Implementing DOD's International Science and Technology Strategy

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Introduction

The United States Department of Defense has recently published its first international science and technology (S&T) strategy.[1] This much needed document provides top-level guidance to all elements of the DOD S&T enterprise and, as a publicly released document, is also intended to be useful to the many international allies and partners of the United States.

At approximately $13 billion a year, the American defense S&T program is the largest in the world and now exceeds the total defense budget of all but ten nations worldwide.[2] It is the wellspring of the Nation's unprecedented technical superiority. The extensive programs supported by this budget generate the technology base from which the United States develops, acquires, and maintains a vast array of worldwide capabilities.[3]

Although at lower, but still significant levels, the activities of the global defense S&T community also enhance military capabilities of existing and potential partners and allies. Not only are the enhanced capabilities of these nations of significant value to the United States in potential coalition operations but, through information sharing and other activities, but the scientific and technical results that have produced these capabilities can directly benefit to the United States in its own science and technology program.

As can be seen from the recently released "International Science and Technology Strategy for the United States Department of Defense," the network for worldwide sharing of defense S&T information is vast, and the new strategy provides an excellent framework to maximize this potential. This paper provides some specific thoughts on implementation and how certain steps might benefit all involved.

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[1] Department of Defense, Defense Research and Engineering, "International Science and Technology Strategy for the United Sates Department of Defense" (Washington, DC: Department of Defense, April 2005). The original idea for creating a DOD International Science and Technology Strategy for the United States Department of Defense as put forward by Dr. John Hopps Jr. (1939-2004), former Deputy Director, Defense Research and Engineering. This paper is dedicated to his memory. He was truly a gentleman and a scholar.

[2] The total defense budgets of only Russia, China, Japan, the United Kingdom, France, Germany, Saudi Arabia, Italy, India, and South Korea exceed U.S. spending on S&T alone.

[3] The U.S. defense science and technology program consists of basic research, applied research and advanced technology development in every technology of interest to the Army, Navy, Air Force and Marine Corps with the exception of nuclear weapons technology, which is pursued by the Department of Energy and is outside the scope of this paper. The DOD programs are frequently characterized as 6.1 (basic research), 6.2 (applied research) and 6.3 (advanced technology development) based on the first non-zero digits in the line item coding of the annual President's budget.

U.S. Approach to International Cooperation

The U.S. approach to international defense science and technology cooperation revolves around four sets of activities: the North Atlantic Treaty Organization (NATO) Research and Technology Organization (RTO), The Technical Cooperation Program (TTCP), and multilateral and bilateral agreements. Each of these sets of activities, which are described below, involves some overlap but is also somewhat unique.[4]

Research and Technology Organization

The DOD S&T strategy states: "The NATO Research and Technology Organization (RTO) is the largest body of its type in the world and offers the best opportunities for sharing defense-related S&T information among the allied nations. The United States will continue to be an active participant at all levels of the RTO, including the Research and Technology Board (RTB), the Research and Technology Agency (RTA), the technical panels, and a wide variety of specific activities."[5]

The Research and Technology Board of NATO consists of up to three members per nation, with one of these designated as the Principal Member.[6] The United States has always had three members on the Board and, even with this number, still has a difficult time assuring that all DOD interested parties can actively participate. Traditionally, the Principal member of the Board has been the Deputy Director of Defense Research and Engineering, and this practice should be continued. Another member has been the Air Force Deputy Assistant Secretary (Science, Technology and Engineering) or the Army Deputy Assistant Secretary (Research and Technology). The third member has traditionally been the NASA Deputy Administrator. Given the large number of DOD components that could (and should) participate, the NASA Deputy Administrator should no longer serve as a member of the Board.[7] NASA Deputy Administrator participated for historical reasons and has been valuable, but the time has come to change this.[8] In the future, the second and third RTB members should be selected by the Director of Defense Research and Engineering (DDR&E) from among the Service S&T Executives and, on

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[4] For example, NATO involves 26 nations, three of which (Canada, the United Kingdom and the United States), are also members of TTCP. In addition, the United States has separate multi-lateral and bi-lateral science and technology agreements involving the majority of the member nations of NATO and TTCP.

[5] For a complete description of the RTO, see: Daniel, Donald C and Caraher, Leigh, "NATO Defense Science and Technology," *Defense Horizons*, No 24, National Defense University, March 2003.

[6] The Principal Member of the RTB votes for the nation on those occasions when this is required and also is the only member who attends Executive Sessions of the Board where most decisions are made. The other Board members participate in annual Plenary Sessions of the Board as well as the Board's annual Strategic Planning Session.

