



# STRATEGIC FORUM

National Defense University

## About the Author

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## Key Points

- ◆ **As Brazil's power and international standing grow, so does the importance to the United States of a close relationship with Brazil.**
- ◆ **Among emerging powers, Brazil is politically and culturally the closest to the United States. For this South American neighbor, defense technology has become a critical aspect of strategic reorientation and force modernization. Sharing U.S. defense technology, including know-how, would strengthen U.S.-Brazil relations.**
- ◆ **The two nations have taken initial steps to strengthen defense relations, including the 2010 Defense Cooperation Agreement and the first U.S.-Brazil Defense Cooperation Dialogue.**
- ◆ **Full implementation of 2010 agreements, pursuit of a shared vision of deeper defense cooperation, and development of a bilateral plan to advance the transfer of defense technology (and know-how) based on Brazil's National Defense Strategy can improve defense collaboration and provide each country with important benefits.**

## Trust, Engagement, and Technology Transfer: Underpinnings for U.S.-Brazil Defense Cooperation

by E. Richard Downes

On the eve of the January 1, 2011, inauguration of Brazilian President Dilma Rousseff, the State Department noted that the United States “is committed to deepening our relationship on a wide range of bilateral, regional and global issues with Brazil’s government and people.” President Rousseff herself declared shortly thereafter, “We will preserve and deepen the relationship with the United States.” During President Barack Obama’s March 2011 visit to Brazil, both leaders cited “the progress achieved on defense issues in 2010” and stated their commitment to “follow up on the established dialogue in this area, primarily on new opportunities for cooperation.” While these rhetorical commitments are important, will they lead to greater cooperation on defense issues and improve U.S.-Brazil ties?

The established dialogue on defense is part of a movement toward greater U.S.-Brazil defense cooperation. On April 12, 2010, U.S. Defense Secretary Robert Gates and Brazil’s Defense Minister Nelson Jobim initialed the first Defense Cooperation Agreement between the two nations in over 25 years. It endorsed multiple interactions already under way between both militaries, but it also broadened the scope of potential cooperation. The agreement endorsed cooperation related to defense technology including research and development (R&D), logistics support, technology security, military systems and equipment, acquisition of defense products and services, and the sharing of operational and defense technology experiences. The agreement also called for the “facilitation of commercial initiatives related to defense matters” and cooperation on “implementation and development of programs and projects on defense technology applications.” In November 2010, Gates and Jobim signed a second accord, a

General Security of Military Information Agreement, designed to facilitate the exchange of classified military information essential for commercial sales and operational cooperation.

These agreements reaffirm that the United States and Brazil have important common regional and global interests best served by sweeping aside past suspicions, smoothing strained relations, and nurturing consultation on security matters. Foreseeable strategic results of improved U.S.-Brazilian relations and heightened collaboration include the enhancement of Brazilian military capabilities, which are central to Brazil's ability to secure its borders and coastline and operate effectively in a dangerous world, and increased U.S. opportunities to collaborate with an important new global actor on a range of international security issues. Achieving robust defense cooperation, however, will take time and political will.

To make progress, each government must develop higher levels of mutual trust and confidence. A practical catalyst and test of U.S. commitment in the near term is Washington's willingness to transfer defense technology to Brasilia in support of its forward-looking 2008 National Defense Strategy. Brazilian and U.S. political and military leaders see long-term strategic and commercial benefits flowing from implementation of this defense plan.

