of specific programs or sets of activities involving international cooperation on WMD nonproliferation. The goal was to be as comprehensive as possible in the coverage of cooperative nonproliferation activities, while still operating within the constraints of the project budget and the availability of appropriate subject matter experts.

The PI developed a starting analytical framework that was provided ahead of time to the subject matter experts to guide their research and analysis. The participants then came together for a one-day workshop, held in Monterey, CA, on March 30, 2012 (see appendix for details). About 20 people participated in the invitation-only workshop. The researchers presented their initial findings and received feedback from designated discussants who had been recruited to comment on the papers. Researchers also received feedback from the other project participants and invited attendees of the workshop. Based on discussions at the workshop and subsequent written feedback provided by the PI, the project participants revised their papers into final products.

NONPROLIFERATION COOPERATION: THE PROJECT FRAMEWORK

One goal of this project is to gain a better understanding of the sources of cooperation on nonproliferation. This involves exploring both the origins of cooperative initiatives and the reasons why individual states do or do not participate in them. As one way to approach this question, early work on this project included a review of alternative theories in International Relations (IR) concerning international cooperation.⁵

⁵ Classic studies include Ernst B. Haas, "Why Collaborate? Issue-Linkage and International Regimes," *World Politics* 32, no. 3 (April 1980), 357-405; Stephen D. Krasner, ed., *International Regimes* (Ithaca: Cornell University Press, 1983); Robert Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984); Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton: Princeton University Press, 1984); and Kenneth A. Oye, ed., *Cooperation*

International cooperation is most often explained as a product of national self-interest in an increasingly interdependent world. Other strands in the literature emphasize the power and leadership of a hegemonic state or changes in knowledge and ideas and the transnational diffusion of these new understandings. Additional research points to the workings of domestic politics or human psychology and how these might be affected by the negotiating strategies states employ. While not specifically focused on international cooperation, experimental research on how people actually behave when confronted with collective action problems points to another important factor. Cooperation levels substantially increase when players can engage in face-to-face communication.⁶

This review suggests that cooperation theory offers useful pointers for identifying potential sources of cooperation on nonproliferation, but it does not fully capture the types of cooperation involved. In particular, cooperation theory does not devote adequate attention to what might broadly be construed as the implementation side, or the steps involved in getting from a policy objective to an operating enterprise. In addition, the academic literature tends to assume a single, binary outcome of interest: either there is cooperation or there is not. In practice, however, there can be multiple steps in the process of achieving and sustaining cooperation, and at times it might be useful to disaggregate these into separate stages.

The Increasingly Collaborative Nature of Cooperation

The observation that nonproliferation cooperation often involves working-level activities can be related to a useful distinction in the IR literature on cooperation. Arthur Stein introduced an important distinction between “coordination” and “collaboration” scenarios.⁷ Coordination is required in response to “dilemmas of common aversions,” which can be represented in game theory by games like chicken or battle of the sexes.⁸ Here, players need only avoid a particular bad outcome, but beyond the minimal coordination required to do so no further cooperation is required. Collaboration, in contrast, is needed when states face “dilemmas of common interests,” which

under Anarchy (Princeton: Princeton University Press, 1986). Debates about the merits of the theories proposed in this first wave of cooperation theory are usefully summarized in David A. Baldwin, ed., *Neorealism and Neoliberalism: The Contemporary Debate* (New York: Columbia University Press, 1993) and Andreas Hasenclever, Peter Mayer, and Volker Rittberger, *Theories of International Regimes* (Cambridge: Cambridge University Press, 1997). Recent studies and reviews include Scott Barrett, *Why Cooperate? The Incentive to Supply Global Public Goods* (Oxford: Oxford University Press, 2007); I. William Zartman and Saadia Touval, eds., *International Cooperation: The Extents and Limits of Multilateralism* (Cambridge: Cambridge University Press, 2010); and Xinyuan Dai and Duncan Snidal, “International Cooperation Theory,” in *The International Studies Encyclopedia*, ed. Robert A. Denemark (Blackwell Publishing, 2010).

⁶ Elinor Ostrom, “A Behavioral Approach to the Rational Choice Theory of Collective Action,” *American Political Science Review* 92, no. 1 (March 1998), 6-7.

⁷ Arthur A. Stein, “Coordination and Collaboration: Regimes in an Anarchic World,” in Krasner, *International Regimes*.

⁸ In chicken, both sides want to avoid a mutually destructive outcome (like a car crash), but each also wants to avoid being the only one to cooperate (and hence be labeled the chicken). In battle of the sexes, both sides want to get together (for example, on a date), but each has slightly different preferences for what they want to do (such as which movie to see) so they still have to coordinate on which activity they choose.

require them to specify the actions they will take to ensure a particular good outcome. To Stein, prisoners' dilemma (PD) is an example of a collaboration game.⁹ Coordination games are self-enforcing – once it is agreed, for instance, that people will drive on the right, there is no unilateral incentive to defect and no enforcement is needed (except in cases of drivers who are drunk or bent on mayhem). Collaboration games involve incentives to cheat and therefore require an enforcement mechanism to maintain cooperation.

This distinction is reflected in different definitions of cooperation. In a widely embraced definition, Keohane depicted international cooperation as involving “policy coordination.”¹⁰ Others, such as a recent volume by Zartman and Touval, define cooperation as involving “working together.”¹¹ This would seem to be a synonym for collaboration, whose root terms suggest “co-laboring” as the essence of cooperation. An examination of nonproliferation activities will show the value of working with both terms and thinking in terms of a spectrum along which cooperation can fall, ranging from minimal coordination to robust forms of collaboration. It is necessary, however, to move away from Stein's definitions to something closer to the ordinary dictionary definitions of both terms.

Treaties to control WMD are frequently interpreted as cases of collaboration, but it would be better to see them as involving primarily coordination. When the focus is on incentives to cheat, arms control looks like collaboration, but this neglects what it takes to actually implement cooperation. U.S.-Soviet nuclear arms control, for example, has often been described as a response to a PD-type situation. If the two sides could not agree on fixed limits on their nuclear arsenals, they ran the risk of an expensive and potentially destabilizing arms race. But each feared the other might cheat, leading to an insistence (more on the U.S. side than on the Soviet side) on adequate verification measures. The nuclear nonproliferation regime can likewise be seen as a multiplayer PD. It multilateralizes an implicit series of bilateral “I won't if you won't” deals between states not to develop nuclear arms. Both Cold War nuclear arms control and the NPT required mutual restraint – they rested upon each signatory agreeing not to do certain things conditional on other signatories also not doing those things.¹²

⁹ In PD, two prisoners are each separately offered a deal by the district attorney. If either confesses and also implicates the other accomplice, that prisoner will get a reduction of his or her sentence. In the absence of communication or other mechanisms to induce the prisoners to stay quiet, the rational incentive for each is to “defect” and implicate the other rather than to cooperate (with the other prisoner, not the D.A.). Because both defect and implicate the other, they end up with a worse outcome from mutual defection than they would have received from mutual cooperation.

¹⁰ Keohane, *After Hegemony*, 51-52. This is described as a consensus definition by Helen Milner, “International Theories of Cooperation among Nations: Strengths and Weaknesses,” *World Politics* 44, no. 3 (April 1992), 467.

¹¹ Zartman and Touval, *International Cooperation*, 1.

¹² Barrett, *Why Cooperate?*, ch. 5.

Although IR theorists include both Cold War arms control and the NPT under the rubric of collaboration games, this language seems a misnomer. Negotiating the treaties required some working together, but thereafter implementation was largely carried out separately. The United States and the Soviet Union each made the required changes to their nuclear weapons deployments and other nuclear activities on their own, without the other's assistance, and until late in the Cold War each side also had sole responsibility for verifying the other's compliance by relying on its own "national technical means." The NPT operates similarly. Each non-nuclear state party agrees not to have a nuclear weapons program, but either not starting such an effort or dismantling an existing program is something it can do on its own without the involvement of other states. Verification requires cooperating with an international organization, the International Atomic Energy Agency (IAEA), but again does not require working directly with other states. Because they are basically agreements to exercise mutual restraint, both nuclear arms control and the main WMD nonproliferation treaties seem closer to coordination, as the dictionary would define that term. They require states to act separately to align their policies around common objectives, but do not require states to work side by side in a shared endeavor. Rather than a sharp dichotomy between coordination and collaboration, this suggests it will be more useful to think in terms of a continuum in which traditional arms control and nonproliferation measures – though perhaps involving modest collaboration – fall closer to the coordination end.