[7] In addition to the Air Force and Army Deputy Assistant Secretaries, DOD RTB members could also include, for example, the Chief of Naval Research, the Deputy Director of the Defense Advanced Research Projects Agency (DARPA) or the Deputy Director of the Defense Threat Reduction Agency (DTRA).

[8] The RTO was created in 1997 by the merger of NATO's Advisory Group for Aerospace Research and Development (AGARD) and the Defense Research Group (DRG). The NASA Deputy Administrator had been one of two U.S. members of AGARD's Board and, at DOD's request, continued as a member of the RTB when the RTO was formed.

occasion, the Deputy Director of DARPA.[9] Consideration should be given to rotating these selections on a three-year basis. In addition, the DDR&E should expand the role and agenda of the Defense Science and Technology Advisory Group (DSTAG) to include an active and frequent role in international S&T matters.[10]

The RTA is located in Paris, France, and consists of a full-time staff of approximately 50 people. Approximately 60 percent of this staff is made up of formal NATO positions; the remainder consists of positions and personnel that are contributed by the NATO nations. The United States has traditionally maintained a total of six military and civilian voluntary positions at the RTA, and this number and mix should be retained.[11] All of the positions are provided by the Air Force. This is a holdover from the creation of the RTO from NATO's Advisory Group for Aerospace Research and Development (AGARD) and Defense Research Group (DRG), and consideration should be given to changing this to more balanced contributions from among the Services.[12] Specifically, the DSTAG should determine which DOD organizations should contribute to the mix based on its strategy for the RTO program content and emphasis areas in the coming years. Personnel should then be selected and assigned on a rotational basis with a three-year minimum, six-year maximum, term.

The RTO technical panels cover the spectrum of U.S. defense S&T interests and should have membership that reflects this.[13] As with the RTB, each nation may appoint up to three members to a panel. In addition, members-at-large with needed, specific technical expertise can also be appointed. Typically, the term of appointment by the United States is three years, although this can be extended for additional terms. The United States should consistently strive to appoint members of the Senior Executive Service with

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[9] The Service S&T Executives are the Army Deputy Assistant Secretary (Research and Technology), the Chief of Naval Research, and the Air Force Deputy Assistant Secretary (Science, Technology and Engineering).

[10] The DSTAG is chaired by the Director of Defense Research and Engineering and includes as members the Deputy Under Secretary of Defense (Science and Technology); Deputy Under Secretary of Defense (Advanced Technology Systems); Deputy Assistant Secretary of the Army (Research and Technology); Chief of Naval Research; Deputy Assistant Secretary of the Air Force (Science, Technology and Engineering); Deputy Director of the Defense Advanced Research Projects Agency; Chief Scientist of the Missile Defense Agency; Senior S&T Advisor, Defense Threat Reduction Agency; Assistant to the Secretary of Defense (Nuclear, Chemical and Biological Defense Programs); and Deputy Director for Resources and Requirements, the Joint Staff (J-8).

[11] The positions include the Assistant Director of the Agency as well as several Executive Officer positions and the Chief of Security.

[12] The RTO was created in 1997 by the merger of NATO's Advisory Group for Aerospace Research and Development (AGARD) and the Defense Research Group (DRG). The NASA Deputy Administrator was traditionally one of two U.S. members of AGARD's Board and continued as a RTB member at DOD's request when the RTO was formed. Most of the RTA staff came from AGARD. The Air Force had provided almost all of the U.S. AGARD voluntary positions, although NASA did provide some limited number prior to the creation of the RTO. The "tradition" of the Air Force providing these positions continued after the termination of AGARD and the establishment of the RTO.

[13] The RTO technical panels are: Applied Vehicle Technology; Human Factors and Medicine; Information Systems Technology; Studies and Analyses; Systems Concepts and Integration; and Sensors and Electronics Technology. In addition, although not a panel, the NATO Modeling and Simulation Group operates at the same level.

internationally recognized technical skills who direct significant personnel and financial resources as national panel members. Members at large should be appointed not only to fill technical gaps on the panel but also to bring previously recognized world-class knowledge to them.

