Cooperative Research and Development Opportunities with Canada: A U.S. Army Perspective

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Introduction

In 1964, the armies of the United States, Australia, Canada, and the United Kingdom signed a "Basic Standardization Agreement" (BSA), which agreed to place a standardization representative in each of the four nations' capital cities. This agreement forms the basis for my current assignment as commander of the U.S Army Research, Development & Standardization Group in Canada. New Zealand joined as an observer to the Basic Standardization Agreement in 1965. The goal is to allow two or more armies from the four countries to operate effectively together within a coalition and focuses on standardization across the functional areas of the battlefield.

This paper describes U.S. Army/Canada co-operative research & development, an area with a long history and tremendous potential, from the perspective of the U.S. standardization representative. It first deals with the scope of co-operative research development, including policy, observations, and challenges, touches upon several Army Materiel Command organizations involved in co-operative research & development (including mine), and then addresses the Army Materiel Command's relationships with Canada's Department of National Defence and the Chief of Research and Development. In the process, the discussion will highlight several co-operative programs and address some acquisition reforms. The paper ends with an overview of the challenges facing co-operative research and development.

International Co-operative Research & Development Policy

International co-operative research & development provides the U.S.Army with benefits that many times are immeasurable. We all know that our future combat and peace operations will be done as a coalition force. Building multi-national relationships, providing compatibility and inter-operability are each essential to our shared future. We gain high quality systems through leveraging world class research & development technologies.

The U.S. Defense "NATO Cooperative R&D Program" funding will change to "Coalition Warfare" and will be funded to the amount of $24.5 million in fiscal year 2000. The U.S. Army's spending share is $1.9 million, the U.S. Air Force's share is $4.3 million, the U.S. Navy's share is $5.5 million, and the Secretary of Defense receives $12.8 million. These amounts may seem small, but money from other sources is also spent on co-operative research & development.

On 23 March 1997, U.S. Defense Secretary William S. Cohen promulgated an international arms co-operation policy memorandum. This official document stated:

"I have determined that International Armaments Co-operation is a key component of the Department of Defense Bridge to the 21st Century. … it is the DoD policy that we utilize International Armaments Co-operation to the maximum extent feasible… We already do a good job of international co-operation at the technology end of the spectrum; we need to extend this track record of success across the remainder of the spectrum, to include major defense systems. We must achieve as a minimum: [Directs DoD to]

Deployment and support of standardized, or at least inter-operable equipment with our potential coalition partners: and Leverage of U.S. resources through cost sharing and economies of scale afforded by international co-operative research, development, production, and logistics support programs. …

This new policy sharpened the focus of international armaments co-operation; and, the armed services were told to use it to the maximum extent feasible. Recent policies led to the introduction of several Office of the Secretary of Defense initiatives: improvements to memoranda of understanding and data exchange agreements, the enhanced Foreign Comparative Testing program, international co-operative opportunity groups, and in August 1997, the opening of Advanced Concept Technology Demonstrations (ACTDs) to allied governments.

Building Blocks of International Co-operation

The foundation of international co-operation is based upon a successful history of memoranda of agreements that allow the exchange of information, people, and materiel. Governments continue to plan and conduct work through bilateral and multilateral working groups, such as NATO, ABCA, and The Technology Co-operation Program (TTCP). This last forum was established in October 1957 between the United States and the United Kingdom and was shortly thereafter expanded to include Canada. Australia joined in July 1965, and New Zealand followed in October 1969. The TTCP memorandum of understanding was signed on 24 October 1995. TTCP provides for activities in research, science, and technology and establishes procedures for information exchange, harmonization, and alignment of national science and technology programs as well as for the establishment of projects under project annexes.

Working through NATO Standardization Agreements requires extensive meetings and at times complex communications. Foreign comparative testing, which will be discussed later, is a part of this third level. These programs collectively support, and in fact some lead to meeting, materiel solutions co-operatively; other times, information is all that the U.S. Army seeks. The means of communication include many international meetings (both bilateral and multilateral), substantial information exchange, as well as actual technology projects. Admittedly, there are few joint development programs at the present time. Regardless, great potential exists for improved cost savings and industrial linkages. Having given this brief discussion of U.S. policy, the paper now offers some personnel observations and perspectives on international co-operation.