The various nonproliferation activities beyond the NPT are to varying degrees more collaborative in nature, in the sense that many of them require actually working together. Some, like UNSCR 1540, still remain closer to the coordination end of the spectrum; if they choose, states can enact the domestic legislation mandated by 1540 on their own without outside help. Other activities, like the export control regimes, are slightly more collaborative in nature. They require periodic meetings to discuss what should be included on "trigger lists" of items that should not be exported freely. Other activities are intensely collaborative. They require personnel from different states to work together, sometimes in an ongoing manner. Efforts to secure WMD materials or convert former chemical weapons factories are work projects that bring together personnel from two or more states. The interdiction activities called for by PSI also involve collaboration, as they can require intelligence agencies to share information or navies to carry out joint operations. In short, although the trend is not linear or unidirectional, there has been a shift over time in the nature of nonproliferation cooperation. *Since the NPT entered into force, additional nonproliferation activities have tended to move from simple coordination to involve greater elements of collaboration.*

The shift to greater levels of collaboration has mixed implications. On the one hand, it increases the potential for friction, as states have to find common ground on the details of carrying out a joint enterprise. Friction of this kind was evident in the CTR program, as U.S. and Russian

officials sometimes disagreed about how certain program elements should be managed.¹³ On the other hand, if the role of collaboration is in fact growing over time, this might also be helpful for explaining the patterns of cooperation observed in the nonproliferation arena. Because collaboration requires working together, it might serve as a conduit or a catalyst for the expansion of cooperation. Certainly some working relationships turn sour and serve as a brake on cooperation. But when working relationships go well, they might have a multiplier effect on cooperation. As noted earlier, face-to-face communication tends to increase cooperation levels, and collaborative endeavors will typically require more personal communication than efforts requiring only coordination. Collaboration at the working level can lead to increasing levels of trust, the sharing of information or know-how, the discovery of new problems that require the further development of cooperation, or the emergence or strengthening of transnational identities.¹⁴ There is also the possibility that the process might simply result in a greater comfort level with collaboration, as the various parties learn how to work together. If this is correct, collaboration might have advantages relative to coordination for the goal of fostering cooperation; it involves more potential feedback loops that could reinforce and add momentum to cooperative initiatives.

The Stages of Cooperation

Many of the leading works treat cooperation as binary: states choose either to cooperate or to defect; mutual cooperation either emerges or it does not. This study, in contrast, considers whether cooperation can be built over time. This makes it useful to disaggregate the process into separate stages.

For purposes of this study, four steps in the cooperation process were identified as most likely to be relevant: proposal-making, establishment, enlargement, and implementation. First, although regimes can develop organically from custom, nonproliferation initiatives do not tend to emerge in this way. Instead, somebody suggests them. Identifying who first proposes an initiative and why can hence be an important part of the story. The making of a cooperative proposal will often be the first step to examine in an attempt to understand the origins of cooperation.

¹³ Disputes over legal liability in case of accidents and over taxation of CTR programs slowed or stalled several planned U.S. activities in Russia. See John W.R. Leppingwell and Nikolai Sokov, "Strategic Offensive Arms Elimination and Weapons Protection, Control, and Accounting," *Nonproliferation Review* 7, no. 1 (Spring 2000), 59-75; [U.S.] National Research Council and Russian Academy of Sciences, *Strengthening U.S.-Russian Cooperation on Nuclear Nonproliferation: Recommendations for Action* (Washington, DC: National Academies Press, 2005), 15-21.

¹⁴ This perspective on collaboration has some similarities to social constructivist discussions of pluralistic security communities. Security communities are sets of states that believe war against other members of the community has become unthinkable; as a result, states develop expectations that issues involving other states inside (but not outside) the community will be dealt with through peaceful means. See Emanuel Adler and Michael Barnett, eds., *Security Communities* (Cambridge: Cambridge University Press, 1998). The difference is that constructivist work on security communities assumes that the development of a shared community identity is key. The focus here is more practical. It is whether or not states learn how to work together effectively regardless of whether this leads to development of a shared identity.

The second step involves negotiations or some other mechanism to bring a cooperative activity into being. Why do other states come to the table and what accounts for the parties eventually reaching an agreement? The second stage is labeled “establishment” rather than “negotiation” because some of the activities considered in this study did not emerge from formal negotiations. In some cases, such as PSI, one state announced the initiative and invited others to join in. In such cases, the states that first respond affirmatively to the invitation effectively establish that program as a going enterprise.

Sometimes, new states join cooperative arrangements after they have been established. This process of recruiting additional participants can be called “enlargement.” Examining why these late-comers decide to come on board may prove instructive. States that hang back at first and then change their minds may have different motivational profiles from those who sign on to cooperative arrangements from the beginning.

Finally, it may be important to pay attention to implementation as a distinct step. Many of the cooperative activities in the nonproliferation realm require something other than pure self-restraint (i.e. not starting a nuclear, biological, or chemical weapons program). They require states to take active steps; in some cases, these steps include working together in an operational way to secure or interdict WMD materials. Implementation, in this sense, includes but goes beyond compliance. Dismantling chemical weapons is a form of compliance with the CWC. But if a state lacks the capacity to do this on its own, it may require help via a supplemental cooperative arrangement. Implementing this supplemental arrangement is more a matter of finding an effective way to carry it out than a question of compliance. Even if a state has every intention of complying with the CWC, chemical disarmament may fail if these other cooperative arrangements do not work. Conversely, these more collaborative arrangements are emerging in part because the goals of the WMD nonproliferation regimes may not be achievable without them. Implementation is a distinct phase in international cooperation, and in the nonproliferation realm it is giving rise to more and more efforts to make collaborative activities operational. Because success in this regard is not automatic, it is important to consider both what factors lead to cooperative activities and to assess the effectiveness of such efforts in accomplishing their goals. The next two sections describe the framework that guided assessment of these questions for this project.

Explaining Cooperation: Potentially Relevant Factors

The case studies in this project examine different cooperative nonproliferation activities. Depending on the case, different stages of cooperation may be important. The following questions were provided to the case study authors to consider:

- Who first proposed the cooperative activity and why?
- How did the activity come to be established as a functioning arrangement?
- Which key actors joined in the activity and why? Have any critical actors refrained from participating and, if so, why?
- To the extent implementation is necessary, how has the activity been made operational in practice? How has it evolved over time and why has it evolved in this way?

Each of these questions is at least in part about factors that lead to or impede cooperation. Based on the review of cooperation theory conducted in the initial stage of this study, the following list of seven factors was provided for case study authors to consider. The factors listed here are not considered mutually exclusive; different cases might involve different combinations of these factors. In addition, it is anticipated that there will also be idiosyncratic elements in each case.

(1) Self-Interest: State interests are the obvious place to start in considering possible explanations for nonproliferation cooperation. In some cases, participation will be a result of a rather obvious, direct national interest. Desire to strengthen nonproliferation might be especially likely to result from perceived security threats, such as might arise when a country fears WMD acquisition by a regional rival. Self-interest could also be an explanation for non-cooperation. A state might see a strategic advantage in fostering proliferation or have an economic interest in exporting nuclear materials or technology, and these interests could account for non-participation in nonproliferation efforts.¹⁵

(2) U.S. Leadership: In the time period covered by the cases in this volume, only the United States could be considered a hegemonic power. This makes it important to examine whether U.S. leadership helps explain nonproliferation cooperation.

(3) Norms and Identity: In some cases, decisions may flow more from national leaders' feelings about what is right or wrong rather than rational cost-benefit calculations. If so, cooperation might reflect a normative understanding, for example, that WMD proliferation is bad or that joining multilateral institutions is good.¹⁶ States that prioritize other norms, such as the NPT's promise of access to peaceful nuclear technology, might instead resist certain post-NPT nonproliferation initiatives in the belief that they conflict with these other norms. In other cases, decisions about cooperation might be more a function of identity. Some national identities could lead to a desire to

¹⁵ For an attempt to test strategic versus economic motivations for sensitive nuclear exports, see Matthew Kroenig, "Exporting the Bomb: Why States Provide Sensitive Nuclear Assistance," *American Political Science Review* 103, no. 1 (Feb. 2009), 113-33.