The RTO conducts approximately 150 activities per year. With rare exceptions, the United States should contribute to all of them. The U.S. S&T program is enormous, and it is in the best interest of the Nation to share as much of it as possible with NATO allies.[14] In addition, the DSTAG should adopt a much more aggressive posture of creating a balanced, top-down/bottom-up approach to proposing RTO activities. To date, this balance is almost totally missing in a portfolio of activities that is almost exclusively created in a bottom-up fashion. Annual, explicit, formal guidance from the DDR&E, based on consensus from the DSTAG, would do much to correct this and assure returns on investment that are more in line with the amount of time spent by some of DOD's best talent on NATO S&T activities.

The DOD strategy states that: "The DOD will appropriately pursue and accept leadership opportunities at all levels of the RTO as these opportunities present themselves."[15] This is an excellent element of the overall strategy and one that needs more proactive attention than it currently gets. There are four levels to be considered: chairing the Research and Technology Board, directing the Research and Technology Agency, chairing the seven technical panels, and chairing the more than 100 annual activities undertaken by the RTO.

The United States has done a good job in two elements of RTO leadership only, chairing the RTB and directing the RTA. Here the expectation is that, as the chair and director positions rotate every three years, the U.S. will continue to provide a candidate for each position at every opportunity.[16]

The situation with panel chairs is not as good. The U.S. currently has no plan for grooming, encouraging, and selecting candidates to chair the seven panels and groups. Given the size of its S&T program, it seems reasonable that the U.S should seek to chair approximately three of these at any one time, with individuals simultaneously serving as vice-chair of three more. As of this writing, the U.S. currently has one chairman and one vice-chairman. It is important to note that the panels elect their own chairs and vice-chairs. However, experience has shown that when the U.S. has individuals who are active members of a panel and indicate an interest in leading it, the leadership opportunity will most likely present itself. Also, more often than not, the vice-chairs are subsequently

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[14] For a more extended discussion on this, see Donald C. Daniel, "NATO Technology: From Gap to Divergence?" *Defense Horizons* 42 (Washington, DC: Center for Technology and National Security Policy, July 2004).

[15] "International Science and Technology Strategy for the United Sates Department of Defense," 8.

[16] The RTO Operating Procedures call for election of a chairman and selection of a director, both by the RTB, every 3 years. The expectation is that one person will come from the North American side of the Atlantic and one from the European side and that this will switch at every election/selection. Thus the U.S. (or Canada) needs to provide a suitable candidate for chairman and director every 6 years, but not in the same cycle.

elected to the chair, so this former position takes on significant importance in positioning individuals to be chairmen.

In considering candidates for panel leadership positions, once again the DSTAG is key to success. Appointments to all of the panels should be considered by the DSTAG on an annual basis, with particular attention given to future leadership opportunities and individuals who are good candidates to assume leadership. In planning and making these appointments, attention should also be given to a time frame of at least 3 years. Finally, given the multi-service nature of the RTO panels, leading them is an excellent opportunity for the DOD not only to refine the international skills of some of its more senior executives, but also to enhance their cross-service skills as well. The DSTAG should consider this fact in the overall development plans of those considered for selection.

The strategy also states that "DOD participants will bring forward relevant technology, using appropriate policy and regulatory guidance, to share with our NATO colleagues."[17] This element of the strategy is, no doubt, very welcome by our allies in NATO and care must be taken to communicate it throughout the DOD technical community. In implementing this part of the strategy, DOD must take full advantage of National Security Directive 189, "National Policy on the Transfer of Scientific, Technical and Engineering Information," which clearly states that the products of fundamental research are unrestricted unless they are classified. Although published in 1985 during the Cold War, NSD-189 still remains the policy cornerstone on the subject, and the Administration has clearly stated its support of the directive and its concept.[18] Furthermore, for the purposes of working with NATO, the DOD should interpret fundamental research as the body of work included in the DOD basic research and applied research categories. The United States should also take advantage of the fact that RTO work can also by done at NATO Confidential or NATO Secret levels.

Concluding its guidance on NATO, the strategy says: "Finally, we will actively participate with NATO's Allied Command Transformation to showcase our technologies in appropriate NATO demonstrations and experiments."[19] In implementing this part of the strategy, the U.S. must assume a leadership role in helping Allied Command Transformation (ACT) define specific processes that will be used to imbed NATO (U.S.) technology in the NATO/ACT led demonstrations and experiments. The United States should also adopt a position that it (not NATO) will pay the cost for doing so. In implementing this portion of the strategy, care must be given to planning RTO activities through the panels and groups well in advance. U.S. leadership on these bodies in doing so is essential. Furthermore, technologies must be carefully selected and the level of maturity carefully delineated to ACT.