Perspectives on International Armaments Co-operation

International armaments co-operation is a complex business, involving many actors at different levels: presidents and prime ministers say we must have international armaments co-operation; defense secretaries and ministers say resource constraints demand it; chiefs of staff seem cautious; planners have difficulty planning for it; and, program managers want only what is below cost, on schedule, or above performance standards. These varying perspectives stem primarily from a lack of education and communication. It is interesting that the U.S. Department of Defense's 5000.1 acquisition policy requires program managers to consider international co-operation when initiating a new materiel development. Our policy imposes a four tier hierarchy of materiel alternatives ranked in the following order: 1) procurement of commercially available/non-developmental items or modification of U.S. or Allied systems 2) co-operative development with one or more Allies 3) new joint service development 4) new service specific development. As can be seen, international co-operation comes under review in the first two options. Why then is it not more widely used? The answer lies with additional challenges, which impinge on effective international co-operation between armies and defence establishments.

Challenges to International Co-operation

With the U.S. Army's focus on Force XXI, Army After Next, Strike Force, and battlefield digitization as well as the refocus of the Canadian Forces on their own vision and technology thrusts, there is not always a match in standardizing equipment through co-operative programs. These continuously changing missions and thrusts require close co-ordination and communication between allied countries. The large defense industrial base and industry conglomerates see the defense acquisitions programs in the post-Cold War era as small projects compared to their other diversified missions and areas of profitability. The armed forces no longer dictate the direction of development and have, by default, increasingly focused on commercially available/non-developmental items and dual-use technologies to leverage upon commercial strengths.

The Arms Export Control Act (AECA), Pub L. 94-329 (1976), (22 U.S.C. 2651), which governs the sale and export of defense articles and military-related technical data, is the legal basis for most international programs. The AECA covers commercial and government sales programs, including certain government co-operative research and development programs. The AECA specifically requires, by law, that exports to other countries support U.S. national security interests.

The International Traffic in Arms Regulations (ITAR), 22 CFR 120-130 implements section 38 of the AECA with regard to commercial exports of defense articles and related technical data. Administered by the U.S. Department of State, these regulations contain the U.S. Munitions List (USML) that identifies the defense articles subject to export control. Section 126.5 of the ITAR permits exports to Canada of any unclassified defense article, or unclassified technical data with a license if the article or data is for end-use in Canada by Canadian citizens, or returned to the United States. This arrangement, however, is subject to some exemptions. Moreover, Canada's special status in the ITAR is under review by the United States, raising some concerns on both sides of the border over the impact any changes to the existing relationship might have on defense development sharing agreements and programs.

The U.S. Department of Defense's Planning Programming Budgeting System changes annually as programs are funded in the Program Objective Memorandum, which is debated regularly by our two elected bodies of government. The complex materiel acquisition process places additional requirements on organizations conducting international research and development. No less than twenty-three different offices in the Office of the Secretary of Defense are involved in international co-operation, and an extensive network of communications and an automated tracking system are required for international agreements.

The "Not-Invented-Here" syndrome has a strong foothold within and between U.S. states, their agencies, and departments due to the competitive nature of organizations now being run as businesses. Organizations must prove return on investment, cost avoidance, or some type of savings in order to get funding for future years.

Army Materiel Command and the U.S. Army Training and Doctrine Command (TRADOC) are addressing not only one force structure but a continuum of combat-capable forces likely to be available to the United States in the near and distant future: today's Army of Excellence; Force XXI, to be fielded in 2000; Army 2010, a vital component of Joint Vision 2010; and the Army After Next (AAN), the force of 2020+. Army Materiel Command is working diligently alongside TRADOC in supporting 'out-of-the-box' thinking with advanced technologies of tomorrow. The practical application of new technology in the field and within headquarters settings has been, and continues to be, tested by a series of Advanced War-fighting Experiments (AWEs), the most recent being Army Experiment 6.

U.S. Army /Canada co-operative research and development represents a fascinating field in challenging at times, with many obstacles. These trials and tribulations require planning, co-ordination, communication, and a little patience to leverage the many worthwhile technologies out there.

U.S. Army Materiel Command

The U.S. Army Materiel Command is the Army's principal materiel developer. Headquartered in Alexandria, Virginia, Army Materiel Command accomplishes its mission through ten major subordinate commands that direct the activities of numerous depots, arsenals, ammunition plants, laboratories, test activities, and procurement operations. Approximately 65,000 employees, both military and civilian, run these organizations. Laboratory and engineering centers, acquisition centers, national inventory control points, and program managers comprise Army Materiel Command's commodity commands. The activities of mission-oriented commands and others include analysis, management, logistics, and sustainment.