¹⁶ For an argument about the impact of nonproliferation norms associated with the NPT, see Maria Rost Rublee, *Nonproliferation Norms: Why States Choose Nuclear Restraint* (Athens, GA: University of Georgia Press, 2009).

show solidarity with the United States or “the international community,” whereas others might provide a motivation to express defiance toward the existing international order.¹⁷

(4) Ideas, Learning, and Transnational Networks: In some cases, it will not be immediately obvious what best serves a state’s interests or the question of whether an activity serves the national interest might be a subject of debate. In some of these cases, the way a state’s decision-makers come to think about the relevant problem or activity could be important. Especially in cases where a state changes course – from being a holdout to a participant, for instance – a process of “learning” or the embrace of “new thinking” might be a key factor.¹⁸ In some of these cases, the relevant ideas may be transmitted through transnational networks such as an epistemic community.¹⁹

(5) Outside Inducements or Persuasion: In some cases, states that are initially reluctant to join a nonproliferation initiative might be persuaded or even pressured by outside actors to do so. As Lisa Martin has noted with respect to economic sanctions, cooperation in applying multilateral sanctions is sometimes achieved through coercive measures.²⁰ In addition to threats, bribes and suasive messages can also be used to influence states.²¹ In cases where states change their policies in a cooperative direction, it is worth examining whether they were provided with negative incentives (i.e. coercive threats or pressures), positive incentives (i.e. economic aid or other side payments), or communications that contained persuasive information or analysis.

(6) Domestic Political Change: In the cooperation literature, it is now widely acknowledged that domestic politics can be an important factor.²² In some cases, whether or not to cooperate can be a subject of internal disagreement or debate. In these cases, it may be possible to relate a decision about whether to participate to the outcome of domestic debate or to a change in governmental leadership.

¹⁷ Jacques Hymans contends that an identity based on “oppositional nationalism” is often a motivation for state efforts to acquire nuclear weapons. Jacques E.C. Hymans, *The Psychology of Nuclear Proliferation: Identity, Emotions, and Foreign Policy* (Cambridge: Cambridge University Press, 2006).

¹⁸ For an argument that joint learning was important in the case of Argentine-Brazilian denuclearization, see Jeffrey W. Knopf, “The Importance of International Learning,” *Review of International Studies* 29, no. 2 (April 2003), 187-209.

¹⁹ These are transnational networks of technical or scientific experts in a particular field who largely agree on the nature of and appropriate solutions to some problem. See Peter M. Haas, ed., *Knowledge, Power, and International Policy Coordination*, a special issue of *International Organization* 46, no. 1 (Winter 1992).

²⁰ Lisa L. Martin, *Coercive Cooperation: Explaining Multilateral Economic Sanctions* (Princeton: Princeton University Press, 1992).

²¹ On the use of positive incentives in nonproliferation, see Thomas Bernauer and Dieter Ruloff, eds., *The Politics of Positive Incentives in Arms Control* (Columbia, SC: University of South Carolina Press, 1999); Miroslav Nincic, “Getting What You Want: Positive Inducements in International Relations,” *International Security* 35, no. 1 (summer 2010), 138-83.

²² I examined the impact of domestic pressures on U.S. decisions to seek nuclear arms control in Jeffrey W. Knopf, *Domestic Society and International Cooperation: The Impact of Protest on U.S. Arms Control Policy* (Cambridge: Cambridge University Press, 1998).

(7) Capabilities: The first six factors all have to do with state preferences, i.e. whether or not states think it worthwhile to cooperate with a nonproliferation measure. In some cases, a policy may be less a function of preferences than of capabilities. A state may lack the necessary resources – money, technology, know-how – to be able to participate in some activities. In such cases, it might have an interest in or a preference for participating, but still not be able to cooperate in practice. It is also possible that states that initially stay out of an activity and later join might do so because of a change in capabilities rather than preferences, i.e. because they developed or were provided with the necessary capabilities. Hence, capabilities are another factor to consider in explaining nonproliferation cooperation or its absence.²³

Assessing Effectiveness

In addition to seeking greater understanding of the sources of cooperation on nonproliferation, this project also seeks to evaluate the effectiveness of cooperative nonproliferation activities. Due to both data and time limitations, the cases here are not intended to supply the kind of detailed program evaluation that might be carried out by a government oversight office. Rather, the goal in each case is to make an informed estimate of how successful each initiative has been in achieving its ostensible objectives.

Broadly speaking, three aspects of each activity are likely to be relevant: the degree of cooperation achieved, the extent to which that cooperation generated the intended activity or product (e.g. secure nuclear facilities or a common negotiating position on North Korea), and the degree to which that product contributed to the successful prevention of proliferation. Reflecting these factors, the following questions were suggested to help case study authors in assessing cooperative activities:

- What were the primary objectives of the program(s) being studied?
- How much cooperation was achieved, and how did this compare to the amount of cooperation that was sought?
- To what extent did each program succeed in implementing the activity or activities it was intended to promote? What are the program's most visible accomplishments? What are its most visible failures?
- How successfully did the activity contribute to the goal of nonproliferation?

²³ One study of compliance with UNSCR 1540 concludes that state compliance is driven more by state capacities than by interests. See Douglas M. Stinnett, Bryan R. Early, Cale Horne and Johannes Karreth, "Complying by Denying: Explaining Why States Develop Nonproliferation Export Controls," *International Studies Perspectives* 12, no. 3 (Aug. 2011), 308-26.

In some cases, assessments will likely have to be along the lines of describing the program as having a high, medium, or low degree of effectiveness, and perhaps even that judgment will involve uncertainty. Even if the evaluations in some individual cases are necessarily rough or incomplete, it should still be possible to gain insights from the exercise of going through a systematic assessment. In addition, it should also be possible to draw lessons from a comparison across cases. This study will not be the final word on the subject. But, because no comparative analysis of cooperative nonproliferation activities has ever been carried out previously, the comparative assessment that follows should provide valuable insights that help improve the effectiveness of international nonproliferation efforts in the future.

WORKSHOP SUMMARY

Prepared with the guidance summarized above, project participants met for a one-day workshop in March 2012. The workshop took place via four panel discussions (see appendix for details). The first dealt with broad overviews of the theory and history of nonproliferation. The second panel focused on some of the first initiatives to deal with the security of nuclear and other WMD-related materials. The next panel discussed some of the main post-9/11 initiatives. The final panel considered some more ad hoc and regionally focused cooperation efforts. The presentations and discussions are briefly summarized here.

Panel I

In the first panel, Jeff Knopf, then of the Naval Postgraduate School, began by summarizing the purposes of the project. He presented the analytical framework that is described above. Next, Christine Wing of the Center on International Cooperation at New York University (NYU) provided a historical overview of the evolution of nonproliferation regimes. She divided this into three time periods: Cold War, post-Cold War, and post-9/11. In the first period, nuclear weapons and U.S.-Soviet bilateral relations dominated efforts at cooperation, but some efforts to deal with biological and chemical weapons and some moves toward multilateral approaches also took place. The period from the Cold War to 9/11 involved several key developments: consolidation of the nuclear nonproliferation regime, as NPT membership became nearly universal; innovative new approaches such as CTR; a greater focus on chemical and biological weapons; and a move from a bilateral to a multilateral focus. After 9/11, terrorism became a more important concern; most new initiatives were voluntary and informal rather than formal in character; and there was more focus on “WMD” as a category rather than nuclear, biological, and chemical weapons being addressed separately. Wing closed by raising an important question: do all the initiatives fit together to form a single system, or will some of the newer activities serve more to challenge and perhaps undercut the older, treaty-based nonproliferation instruments?

Scott Jones of the Center for International Trade and Security at the University of Georgia discussed the four main multilateral export control regimes (MECRs): the Nuclear Suppliers Group, the Australia Group, the Missile Technology Control Regime, and the Wassenaar Arrangement. He noted that the regimes began as small groups of like-minded states, but they have grown in membership, some as large as 46 states. Because the regimes operate by consensus, many observers have concluded that their larger memberships doom them to failure, since every state has veto power. Jones argued this has not happened and the MECRs are more effective than many observers give them credit for. He said this was true in part because the regimes require state representatives to work together. There are regular meetings at which regime participants review and update the control lists and guidelines that are supposed to shape each state's export control laws. Because these meetings still result in progress in updating the control lists, they are a sign the regimes are still working. Although the NSG's treatment of India has been controversial, Jones interpreted India's request to join the NSG as a sign the regime is effective in legitimizing export controls and establishing standards for international conduct.