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[17] "International Science and Technology Strategy for the United Sates Department of Defense," 8.

[18] Letter from Dr. Condoleezza Rice, Assistant to the President for National Security Affairs, to Dr. Harold Brown, 1 November 2001.

[19] "International Science and Technology Strategy for the United Sates Department of Defense," 8.

The Technical Cooperation Program

In regards to The Technical Cooperation Program (TTCP) the strategy states: "The DOD will continue to be an active participant at all levels in TTCP."[20] It goes on to say: "Increased emphasis will be given to project arrangements that emphasize work sharing and/or equipment and material transfer."[21]

The United States clearly recognizes the special relationship that exists between Australia, Canada, New Zealand, the United Kingdom and itself and should continue to be an active participant at all levels in TTCP. Although the potential for return on investment is not as large as in the RTO, the smaller number of countries involved and the less formal atmosphere in TTCP offer significant possibilities. The United States should continue to advocate information exchange, harmonization and alignment, and project arrangements for basic research, exploratory development, and demonstrations of advanced technology in the stated areas of most interest to TTCP nations: aerospace systems; command, control, communications and information systems; chemical, biological and radiological defense; electronic warfare systems; human resources and performance; joint systems and analysis; maritime systems; materials and processing technology; sensors; and conventional weapons technology.

The United States should also appropriately pursue and accept leadership opportunities at the group and panel levels of TTCP. As it does with NATO, it should regularly make available some of its very best technical senior executives to chair TTCP Groups with the goal of chairing four or five groups simultaneously, as opportunities present themselves. It should also provide some of its best, most experienced senior technical managers and experts to chair TTCP Technical panels.

The United States should offer some of its best technology, subject to appropriate policy and regulatory guidance, to share with TTCP colleagues and should strongly encourage the other members—Australia, Canada, New Zealand, and the United Kingdom—to do the same. Working specifically with Canada and the United Kingdom, the United States should attempt to maximize those cooperative ventures that can be showcased in both TTCP and RTO environments, with emphasis on demonstrating technology and transitioning it to the operational military forces. Working specifically with Australia and, to a lesser extent, New Zealand, those areas where specific expertise (such as hypersonic propulsion) has been demonstrated by all parties and is of mutual interest should be emphasized.

Multilateral Agreements

Concerning multilateral agreements, the strategy states: "The U.S. DOD will continue to develop these agreements as appropriate. Emphasis will be given to regional areas where cooperation and demonstration of new technologies can have significant near-term

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[20] "International Science and Technology Strategy for the United Sates Department of Defense," 8.
[21] Ibid, 8.

impact on U.S. national security or that of allies and partners."[22] Multi-lateral agreements in S&T are relatively rare. Given the opportunities that exist with the RTO, TTCP, and bilateral agreements this is not surprising. There seems to be little reason to expand this level of activity in implementing the new strategy for this segment. DOD should simply maintain the status quo.

Bilateral Agreements

As for bilateral agreements, the strategy states: "The specificity and classification of these agreements will continue to be based upon the mutual desires of the signatory nations."[23] In implementing this portion of the strategy, the U.S. will continue to be well served by focusing on those nations with which it maintains special relationships and which possess technical excellence in those areas of highest interest to both parties. Certain bilateral S&T agreements could also be used as precursors to more formal development, or even production activities involving both countries. This has traditionally not been done and perhaps represents missed opportunities or, more importantly, future opportunities that should not be missed. Implementing this element of the strategy will take very close coordination between the DDR&E and the Under Secretary of Defense for Acquisition, Technology and Logistics.

Another area of consideration for implementation of the strategy for bilateral agreements concerns two countries that are growing significantly in ability and with which no formal bilateral S&T agreements exist: India and China.[24] Specific attention should be given to this matter. The explosive growth of software technology in India and relatively good relations between the United States and the second most populous country in the world make this a ripe area for consideration. In regards to China, the rapid growth in their production of scientists and engineers should be getting the attention of the DOD. Given the modest success that U.S. industry has had in the aerospace sector with China, this area could perhaps be the one that both sides are most comfortable with.

U.S. Goals and Expectations

Active Program

In calling for an active international S&T program, the strategy states: "The DOD will maintain and advocate an active international S&T program involving every element of the S&T enterprise: the Director of Defense Research and Engineering, the Defense Advanced Research Projects Agency, the Missile Defense Agency, the Defense Threat Reduction Agency and, most importantly, the service S&T laboratories."[25] The strategy goes on to say: "Reliability among partners is both promised and expected to ensure

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[22] Ibid, 8.