Army Materiel Command's International Co-operative Programs Activity and USARDSG-CA

The International Co-operative Programs Activity in Alexandria, Virginia provides centralized management and guidance of international co-operative programs as well as overseas presence in selected countries. The workload is considerable, especially for staffs that have been reduced by some 50% in the last four years. The Commander of the US Army Research, Development and Standardization Group - Canada (USARDSG-CA) provides the eyes and ears of Army Materiel Command in basic and applied research, development of materiel, and ABCA standardization inside Canada. His customers are Army Materiel Command's laboratories and the major subordinate commands.

Army Research Laboratory

The Army Research Laboratory provides the TRADOC battle labs, research and development centers, and program managers/program executive officers with corporate research, technology, and analysis. They are now in the process of building a truly "world class" lab, while in the midst of consolidation and reductions in personnel. The Army Research Laboratory's five grand challenges furnish the focus from the science and technology objectives listed in the U.S. Army's Science and Technology Master Plan. Major thrusts, in turn, support these challenges:

Provide weapons systems technology for the future combat systems. This challenge is addressed by the following thrusts: develop propulsion science and technology for future turbine engines, co-operate with DOE/Industry on efficient diesel engine technology, develop structural concepts and novel materials for light weight air and ground vehicles, improve loads and durability prediction technology.

The Army Research Laboratory is located in three primary locations: the Adelphi Laboratory Center, Maryland; the Aberdeen Proving Ground, MD; and the White Sands Missile Range, New Mexico. It also shares locations and facilities with the NASA Langley Research Center, Virginia - Vehicle Technology Center and the NASA Lewis Research Center, Ohio - Vehicle Technology Center. The Army Research Laboratory's federated laboratory concept is much like Canada's Defence Industrial Research program for industry and the DND/NSERC Research Partnership program with academia at selected Canadian universities.

The Army Research Laboratory uses Co-operative Research and Development Agreements, which authorize American government federal laboratories to enter into co-operative research and development agreements with foreign persons and entities, other U.S. Federal agencies, state and local governments, industrial organizations, public and private foundations, non-profit organizations, and other persons.

Army Research Office

The Army Research Office identifies major developments in various scientific fields relevant to the needs of the U.S. Army from 120 universities and other countries. The Army Research Office arranges visits, technical meetings, workshops, and conferences. A dedicated International Programs Office within the larger organization entertains proposals for research on original and unique concepts in basic sciences. Under its auspices, a Rotational Scientists Program sends scientists for short-term research several weeks abroad. The Army Research Office sponsors the discovery of emerging technologies with long-

term potential for meeting or exceeding future army technological requirements. In doing so, the Army Research Office co-ordinates and leverages on-going activities with other government laboratories, industry, and academia.

Recently, the Army Research Office and the Defence Research Establishment Valcartier sponsored a Canadian workshop on the transport of high intensity femto-second pulses in the atmosphere. Scientists from Laval University, the University of Toronto, as well as personnel from Egypt, France, Germany, Russia, and the United States attended.

The Army Research Office maintains an open broad agency announcement, in accordance with the U.S. Federal Acquisition Regulation. Companies or individuals can contact the International Office through the Army Research Office, P.O. Box 12211, Research Triangle Park, NC 27709 Tel: (919) 549-4202.

Army Materiel Command Co-operation with Canada's Department of National Defence

Government to government co-operation between the U.S. Army and Canada rests primarily in co-operation between Army Materiel Command's Research and Development Centers and their equivalent Canadian laboratories - the Defence Research Establishments. Representatives attend bilateral and multilateral get-togethers, workshops, and conferences. Working groups allow subject matter experts from the ABCA countries to leverage the best collective technologies toward meeting their common goals. They work together on areas of interest via memoranda of understanding, data exchange agreements, and Technology Research and Development Program project arrangements.

Bilateral Master Data Exchange Arrangement

A master data exchange memorandum of understanding was signed on 10 April 1984 and allows for the development of specific data exchange annexes. A data exchange arrangement to the master agreement is concluded for each specific data exchange area. It identifies the scope of the exchange and the responsible authorities. The following data exchange arrangements are in effect: shelters and organizational equipment (signed 11 January 1999); robotic systems (signed January 1997); civil engineering technologies (signed March 1996); and presently under discussion, mine, countermining, and demolitions technologies.