Mike Malley of the Naval Postgraduate School served as discussant for this panel. He noted that it might matter whether or not an individual activity is embedded in a larger context such as a treaty regime. Cooperation is likely to be greater with activities that are embedded in this way. In subsequent discussion, Bill Potter of the Monterey Institute pointed out that U.S.-Soviet cooperation on nonproliferation was quite strong during the Cold War. U.S.-Russian cooperation, while it still exists, has in some ways not been as good in the post-9/11 period. Potter also disagreed with Scott Jones on the exemption the NSG made to allow the U.S.-India nuclear deal, arguing it had really damaged the regime. Finally, Togzhan Kassenova of the Carnegie Endowment observed that sometimes it is the great powers that do not comply with rules of the nonproliferation regimes, and we should not assume that the issue of non-cooperation applies only to smaller states.

Panel II

This panel involved three papers. First, Alan Kuperman of the University of Texas discussed the Reduced Enrichment for Research and Test Reactor (RERTR) program. The United States initiated the RERTR program in 1978, in part in response to India's "peaceful" nuclear test in 1974. The program was later absorbed into DOE's GTRI. The goal of RERTR has been to switch research and test nuclear reactors from the use of highly enriched uranium (HEU), which can be used to make a nuclear bomb, to the use of low enriched uranium (LEU), which cannot be used in nuclear warheads unless it undergoes further enrichment. The program has been remarkably successful, as reflected in the fact only one new reactor has been built using HEU since the program

began – but there have also been some cases of non-cooperation in converting old reactors, including in the United States and Russia.

Kuperman argued that much of the cooperation can actually be explained by coercion. When a reactor has needed nuclear fuel supplied by the United States, the United States has enjoyed the leverage to mandate conversion of that reactor to use of LEU. Norms have also played a role, as some reactor operators were convinced that HEU should no longer be used because of the proliferation risk. The RERTR case also provided some support to the hypothesis that working-level relationships can be important. U.S.-based scientists worked with the IAEA to produce technical analyses that showed conversion to LEU would not degrade reactor performance or be excessively costly. These analyses were important in persuading some reactor operators that they could afford to undertake conversion.

Togzhan Kassenova of the Carnegie Endowment for International Peace addressed the CTR program. She focused on the nuclear dimension in U.S.-Russian relations, setting aside activities involving chemical and biological weapons or the denuclearization of Ukraine, Kazakhstan, and Belarus. She noted that, in contrast to other cases that are multilateral, CTR was mostly bilateral in nature. The case highlights the importance of individuals, starting with the roles of Senators Sam Nunn and Richard Lugar in getting it going. CTR also reveals the potential power of domestic politics as an obstacle to cooperation. Members of the U.S. Congress often feared CTR money served largely to free up funds in Russia for its nuclear weapons program, while many Russians felt humiliated at having to accept aid from the United States and feared U.S. personnel would discover Russia's sensitive nuclear secrets. Given these obstacles, Kassenova contended that the amount of progress accomplished by CTR is quite remarkable.

Nevertheless, individual CTR programs varied in effectiveness. They were handicapped by a lack of trust in U.S.-Russian relations, the inefficiencies in program management resulting from poor bureaucratic coordination, and differences in Russian and U.S. political and legal cultures regarding issues such as liability. Two of the most successful programs involved lab-to-lab cooperation and cooperation between the U.S. and Russian navies on materials protection, control, and accounting (MPC&A). These programs succeeded because they built working-level relationships among participants who respected each other's professional expertise and who could operate for a time below the radar of higher ranking government officials. Finally, Kassenova cautioned against assuming the CTR model can be directly transplanted to other situations. She said it was only possible because Russia's situation in the early 1990s was so desperate, and comparable conditions would not likely exist in other cases.

The third presentation, by Wyn Bowen of Kings College, London, concerned the G-8 Global Partnership (GP) Against the Spread of Weapons and Materials of Mass Destruction. Bowen noted that the GP is a post-9/11 initiative that was pushed by the United States, but was also facilitated in important ways by Canada. The GP was intended to focus on chemical and biological weapons, especially through projects in Russia, and hence in some ways complemented CTR. Over time, the program expanded in terms of both donors and recipients. According to Bowen, the GP has been fairly successful at the operational level in pursuing program activities. For example, dismantlement of decommissioned Russian nuclear submarines is nearly completed. Yet the program has experienced problems at a more macro level: consensus decision-making made strategic planning and program adjustment difficult, countries have not delivered on their financial pledges, and some of the initial top priorities ended up being relatively neglected. Domestic politics, such as “buy local” provisions, also complicated implementation.

The discussant for this panel, Jeffrey Fields of DTRA, said the cases show the importance of looking at how cooperative agreements emerge in the first place, and not just at implementation. He also said we should not conflate lack of trust with the legitimate concerns states might have about protecting national security secrets concerning their nuclear programs. One workshop attendee observed that the reliance on positive economic incentives to entice other countries to participate in projects like CTR can create people with vested interests in a program budget who will later look for new projects to justify the program’s existence.

Panel III

The four papers on this panel dealt with overlapping efforts to address the concerns revealed by the 9/11 terror attacks and the discovery of the A.Q. Khan network. Emma Belcher of the MacArthur Foundation kicked things off with a discussion of the PSI, which is an effort to facilitate interdiction of illegal shipments of WMD-related materials. The Bush administration and its Undersecretary of State for Arms Control, John Bolton, designed PSI to be an activity that would not be accompanied by any formal treaty or organization. Belcher observed that, despite the Bush administration’s desire to avoid any bureaucratic organization, PSI has in some ways become an institution. The Bush administration also started small, with just a few like-minded participants and only an embryonic design. PSI has since grown quite a bit, with even Russia moving from being an initial critic to a participant (but so far not China). PSI has claimed significant successes, though evaluation is hard because there is no mechanism to report interdictions that take place. Belcher also pointed out some failures, such as not discovering North Korea’s aid to Syria. Belcher concluded that cooperation with PSI could be explained by a combination of self-interest, norms, domestic political change in some countries, and a degree of U.S. coercion. The case shows that an informal,

non-binding approach can work, but it helps to have head of state involvement, such as that of President Bush.

Tanya Ogilvie-White, then affiliated with the University of Canterbury in New Zealand, analyzed UNSCR 1540. In contrast to PSI, 1540 is legally binding because it was adopted under Chapter VII of the UN Charter. Resolution 1540 requires states to criminalize the export or transshipment of WMD and to adopt measures to physically protect and secure WMD-related materials. There was initially significant resistance to 1540, because states resented the Security Council making decisions that would be binding on the rest of the UN membership. Implementation was also slow because many states lacked the capacity to meet the requirements of 1540, were attached to sovereignty norms that conflicted with the nonproliferation and antiterrorism norms associated with 1540, and were angered by the way the Bush administration handled these issues. Over time, however, support for 1540 has increased. Member states and the UN's 1540 Committee have given assistance to help states meet the capacity challenges. The sovereignty norm has been finessed by devolving a greater role to regional and sub-regional organizations. Furthermore, the change in the United States to the Obama administration led to new U.S. government personnel who took a much more active and diplomatic approach to engagement with other states on 1540. Implementation of 1540 has probably not been as successful as states claim in their reports to the 1540 Committee, but has nevertheless been substantial. The most significant remaining gaps include bio-security and resources to actually enforce the new laws being adopted in response to 1540.

Next, Gavin Cameron of the University of Calgary discussed the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) and the Global Initiative for Combating Nuclear Terrorism (GICNT). The ICSANT is a formal convention while the GICNT is an informal instrument that emerged from a bilateral U.S.-Russian initiative. Ironically, participation in ICSANT has been limited in some surprising ways, with some countries that normally support international law, such as Canada and Sweden, not joining the treaty. One problem faced by the ICSANT is that it is more of a counterterrorism measure than a nonproliferation measure, and therefore it became entangled in the larger problem that the UN has not been able to reach an agreed upon definition of terrorism. The GICNT, in contrast, is primarily an information sharing initiative that includes involvement of the private sector. It is only intended to play a supporting role to other efforts, including UNSCR 1540. Because it is a small effort with limited funding, it remains to be seen whether the GICNT will be sustainable.

In the remaining paper in this session, Libby Turpen of Booz Allen Hamilton addressed the nuclear security summits initiated by President Obama. The second such summit, in Seoul, South Korea, concluded just before the workshop. The summits are not about creating a new cooperative

activity, but rather aim to reinforce other initiatives already underway. The first nuclear security summit, in Washington, DC in 2010, appeared fairly successful. Many state participants arrived with voluntary new commitments (termed “house gifts”) and the summit agreed to a detailed plan of work. The second summit, in Seoul, appeared to lose focus and produced less positive results.