[23] Ibid, 9.

[24] As of this writing, a blanket R&D bilateral agreement with India is in staffing in DOD; no specific projects have been identified yet.

[25] "International Science and Technology Strategy for the United Sates Department of Defense," 9.

program success."[26] The key to assuring implementation of both of these statements is, once again, the DSTAG, which is the only senior executive body within the DOD that covers every element of the S&T program and has top-level representation from all of them. Unfortunately, international S&T has not been considered by this group on a regular basis. It seems appropriate that, at a minimum, one full meeting per quarter should be devoted to international S&T. Particular emphasis should be given to personnel assigned to the various areas, specific technologies to be shared with specific elements of the international community, and expectations of technology information to be gained from specific elements of the international community.

In addition to the above, the DSTAG should develop and periodically review participation metrics by the U.S. and international S&T communities. Finally, the DSTAG should devote an annual meeting to a detailed review of bilateral S&T agreements involving the DOD. Over time, the number of these agreements has grown significantly; it is not unusual for individual services or other elements of DOD to have agreements with the same country, the goals and results of which are not coordinated or sometimes even known within all elements of DOD.

Best People

People are the key to the success of almost any strategy. The DOD International S&T Strategy states: "The DOD and the Services will assign the best scientific, engineering and management personnel to represent the U.S. in international S&T activities, and will also provide our personnel with all necessary support to accomplish their tasks."[27] In implementing this portion of the strategy, DOD must devise a scheme for identifying, tracking, and training hundreds of scientists, engineers, technical managers and executives. At this time, there is no system or scheme for doing this across DOD. Selection for participation in hundreds of activities is too often done on an individual service basis at relatively low organizational levels and, on occasion, is even a result of self-nomination. The identification and tracking tasks should be formulated and managed by DDR&E's International Technology Programs Office.

Training is another matter and, at a minimum, careful consideration should be given to establishing formal training programs for individuals who will be involved in international activities, especially those who will serve multi-year appointments on the RTO Board and panels, and perhaps also those serving at similar levels in TTCP. The NATO situation is a particular challenge, because it involves not only the 26 NATO Nations but also, on occasion, the 20 Partnership for Peace and 7 Mediterranean Dialogue Nations.[28] Sending U.S. scientific and technical personnel into forums of this importance

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[26] Ibid.

[27] Ibid.

[28] The NATO Nations are Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Turkey, United Kingdom and United States. The NATO Partnership for Peace Nations are Albania, Armenia, Austria, Azerbaijan, Belarus, Croatia, Finland, Georgia, Ireland, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Sweden, Switzerland, Tajikistan, The Former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine and Uzbekistan. The NATO Mediterranean Dialogue Nations are Algeria, Egypt, Jordan, Israel, Morocco, Mauritania and Tunisia.

with no formal training in the customs and cultures of the individual nations or of NATO is clearly not in the best interest of DOD. Fortunately, the National Defense University in Washington, DC, already conducts a two-week NATO Staff Officers Orientation Course several times annually. It seems reasonable to assume that NDU could tailor a similar course for the scientific and technical community, if requested to do so by the DDR&E.

Reasonable Investments

In terms of investments, the strategy states: "The DOD will invest reasonable amounts of time, funding and knowledge in international S&T from all three fundamental elements of the S&T program: basic research, applied research and advanced technology development."[29] No specific dollar amounts for investment are given in the strategy, nor should they be. Rather, the amounts of U.S. investment should flow from decisions on which forums to support and which technical areas to emphasize within these forums. As mentioned above, NATO has the highest potential return on investment, requires the most number of U.S. participants, and will have the highest cost. This is perfectly reasonable as long as DOD takes a more active role through the DSTAG in defining top priority technical areas, assigns well trained personnel to work them, and encourages appropriate U.S. leadership of the various activities as opportunities become available or are created.

The strategy goes on to say: "DOD will especially emphasize and sustain basic research activities in areas that promise highly significant opportunities and technological returns."[30] This is a logical element of the strategy but one that requires the U.S. to sustain its presence, because basic research is a long-term proposition; to truly benefit from international collaboration requires patience and commitment. It also requires forums where two-way dialog can be accomplished in multiple sessions over several years. The U.S. should especially look for collaborative opportunities where other nations may be taking technical approaches to solving a problem that differs from the approaches being taken within the DOD. The U.S. should also continue to take maximum advantage of its basic research offices in London and Tokyo. These offices are especially valuable in identifying scientists and engineers who would benefit from visits to the United States or could host U.S. scientists and engineers. Concerning this latter point, DOD should more aggressively encourage and sponsor U.S. scientists and engineers not only to visit their foreign counterparts for short periods of time, but also to make more extended visits of a year or more.