A United States - Canada Technical Research and Development Project memorandum of understanding was signed on 29 August 1996. This document allows for the negotiation of project arrangements on specific topics. Project arrangements on "intense laser pulse propagation" and "panaspheric imaging" between Aviation and Missile Command and Canada's Defense Research Establishments were signed in October 1998. A project arrangement on ballistic protection and body armor is also being considered.

Foreign Comparative Test Program

The Foreign Comparative Test program provides funding to program managers to determine whether another country's systems satisfy U.S. Army requirements. Successful Foreign Comparative Test projects have resulted in recent production procurement contracts worth over $100 million to acquire foreign items to meet our war-fighting requirements. The Foreign Comparative Test program facilitates the rapid fielding of NDI equipment, creates teaming opportunities for industry, eliminates unnecessary duplication in acquisition, and reduces acquisition costs by avoiding new start-up developments.

Canadian companies have done well under the arrangement. A "less than three kilowatt" generator made in Canada was tested by PM Mobile Electric Power. The PM let a $3.9 million contract toward an urgent requirement and purchase of 650 each. The U.S. Air Force contracted for 648 each. Another success was the improved mobile subscriber equipment requirement. The countries of Canada, Sweden,

Germany, and Israel competed for down-select in an operational test. Israel's radio was selected for a Taiwanese FMS contract, but a radio manufactured by Canadian Marconi Corporation was selected for the Army Common User System (ACUS) modification program, replacing the AN/GR-222 & -226 radios.

North American Technologies and Industrial Base Organization

The North American Technologies and Industrial Base Organization (NATIBO) facilitates co-operative technology and industrial base planning and program development among the U.S. armed services and Canada. This broad organization has been in existence by charter since 23 March 1987. NATIBO fosters co-operation that promotes better integration of the defense and the commercial industrial sectors, in particular the greater use of dual use products and technologies. NATIBO leverages resources through cost sharing and economies of scale afforded by co-ordinated activities. Emphasis is placed on technology and industrial base planning with a special focus on dual use technologies, facilities, and products. For example, a corrosion detection study in March 1998 initiated a technology insertion project with the U.S. Navy, the U.S. Air Force, and the U.S. Army; the technology uses visible light, eddy current and ultrasonic sensors to locate early weak points and corrosion on aircraft wings, hulls, and fuel tanks. Canada and the United States are currently are negotiating a memorandum of understanding to allow project arrangements that will leverage the technologies and industry studies conducted by NATIBO.

Canada - U.S. Defense Development Sharing Program/Agreement

Even though Canada's co-operative defense development and production sharing dates back over 50 years to the Second World War, a Canada -U.S. Defense Development Sharing Program/ Agreement (DDSP/DDSA) memorandum of understanding was formally signed in 1963. This legal document allows Canadian firms to perform research and development work to meet the requirements of the American armed services. It aims to better utilize the industrial, scientific and technical resources of the U.S. and Canada in the interest of mutual defense. The Canada-U.S. Defense Development Sharing Program provides Canada with an opportunity to share in the research, development and production of high technology military equipment and material of mutual interest to both countries. It also meets the desire for standardization and interchangeability of a large amount of the equipment necessary for the defense of North America. These jointly funded projects (50% American and 50% Canadian) are performed by Canadian prime contractors to meet specific Department of Defense research and development requirements and are under the design authority of the Department of Defense's program manager.

American program managers have saved the U.S. Army over $81 million since the DDSP's beginning in 1963. At present, two projects are active: a metal matrix composites project with Aar Kel Inc. at $1.52 million US/50:50($760 thousand-US) for Tank and Automotive Command and the Bradley fighting vehicle track shoe project with Industrial Rubber at $422 thousand US/55:45, also with the Tank and Automotive Command. Industry Canada has funds available through Technologies Partnership Canada to support this memorandum of understanding. This assistance helps Canadian companies to gain access to cutting-edge research & development projects and increase their competitiveness for possible future production contracts. In February 1999, an American program manager signed a follow-on production contract with Bristol Aerospace for the HOKUM-X technology, in order to meet a U.S. Army target requirement.

Acquisition Reforms.