The nuclear security summits have an ambiguous relationship to the nonproliferation regime. Some non-NPT nuclear weapon states have participated. Many NPT non-nuclear states, however, resist the idea the nuclear security is being added to the existing NPT obligations, so one objective for the summits has been to re-frame nuclear security as an issue of collective security rather than nonproliferation. Turpen attributed the cooperation achieved so far largely to U.S. leadership and the legitimacy provided when the IAEA completed revisions to its physical protection guidelines (INFCIRC 225).

Turpen also made an important observation that many other participants agreed with. She noted that the nuclear security summits continue a “donor-recipient model” in which some states set standards for others and then give them assistance. She pointed out that this reinforces cleavages between “haves” and “have-nots” in the nuclear sphere, which sometimes produces motivations in some states not to cooperate on nonproliferation measures.

The discussant for this panel, Bill Potter, highlighted the importance of certain individuals in the U.S. government in eliciting international support for 1540. He suggested the 2010 nuclear security summit turned out better than its 2012 counterpart because President Obama hosted the first summit and states wanted to show their support for him, but they did not see it as important to do things to bolster the South Korean government. In discussion, Wade Huntley of the Naval Postgraduate School pointed out that PSI, and not just 1540, also involved conflicting norms: in this case freedom of the seas vs. interdiction of illegal shipments. Gavin Cameron responded to a question about membership patterns by asking whether states are likely to choose among different initiatives or pursue an “all of the above” strategy.

Panel IV

This panel examined one case of a regional initiative and two cases of ad hoc cooperation to try to enforce compliance with the NPT. Sara Kutchesfahani of Los Alamos National Lab presented a case study of ABACC. She focused on the role of an epistemic community – a transnational network of scientific and technical experts and sympathetic government officials – in the creation of ABACC. She argued that scientists and academics played a crucial role because they were the ones who convinced policymakers that a mutual verification entity was technically feasible and who came up with the design for how to actually do it. ABACC was not the only factor in the decisions of

Argentina and Brazil to abandon potential nuclear weapons programs; economic liberalization and transitions to democracy also played roles. But ABACC was essential to give leaders in the two countries confidence that they could effectively verify mutual denuclearization. ABACC was not sufficient to persuade the rest of the international community about Argentina and Brazil's nonproliferation *bona fides*, but their successful experience with ABACC made it easier for Argentina and Brazil to take the step of joining the NPT.

The remaining two papers dealt with cooperation among small groups to states to try to induce compliance with nonproliferation commitments on the part of Iran and North Korea. Wade Huntley of the Naval Postgraduate School discussed the efforts of outside powers to bring about a non-nuclear outcome in North Korea. He compared the experience of the Agreed Framework in the 1990s, which created the Korean Peninsula Energy Development Organization (KEDO), and the six-party talks of the 2000s. Huntley noted that this case is unusual because the target of outside pressure – North Korea – was also a participant in the cooperation effort, especially as one of the states involved in the six-party talks. Huntley noted several difficulties with assessing effectiveness. First, these endeavors sought to accomplish more objectives than just ensuring a non-nuclear North Korea. Second, there is the counterfactual question of whether North Korea might have progressed even further in nuclear weapons development in the absence of these efforts. Finally, although these efforts appear to have failed because North Korea has tested nuclear devices, Huntley asked whether these efforts have definitively not succeeded, or instead it should be said only that they have not succeeded yet but still might in the future.

David Santoro of the Pacific Forum concluded the formal presentations with a discussion of efforts to negotiate an end to Iran's suspected nuclear weapons program conducted initially by Germany, France, and the United Kingdom (the EU-3) and later by those three countries plus the United States, Russia, and China (the P5+1). He noted that the motivation for the effort was not just to solve the Iranian issue, but also to help repair relations among the great powers after the disputes over the Iraq war. He argued that the level of great power cooperation achieved has actually been quite remarkable. Ironically, as the extent of cooperation increased, the remaining disagreements and divisions also became more pronounced. In terms of effectiveness, Santoro suggested examining both outcome and process. The process of building cooperation was in some ways a success, but the substantive impact on Iran's behavior has still been a failure to date.

Clay Moltz of the Naval Postgraduate School commented on the papers. He observed that it may be premature to label ABACC a success because there are some signs of potential backsliding in Brazil. Arturo Sotomayor of NPS added that the epistemic community in the ABACC case was in some ways a perverse result of U.S. pressures. The scientists in Argentina and Brazil initially came together because of their shared opposition to U.S. efforts to isolate the South American countries

in response to their nuclear programs. Moltz added that the two time periods discussed by Huntley really have different outcomes: while they lasted the Agreed Framework and KEDO enjoyed greater success than the six-party talks have achieved.

KEY FINDINGS

This project sought to raise awareness of the extent of international cooperation on nonproliferation, explore the factors that explain cooperation, and evaluate the effectiveness of cooperative nonproliferation activities. This section summarizes key findings in each area.

Observations Regarding Cooperation

Cooperation is extensive and expanding, but participation is not universal

Beyond the foundational treaties, a number of other cooperative initiatives have emerged. New cooperative efforts have been introduced over time, especially following major events such as the collapse of the Soviet Union and the 9/11 attacks. In addition, the number of states participating in cooperative activities has increased. As a result, the number of specific programs, projects, and activities in existence has grown tremendously in recent decades.

This remarkable scope of cooperation means it is feasible for the U.S. government to consider a cooperative approach to addressing potential threats of WMD proliferation. If a cooperative approach is effective, it might obviate the need for the United States to pursue a unilateral course, with its attendant costs and risks. At the same time, support for the cooperative initiatives is not universal. Some key states choose not to participate in at least some of these efforts, while others express criticism and do not regard them as legitimate. This means that, while cooperative approaches are worth trying, the United States cannot necessarily count on them to succeed in all cases.

Explaining Cooperation

Self-interest remains the single greatest driver of cooperation, but interests are open to reinterpretation and are not always the decisive factor

Across the various cases, national interests emerged as the most important factor in explaining whether or not states embrace cooperation on behalf of WMD nonproliferation. The conventional wisdom holds that globalization and the emergence of dangerous transnational actors and networks are making proliferation and terrorism threats that potentially affect all states. With caveats, this conventional wisdom received support in this study. Many states cooperate with

nonproliferation activities because they think it is in their interest to address dangers posed by WMD proliferation, illicit trafficking networks, and poorly secured nuclear materials.

Not all states participate in these activities, however, and self-interest also helps explain these decisions. Some states do not perceive proliferation or terrorism to be major threats to them, or they have other security or economic interests that lead them to oppose some of these initiatives. In other cases, states do not cooperate even though it might be in their interests to do so. In some cases, considerations of national pride or fairness seem to override the interest calculations states might otherwise make. Some countries have become sensitive about what they perceive as being dictated to by the United States or the unequal treatment of nuclear “haves” and “have-nots” under the NPT, and this makes them resistant to taking on additional nonproliferation obligations.

Finally, it is important to recognize that interests are not set in stone. Perceptions of interests can change. In particular, many states that started out as critical of some of the nonproliferation initiatives have eventually changed their minds and sought to join in. India, for example, began as the initial target of the NSG and now wants to become a member.

U.S. leadership is critical, but can be a double-edged sword

With a few exceptions, most of the initiatives examined in this project were first proposed by the United States. In most cases, it is hard to imagine them coming into being in the absence of strong U.S. leadership. This suggests U.S. leadership will continue to be critical to the future of international cooperation on nonproliferation.

At the same time, the U.S. role does not always have a positive impact. Some states have concerns about the extent of U.S. reach as the world’s sole superpower, which makes them reluctant to endorse U.S. proposals. The way in which the U.S. government handles its diplomatic outreach can make a big difference. When officials take a heavy-handed approach, using harsh language and seeming to dismiss the concerns of other countries, this limits support for even those cooperative activities that officials want to promote. PSI serves as a case in point. In contrast, when officials take a more traditionally diplomatic approach and invest time and energy in finding creative solutions to other states’ concerns, U.S. leadership is more effective in eliciting cooperation.

On the other hand, in selective cases the United States has also been able to apply coercive pressure effectively. For this to work, the United States needs to have a source of leverage and be acting on behalf of goals that are widely seen as legitimate. As long as it is used sparingly and only when circumstances are favorable, coercion can be an effective element of U.S. leadership. But the United States must be careful not to overdo it or it will be likely to provoke a backlash.