Finally, on investments, the strategy states: "We will also strive to increase advanced technology development activities that show specific promise for enhanced interoperability with our allies and potential coalition partners. Emphasis will be given to demonstrating these technologies in a coalition environment."[31] All four sets of cooperative activities—NATO, TTCP, multilateral and bilateral—can benefit from this element of the strategy. NATO's Allied Command Transformation specifically has as a part of its mission the planning and execution of concept definition and experimentation.

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[29] "International Science and Technology Strategy for the United Sates Department of Defense," 9.
[30] Ibid, 9.
[31] Ibid.

The United States should play an aggressive role in leading the RTO in its interaction with ACT, and especially in demonstrating such technologies as distributed mission training, unmanned combat vehicles, and the full spectrum of command and control technologies. Similar demonstration activities could be considered via TTCP. Major initiatives in air-breathing propulsion and reducing fuel consumption should also be pursued.

Reasonable Return on Investments

The strategy makes it clear that the "DOD expects reasonable returns on investments of time and funding."[32] It goes on to say: "These returns should clearly demonstrate increases in the defense technological capability of the U.S. It is also our expectation that similar increases in defense technological capability will result for our allies and potential partners."[33] Although no nation invests time and funding in defense S&T at the same level as the United States does, DOD should encourage all allies to invest at similar percentages of their overall defense budgets. At the present time, the U.S. goal is to invest 3 percent of its total defense budget in S&T. The United States should also expect that its S&T program and that of its Allies will produce increasing interoperability in military operations, and metrics should be established by the DDR&E to show this.

Finally, concerning return on investments, the strategy states: "A fundamental aspect of these returns on investment will continue to be found within forums sponsored by NATO, TTCP, multilateral agreements and bilateral agreements, and it is our expectation that both the United States and our allies will bring results from their best work to these forums."[34] In implementing this element of the strategy, the DDR&E, working through the DSTAG, should continuously provide clear direction on specific aspects of the U.S. technical program to be offered to the various international forums and follow this up with appropriate reviews. These reviews should also feature assessments by the U.S. participants on the quality and quantity of technology being offered through NATO, TTCP, and multilateral and bilateral agreements.

Avoiding Technological Surprise

In addressing technological surprise, the strategy states: "we will continue to remain cognizant of emerging technologies by being active participants in appropriate international forums."[35] Perhaps more importantly, another element of the strategy should be to generate technological surprise, and selected bilateral agreements with the most trusted allies are perhaps a good way to address this.

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[32] Ibid.
[33] Ibid.
[34] Ibid, 9, 10.
[35] Ibid, 10.

Summary

The strategy summarizes the DOD position by stating: "It is anticipated that this guidance will be incorporated by the DOD staff, agencies and Service labs as they prepare their S&T plans."[36] In realizing this part of the strategy, DOD would benefit greatly by having all of its services produce a publication similar to that produced bi-annually by the Army that covers in detail global S&T, with a top level assessment of international expertise across the complete spectrum of Army interest areas.[37]

This paper has presented a framework for implementation of the recently released "International Science and Technology Strategy for the United States Department of Defense." Specifically, it encourages more top-down guidance and oversight from the DSTAG in the hope of providing more cohesive direction to the thousands of scientists, engineers, managers, and executives engaged in the various DOD international activities. It is also hoped that the ideas presented here will assist those individuals in becoming better trained and having a better understanding of the political world they enter.

The argument has been made that NATO, through its Research and Technology Organization, offers the best potential for return on investment for the United States from the various options that are available. This unique political and military forum is unquestionably the largest grouping of the most advanced technical nations in the world. As such, it simultaneously offers the most challenging bureaucracy and the highest potential rewards.

On a final note, a top-level international defense S&T strategy will require the United States to more readily share its S&T results, especially at the basic and applied research levels, with current and future partners. It will also require the United States to be more receptive to the basic and applied research results of allies and coalition partners. As our world effectively becomes smaller, the United States must become more proactive in managing its international defense S&T enterprise. Clear policies, strategies, and plans will serve us well, both within and beyond the boundaries of our country.

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[36] Ibid.

[37] "Global Science and Technology Watch," Vol II, Annex E, 2003, Army Science and Technology Master Plan.