Army Materiel Command and Canada's Department of Defence are benefiting immeasurably from various materiel acquisition reform initiatives. Individuals in industry and academia must realize that change and

reform will be a constant in the future, in regards to the U.S. Army and projects under supervision from the Pentagon. The following list, though not exhaustive, provides several key areas of reform:

Integrated product and process development

Best business practices, products, processes, and standards

Solicitations that give flexibility (tells what we want and not how to do it)

Exploit simulation-based acquisition

Customer requirements integrated - cost as an independent variable

Best value contracting, Public Law 98-369

Agile and flexible manufacturing, smaller production, and continuous improvements

Electronic commerce and the paperless contracting process

Advanced Concepts Technology demonstrations

Advanced Technology demonstration

Advanced Concepts and Technology II

Electronic commerce, in particular, is an important initiative worth investing in. The Defense Logistics Agency will be hosting the 2nd annual E-Commerce Day on 10 June 1999 (URL: http://www.acq.osd.mil/jecpo/ecday99/index.htm)

Conclusion - Continued Focus on International Co-operative Research & Development

One of the chief goals of the U.S. Army Research, Development, & Standardization Group in Canada representative is to bring world-class Canadian technologies to the attention of the U.S. Army. Assistance is needed in identifying Canadian niche technologies that will provide the future coalition soldier with equipment and systems (technologies) that are better than current systems, faster to develop, and cheaper to make and sustain. It is highly recommended that any Canadian company interested in obtaining American defence-related business work through Canada's Department of National Defence, in particular the Director General Industry and International Programs and the Chief of Research and Development; the Canadian Commercial Corporation; Industry Canada; and the Department of Foreign Affairs and International Trade. The aim should be to build a better mousetrap, regardless of national origin.

People on both sides of the border must champion international co-operative developments. It is an area of great potential for everyone involved, but conditions remain fluid; since today’s successful champions are multi-tasking (doing more with less - or is it less with less), open communication is critical. Constantly changing political and economic conditions in each country add a further unpredictable dimension. Many challenges exist in international co-operative developments, but stewardship, down-sizing, the industrial environment, and common sense require the United States and Canada to pursue it in a serious manner. We share a common continent, common democratic traditions, and undoubtedly a common future together. These must be defended with the best tools and weapons available against any potential adversary or aggressor. The immeasurable benefits of international co-operation make the effort more

than worthwhile. As President Johnson stated in 1964, the end-goal is "Peace, Freedom, Respect, and Co-operation." We must remember these things and breach the cultural barriers of today to leverage tomorrow's technologies.

Bibliography

Information Talking Paper, 14 July 1998, "Closure of U.S. Army Research, Development, and Standardization Groups in Australia and Canada"

Army Science and Technology Master Plan 1998 CD-ROM

Army Materiel Command Promotional CD-ROM

Canadian Department of National Defence Planning Guidance 1999. Discussion and information provided by Major Gavin Liddy, DFPPC 7-2, 7 January 1999

ICPA Presentation and charts, 2 February 1999, Colonel Charles Westrip, "U.S. Army International Cooperative Programs Activity"

Ref. International Programs Security Handbook, OSD(PS), February 1995(revised April 1998)

Points of Contact:

Canadian Embassy - Director, Government Markets, Judith Brandt , 501 Pennsylvania Avenue, N.W. Wash, DC 20001, Tel: (202)682-7743, judith.brandt@washdc01.x400.gc.ca

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Other Canadian Forces liaison officers are at TACOM ARDEC, CECOM, MTMC,TACOM, TECOM, TEXCOM, TRADOC, NSC, Bragg, Bliss, Knox, Sill, Rucker, Leavenworth, Leonard Wood, Benning, Huachuca, Gordon, USMC, and USACOM.

Canadian Commercial Corporation, Senior Business Development Officer, Jim Burt, 1100-50 O'Connor Street, Ottawa K1A 0S6, jim@ccc.ca, (613) 995-2121

Web-Sites on the Internet:

Note: Links will open in a new browser window

U.S. Army Research., Development & Standardization Group-Canada

Defense Advanced Research Projects Agenc

International Co-operative OSD Research & Development Page

Major U.S.Department of Defense acquisition policy directives

Defense Acquisition Deskbook

DSMC's home page

Foreign Comparative Test Home Page

Arms Control Implementation & Compliance

The Militarily Critical Technologies List

Canadian Commercial Corporation (604) 666-4781

Technology Partnership Canada

Canadian Defence Industries Association

Defense Modeling and Simulation Office (Industry Days, 1-3 Jun 99)

Army Materiel Command Advanced Planning Briefs to Industry

The North American Technology and Industrial Base Organization (NATIBO)