Norms matter, but be aware of conflicting norms

In general, participation in cooperative efforts is greater among states that already embrace nonproliferation and antiterrorism norms and that already favor international cooperation and multilateralism more generally. New cooperative initiatives can also be effective at times in building up these norms and encouraging more states to embrace them.

Initiatives based on norms against proliferation or terrorism can sometimes come into conflict with other norms that states embrace. These include sovereignty norms, norms of free trade and freedom of the seas, and support for the peaceful use and disarmament pillars of the NPT. When norms collide in this way, support for cooperative nonproliferation efforts is reduced. Initiatives that operate at the intersection of proliferation and terrorism can also encounter difficulties because discussions of terrorism at the UN have involved greater levels of disagreement than discussions focused solely on WMD proliferation by states.

Domestic politics can sometimes act as a constraint on cooperation

The effects of domestic politics vary considerably. In some cases, domestic constituencies favor international cooperation on behalf of nonproliferation. Occasionally, actors outside the state's executive branch are even key entrepreneurs promoting cooperation, as occurred with the roles of Senators Nunn and Lugar in bringing CTR into existence. In other cases, domestic audiences probably are not paying much attention, leaving state leaders a relatively free hand. Finally, in some cases domestic political factors act to constrain the prospects for effective cooperation. This also happened in the CTR program, for instance, in the way "buy American" provisions forced the program to use equipment that did not always work in Russian facilities. In some other countries, U.S. unpopularity with public opinion can also limit the willingness of leaders to go along with initiatives associated with the United States.

Capacity issues are important

Participation in cooperative nonproliferation efforts is not simply a function of state willingness to join in. Capabilities also matter. Some of the more recent initiatives impose far-reaching obligations on states, and developing countries with limited government capacity can find it quite challenging to meet these obligations. In general, this means programs that include mechanisms to provide assistance to states in need are likely to elicit greater levels of participation.

Working-level relationships, especially among scientific and technical experts, have become a crucial ingredient in many successful endeavors

Many cooperative nonproliferation efforts involve operational activities, such as interdicting ships carrying illicit WMD-related cargo or dismantling a former chemical weapons production facility, or other actions that require a degree of knowledge and expertise, such as crafting laws to

criminalize the financing of proliferation or setting up export control systems. Many of these efforts require personnel from different states to work together. The quality of these working-level relationships has hence become a crucial factor – an intervening variable in the language of social science – in the likelihood that cooperative programs will be successful.

The practical projects that are the focus of many initiatives often have a technical aspect that bring people with a particular professional background – in science, economics, or intelligence – into contact with fellow professionals. These working relationships among people who are experts in a specific discipline are particularly important. A transnational epistemic community of scientists designed ABACC. Technical analyses by personnel from U.S. labs helped convince many nuclear reactor operators to participate in the RERTR program. The quality of working-level relationships, as well as their ability to be insulated from higher level politics, also played a role in the varying success of different CTR programs. The lab-to-lab component of MPC&A and the effort to improve materials protection at Russian nuclear navy sites both involved good relations between U.S. and Russian personnel and hence proceeded more smoothly than many other CTR projects.

Working-level relationships interact with and can have a multiplier effect on several of the other factors noted above. They can influence the way in which states interpret their interests with respect to nonproliferation, help supporters of cooperation overcome domestic constraints, or help states build up their capacities to participate effectively. Nevertheless, not everything can be accomplished at the working level. President Obama initiated the nuclear security summit process in part as a way to bring high-level political attention and urgency to issues that cannot necessarily be moved forward by personnel at lower levels of state bureaucracies. The greatest progress is likely to come when high-level interest empowers individuals at the working level to connect with their counterparts in other countries to figure out how to implement cooperative programs and activities.

Evaluating Effectiveness

Finding ways to evaluate the effectiveness of cooperative nonproliferation activities proved to be the most challenging and inconclusive aspect of the project. Most project participants felt they could offer only rough judgments of the success of the initiatives they examined. Despite this, it is possible to draw some conclusions.

Cooperative nonproliferation has a mixed record, but it is possible to document some major successes

One of the difficulties in evaluating the initiatives studied in this project is that it is not always possible to obtain clear information about whether or not program objectives have been achieved. But evidence is not always so hard to obtain, and where a basis exists for informed

judgment, it suggests a mixed record of both remarkable successes and some frustrating failures. In some cases, positive achievements can and have been documented in great detail. For example, the Nunn-Lugar “scorecard” lists how many warheads, missiles, bombers, subs, and production facilities have been dismantled with assistance from CTR.²⁴ U.S. officials have also sometimes announced a certain number of PSI interdictions, although they have not provided a basis for outsiders to independently verify these claims. Even where a quantitative measure is not possible, one can identify clear successes in some efforts. For example, although ABACC does not always function smoothly it was successfully created, it still exists, and it contributed in obvious ways to helping Argentina and Brazil move away from potential nuclear weapons programs.

Some cooperative endeavors include reporting requirements that make it possible to track progress, though with some uncertainty due to the fact that state reporting might not always be accurate. Most countries, for example, have now filed at least one report on their implementation of UNSCR 1540. As Ogilvie-White observed, summary tallies by the 1540 Committee of the collected country reports show significant progress in meeting some benchmarks set out by 1540 while also revealing that many states lag behind in other areas.

Finally, it also possible to identify some outcomes that appear to be program failures. Syria received significant assistance from North Korea in constructing a nuclear facility that was eventually destroyed by Israeli bombing. The lack of discovery and interdiction of North Korean shipments to Syria can be interpreted as a failure for PSI. There are also two cases that differ in significant ways from the other efforts studied for this project: these involved ad hoc cooperation among small groups of outside powers to induce North Korea and Iran to abandon the pursuit of nuclear weapons. So far, at least, both of these efforts have failed to achieve their ostensible objectives.

Although the overall record is mixed, both individual instances of success and partial levels of success in achieving program goals represent positive contributions to nonproliferation. As John Holmes and Andrew Winner have pointed out with respect to PSI, 100 percent effectiveness is not necessary for the program to be worthwhile. As they note, “stopping even one catastrophic terrorist event or deadly weapons-related cargo may be deemed a success if it averts devastating consequences.”²⁵

²⁴ A periodically updated tally has been maintained at <http://lugar.senate.gov/nunnlugar/scorecard.html> and at http://www.dtra.mil/docs/dtriac/20120601_ctr-scorecard_slides_jun12.pdf?sfvrsn=0. With Senator Lugar leaving office, it is not clear what will happen to the version his office website has posted.

²⁵ John R. Holmes and Andrew C. Winner, “The Proliferation Security Initiative,” in Busch and Joyner, *Combating Weapons of Mass Destruction*, 149.

Cooperative efforts have helped raise awareness and promote norms

Whether or not it is possible to document specific achievements, there are good reasons to believe that the ways governments think and act today are different because of the range of international nonproliferation initiatives that have been launched. The various high-level meetings and outreach and assistance efforts undertaken have created greater awareness of the dangers associated with WMD proliferation, poorly secured nuclear or chemical materials, illicit trafficking networks, and transnational terrorist organizations.²⁶ The standards that are set or suggested by some of the initiatives also help establish norms that states seek to live up to if they want to be perceived as responsible members of the international community. In some cases, an individual may act because he or she has become more aware of the dangers associated with WMD proliferation or the prevailing practices and standards for preventing it without this action being specifically traceable to a particular cooperative initiative. Yet, if that individual action flowed from the increased awareness created by international nonproliferation efforts, it would be another form of positive contribution arising from those efforts.

Cooperative activities can have other benefits besides their stated objectives

In most cases, the cooperative initiatives here have the goal of stopping proliferation by addressing one or more sources of proliferation risk, such as legal exports of dual-use items, illicit trafficking, or poorly secured nuclear materials. Beyond whatever progress they achieve with respect to their stated goal, however, cooperative initiatives can have other second-order or spinoff effects. As Wade Huntley pointed out, this can be seen in the North Korea case. The ostensible purpose of both the Agreed Framework and the six-party talks was to denuclearize North Korea. Measured against that objective, the initiatives ultimately failed, at least to date. Yet, there have also been long-standing fears that South Korea and Japan might react to a North Korean bomb by initiating nuclear weapons programs of their own. Huntley observed that multilateral cooperation on the North Korea issue was also intended to help maintain regional stability and demonstrate international commitment to the nonproliferation regime as a way to reduce the incentives for Japan and South Korea to follow in North Korea's footsteps. Although these have not been the only factors in keeping Japan and South Korea non-nuclear, to whatever extent they have contributed to this outcome the Agreed Framework and six-party talks have had benefits that should not be overlooked in an assessment of program accomplishments.

Similar considerations apply to CTR. In this case, the program can be credited with considerable success with respect to its primary objectives. In addition to its contributions to reducing WMD proliferation risks, however, CTR was also a mechanism, in the immediate aftermath of the Cold War rivalry, to begin building trust and habits of cooperation between the

²⁶ This is also a finding of the Nuclear Threat Initiative (NTI) *NTI Nuclear Materials Security Index* (Washington, DC: Nuclear Threat Initiative, 2012).

United States and Russia. It was not always successful in this regard, as frictions in U.S.-Russian relations sometimes spilled over into CTR activities. And, in October 2012, Russia announced it would no longer participate in CTR. Nevertheless, whatever contributions CTR made to reducing the influence of Cold War thinking on U.S.-Russian relations can be considered a bonus on top of its more direct nonproliferation accomplishments.

Proliferation problems would likely be worse in the absence of cooperative nonproliferation activities

In any program assessment, it can be useful to consider the counterfactual question of what would have happened if the programs had never existed. Although this is necessarily a thought experiment, it is hard to imagine that the world would be safer today if countries had not acted to create the various mechanisms for international cooperation on nonproliferation considered in this study. In the absence of export control regimes, CTR, PSI, and various regional initiatives and antiterrorism efforts, the record of WMD proliferation and its attendant risks would almost certainly have been worse.

In short, although it proved impossible to quantify exactly the level of success in achieving their objectives or the extent to which this has contributed to reducing threats associated with proliferation, the various cooperative endeavors studied in this project have clearly made some positive contributions. Although there are many criticisms that can be made of cooperative nonproliferation activities, the world is better off with them than it would be without them. This makes it important to sustain them and to utilize them where appropriate. It also makes it important to consider how their performance might be improved.

POLICY RECOMMENDATIONS

The key findings lead to five broad policy recommendations. These start with the need to recognize the potential utility of cooperative approaches to nonproliferation. But they also include recommendations to address potential limitations in the current set of initiatives.

(1) Cooperative nonproliferation programs remain a worthwhile policy option and efforts should be made to strengthen them

The research for this project showed that cooperative nonproliferation initiatives have made valuable contributions to achieving nonproliferation objectives. When decision-makers consider options for addressing proliferation dangers, they should be aware that a variety of vehicles for international cooperation exist and many of these have achieved some positive results. While cooperative approaches have limitations and will not necessarily always be an appropriate part of policy, they should always be included in the list of options under consideration.

At the same time, few of the endeavors studied in this project have a perfect record. For most of them, there is still room for improvement. Given the potential value of international cooperation on nonproliferation, it makes sense to invest in efforts to strengthen the array of cooperative initiatives that exist.

(2) U.S. leadership remains essential but requires a deft touch

The United States is still the prime mover with respect to getting cooperative initiatives underway and attracting support for them. The United States will not be the source of every worthwhile idea, and there is scope for other countries to take the lead on particular proposals. But U.S. leadership continues to provide vitality to international cooperation. Because heavy-handed exercises of U.S. “hegemony” can arouse opposition, however, U.S. leadership will be most effective when it is implemented with a light diplomatic touch and sensitivity to how other states perceive the issues at stake.

(3) Avoid ideological debates about how to structure cooperation; both informal and institutionalized approaches can be effective

In U.S. domestic politics, sharp debates periodically emerge between those who favor “multilateralism” with all its connotations of working through formal international institutions and those who criticize international institutions and favor working informally through “coalitions of the willing.” Both approaches, however, can be effective, and sometimes one can start to take on characteristics of the other. Many of the initiatives examined in this project began as informal efforts by small groups of like-minded states, but over time grew in membership and developed some more formal, institutionalized elements. In other cases, a small, ad hoc group of states essentially functions as an intermediary on behalf of a formal element of the regime, such as in efforts to persuade Iran and North Korea to come into compliance with the NPT. It makes sense to be pragmatic in weighing how informal or institutionalized to be in the pursuit of international cooperation. Where possible it would be desirable to insulate nonproliferation policy from prevailing partisan and ideological cleavages.

It would also be useful to keep an open mind about possible evolution in how initiatives operate after they become established. The creators of PSI, for example, had a strong aversion to establishing any new bureaucratic organization in association with the initiative. PSI’s informality, however, may be becoming a liability. About 100 states have now endorsed the PSI principles, which is a major accomplishment for the initiative, but this growth in membership also makes coordination more difficult. What should be the rules, for instance, for sharing intelligence among states that are not allies and have no prior history of doing so? In addition, the lack of any mechanism for releasing information about PSI operations means that interdiction activity remains shrouded in secrecy.

While a degree of operational secrecy is obviously necessary, finding a way to credibly confirm and publicize successful interdictions would likely bolster the deterrent effects of PSI on illicit trafficking. PSI likely does not require a full-fledged bureaucracy of its own, but finding a way to give it greater institutionalization could enhance program effectiveness.

(4) Be sensitive to the needs and perceptions of developing countries, including how these are affected by framing²⁷

Although not all of the activities studied in this project aspire to universal membership, many of them seek to be effective globally. Moreover, some, such as UNCSR 1540, do apply to all states. As a result, developing nations find themselves being asked to take on significant new burdens. Many of them do not perceive the same level of threat from proliferation and terrorism that the United States does. They also have limited resources and government capacities to take on some of the tasks being requested of them, and they have competing priorities in the areas of public health, education, and economic development.

As a result, capacity-building has become a crucial aspect of international cooperation on nonproliferation. This has led to a greater commitment to provide international assistance to countries that need it and efforts to help match donors and recipients. These assistance programs are crucially important and need to continue. At the same time, however, the donor-recipient model has become something of a double-edged sword. To some extent, it plays into and reinforces long-running complaints about the division between “haves” and “have-nots,” complaints that are most pronounced with regard to the NPT.

There is a need for more creative thinking about how to avoid reinforcing existing cleavages in world politics, because this could eventually undermine support for international cooperation on nonproliferation. The cases examined in this project suggest two possible ways to deal with this issue. One option would be to do more work via intermediary organizations. Acceptance of UNSCR 1540 increased once the 1540 Committee started to function and also after regional and sub-regional organizations were given larger roles. The two nuclear security summits held to date have similarly called for an enhanced IAEA role in nuclear security. Global and regional organizations have potential advantages in terms of their legitimacy with and acceptability to developing countries. Having such organizations function as intermediaries between donor states and recipients, or between “haves” and “have-nots” more generally, could reduce the likelihood of reinforcing some of the cleavages associated with the NPT. Possible models exist in other areas of world politics; examples include the World Health Organization, the UN World Food Program, or the World Bank. These organizations receive contributions from member states but have their own

²⁷ The following analysis has been greatly influenced by the contributions of Tanya Ogilvie-White and Libby Turpen to this project, although the specifics as presented are fully the responsibility of the author.

professional staffs determine how to distribute assistance and how to work with aid recipients on implementation. A similar model might enable the United States to promote nonproliferation objectives while placing itself at arm's length from program implementation, which might reduce the possibility that states will express resentment at perceived U.S. pressure. For countries that are comfortable with or actively value a bilateral relationship with the United States, there would be no need for such an indirect approach. But it might be useful to have such a mechanism available where it would increase the acceptability of a program with another government. For example, perhaps some CTR money for chemical weapons dismantlement could be funneled through the Organization for the Prohibition of Chemical Weapons (OPCW) should a future state that has bad relations with the United States declare the existence of a chemical weapons stockpile that it cannot dispose of safely without assistance.

A second possible response to the limitations of the donor-recipient model involves the framing of initiatives. The United States and other leading countries tend to describe these as being a response to the dangers posed by WMD proliferation and terrorism. Yet this framing does not necessarily resonate with states that see little threat to themselves from such dangers. In addition, the term "threat reduction" can have the unfortunate consequence of making it appear that the recipient of assistance is regarded as a threat to be reduced. A process of dialogue about the larger purposes and underling principles of the cooperative endeavors might enable them to be re-branded in a way that would make them more attractive to developing countries. Something that emphasizes security instead of threat and that highlights shared responsibilities among equals might provide a way to frame cooperative activities that would elicit greater support. Describing them as efforts to promote collective, global, regional, or cooperative security would all be potential options.

(5) There is a need to think more about how the different initiatives relate to each other and to the nonproliferation regime, and to improve integration among them

It can be quite surprising to realize how many different cooperative activities and initiatives exist that deal with the proliferation of nuclear, biological, and chemical weapons and their means of delivery. This is good news, because it shows the international community has serious concerns about the dangers posed by such weapons and that states are willing to work together to try to lessen the dangers. But the sheer number of cooperative endeavors also creates complications. To put it simply, it is far from clear how all these activities are supposed to fit together.

One problem is that participants are not the same across the different initiatives. Even the different export control regimes have slightly different members. If countries belong to different subsets of the various arrangements, it can be hard for governments to coordinate with each other because they have made varying sets of commitments. It also makes it hard to integrate the various initiatives because some countries participate in many of them while others are active in just a few.

It also remains unclear how the more informal, voluntary measures are supposed to relate to the formal, treaty-based elements of the nonproliferation “regime complex.”²⁸ Most project participants view them mainly as supplementary measures intended to fill gaps in the foundational treaties. But not all commentators or government officials view them this way. They have also been interpreted as ways to bypass the treaties or even as alternatives meant to some degree to supplant them. For the sake of achieving nonproliferation goals and enhancing global security, it will be necessary to figure out the most effective way of fitting the different pieces together.

Rather than launch any new cooperative initiatives, governments today need to enter into a dialogue to discuss how they view the connections between different cooperative nonproliferation measures and how these fit into the broader global security architecture. If serious thought is not given to integration of the various activities, there is a risk that cooperative efforts will become incoherent or even begin to work at cross-purposes with each other. The goal should not be complete consensus or perfect fidelity to some underlying philosophical principle. Rather, the goal should be to develop enough of a shared understanding among a working majority of participants that it becomes possible to put forward a clear picture of how the cooperative enterprise is supposed to work as a whole. While the effort to improve integration is underway, it will also be important to continue the work of the individual cooperative initiatives for the practical contributions they can make to reducing proliferation dangers.

CONCLUSIONS: BUILDING COOPERATION

The international regimes that seek to prevent WMD proliferation rest upon foundations provided by global treaties: the NPT, BWC, and CWC. By themselves, these treaties have not removed every possible risk of proliferation. As a result, states have launched a variety of other efforts to address some of the remaining proliferation problems as well as new problems, such as possible WMD acquisition by terrorist groups, that have grown in salience since the key nonproliferation treaties were concluded. Many of these newer efforts require cooperation, and often multilateral cooperation, to achieve their objectives.

No existing study has focused on and sought to compare the effectiveness of these additional cooperative endeavors beyond the core nonproliferation treaties. The goals of this study were to examine the sources of cooperation on nonproliferation and assess the effectiveness of cooperative nonproliferation activities. In addition, the research conducted for this project also produced one broad observation about the nature of nonproliferation cooperation. The core treaties

²⁸ I thank Scott Jones for suggesting this term.

each involve a commitment to self-restraint by each signatory. As such, they are primarily about policy coordination. In contrast, many of the cooperative efforts that have emerged since involve greater degrees of active collaboration. To the extent this is true, implementation is likely to involve something more than merely not doing something, such as not building weapons; implementation may actually require carrying out certain operational activities. This, in turn, is likely to put a greater premium on working-level relationships than was necessary when the key treaties were being negotiated.

Existing theories of cooperation do not entirely capture the type of cooperative nonproliferation activity that has developed in practice. Mainstream theories focus on what might be called “agreeing to cooperate”; they are concerned with whether negotiations result in an agreement, whether international institutions will be created or sustained, and whether individual states will agree to comply with cooperative arrangements. Social constructivists, in turn, focus on “constructing cooperation”; what they mean by this, however, is not physical construction but rather developments in the realm of ideas, i.e. whether states construct shared norms and identities that lead them to favor cooperation. This study, in contrast, identifies a need to pay attention as well to what might be called “building cooperation.”

States have been building cooperation on nonproliferation in several different ways. First, as states come to perceive gaps or shortcomings in the existing set of nonproliferation arrangements, they build on these by creating new cooperative activities to address new or unresolved problems. Hence, the nonproliferation regime is getting built up over time. Second, as states have to figure out how to turn a new idea into reality, they have to build working-level relationships and operational capacities necessary to carry out a planned activity. Hence, cooperation is also being built in the very prosaic sense of being put together, piece by piece. Third, as cooperative activities get off the ground, states sometimes seek additional participants, thereby building up the circle of cooperating parties. Thinking in terms of the metaphor of “building cooperation” highlights these practical and operational issues in international nonproliferation activities. Future efforts to reduce the dangers from nuclear, biological, and chemical weapons will benefit from actions to consolidate and integrate the cooperative nonproliferation initiatives that have been created to date as well as from efforts to build upon them further.



**Multilateral Cooperation on Non-Proliferation Workshop
Portola Hotel and Spa
Monterey, CA • March 29-30, 2012**



Hosted by the Naval Postgraduate School (NPS),
Center on Contemporary Conflict (CCC)
With support from the Defense Threat Reduction Agency (DTRA)

AGENDA

Thursday, March 29, 2012

Timeline	Content	Delivery
6:00-8:00PM	Opening Reception	Jack's Lounge, Portola Hotel

Friday, March 30, 2010

Timeline	Content	Delivery
7:30-8:30	Breakfast and Registration	Cottonwood 1
8:30-9:00	Welcome and Orientation	Jeff Knopf, NPS Anne Clunan, NPS and PASCC
<i>Panel 1: Multilateral Cooperation: Theoretical Framework, Historical Evolution, and Export Controls</i>		Chair and Discussant: Mike Malley, NPS
9:00-10:30	Introduction	Jeff Knopf, NPS
	Historical Overview	Christine Wing, NYU CIC
	Export Control Regimes	Scott Jones, U. Georgia CITS
10:30-10:45	Coffee-Tea Break	Cottonwood 1
<i>Panel 2: Cold War and Immediate Post-Cold War Initiatives</i>		Chair and Discussant: Jeffrey Fields, DTRA
10:45-12:15	RERTR	Alan Kuperman, U. Texas
	CTR	Togzhan Kassenova, CEIP
	G-8 Partnership	Wyn Bowen, Kings College

Timeline	Content	Delivery
12:15-1:15	Lunch	Cottonwood 2
<i>Panel 3: Post-9/11 Efforts and a Focus on Non-State Threats</i>		Chair and Discussant: Bill Potter, MIIS
1:15-3:00	PSI UNSCR 1540 GICNT Nuclear Security Summits	Emma Belcher, MacArthur Tanya Ogilvie-White, U. Canterbury Gavin Cameron, U. Calgary Libby Turpen, BAH
3:00-3:15	Coffee-Tea Break	Cottonwood 1
<i>Panel 4: Regional Initiatives and Coordination on Enforcement</i>		Chair and Discussant: Clay Moltz, NPS
3:15-4:45	ABACC Six Party Talks P-5/EU and Iran	Sara Kutchesfahani, LANL Wade Huntley, NPS David Santoro, PacForum
4:45-5:15	Wrap up / Review	Jeff Knopf, NPS
6:00	Bus Pickup for Dinner	Please meet in the lobby at 6PM
6:30-9:00	Dinner	Tarpy's Restaurant

Participant List

Name	Affiliation
Alan Kuperman	University of Texas
Angela Archambault	Naval Postgraduate School
Anne Clunan	Naval Postgraduate School
Arturo Sotomayor	Naval Postgraduate School
Bill Potter	Monterey Institute of International Studies
Bryan Lee	Monterey Institute of International Studies
Clay Moltz	Naval Postgraduate School
Christine Wing	Center on International Cooperation, NYU
David Santoro	Pacific Forum
Emma Belcher	MacArthur Foundation
Gavin Cameron	University of Calgary
Jeff Knopf	Naval Postgraduate School
Jeffrey Fields	Defense Threat Reduction Agency
Judith Tulkoff	Naval Postgraduate School
Libby Turpen	Booz Allen Hamilton
Michael Malley	Naval Postgraduate School
Ryan French	Naval Postgraduate School
Ryan Jacobs	Naval Postgraduate School
Sara Kutchesfahani	Los Alamos National Lab
Scott Jones	CITS, University of Georgia
Tanya Ogilvie-White	University of Canterbury
Togzhan Kassenova	Carnegie Endowment
Wade Huntley	Naval Postgraduate School
Wyn Bowen	Kings College London