## U.S. Interests in Closer Defense Cooperation

For the United States, a stronger defense relationship could strengthen bilateral political ties and improve cooperation on multiple regional and global security issues. The U.S. National Security Strategy (May 2010) cited Brazil as one of the "Emerging Centers of Influence" and expressed a commitment to work together "to move beyond dated North-South divisions to pursue progress on bilateral, hemispheric, and global issues."<sup>1</sup> The scope of shared strategic interests in the hemisphere include peacefully managing challenges posed by national instabilities and local conflicts, democratic development, and the need to defeat transnational organized criminal networks. Looking globally, common interests include alter-

native energy development, trade, peacekeeping, cybersecurity, nuclear nonproliferation, international terrorism, narcotics-trafficking, the environment, and development in Africa. According to a veteran Washington analyst of the country, Brazil has become "a respected player and interlocutor with both the emerging market countries and the industrial states."<sup>2</sup>

**Defense Engagement.** A closer U.S. defense relationship with Brazil serves the strategic interests of both nations and reduces the potential for misunderstandings and antagonism. Sustained bilateral engagement reinforces mutual trust, broadens nascent cooperation, and underscores respect for national sovereignty and international law. In a recent study, Ambassador Luigi Einaudi observed that "[b]oth countries need to take a new look at each other, recognize their mutual interest in more intimate relations, and make achieving them a priority."<sup>3</sup>

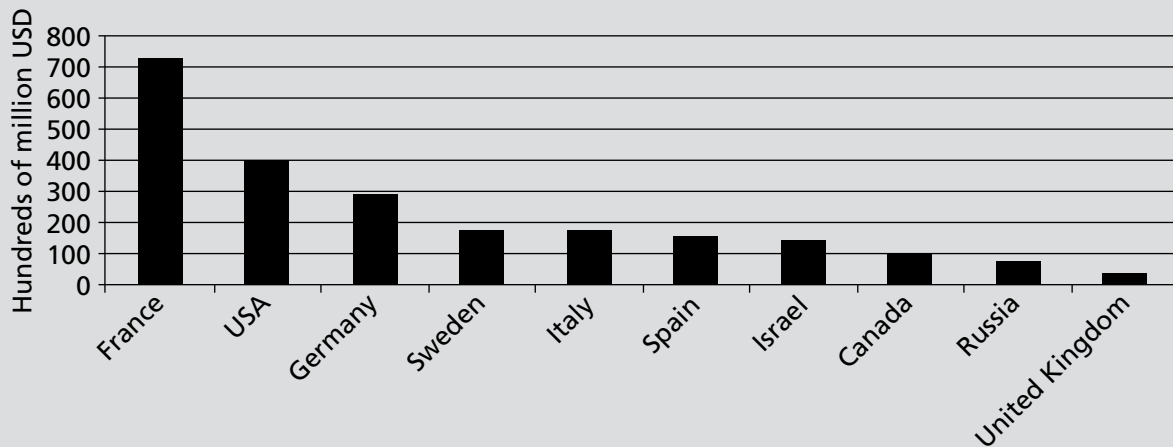
Bilateral cooperation in disaster relief and other humanitarian missions and exposure of intermediate-grade and senior U.S. and Brazilian military officers to each other's concerns would lead to deeper mutual understanding. A closer military relationship would also further opportunities for language training, cultural exposure, and exchanges of operational experiences in non-traditional security environments.

**Arms Sales.** The Obama administration is determined to help U.S. companies pursue the new market opportunities Brazil represents. With Brazil's defense spending and foreign acquisitions increasing and over USD 2.3 billion expended for weapons imports from all suppliers between 2000 and 2010, it should be an emerging market for U.S. defense businesses. The Department of State and U.S. industry are seeking to increase the meager 16 percent U.S. share of Brazil's foreign purchases of weapons and boost sales of defense services.<sup>4</sup>

## Brazilian Interests in Closer Defense Cooperation

Agreements on defense cooperation define a path to acquire expertise and capabilities integral to Brazil's attainment of its international aspirations. Ratification

## Brazilian Weapons Imports by Country of Origin, 2000–2010



Source: Stockholm International Peace Research Institute Trade Registers, available at <[www.sipri.org](http://www.sipri.org)>.

of the bilateral 2010 Defense Cooperation and General Security of Military Information Agreements with the United States by Brazil's congress will help the government implement its 2008 National Defense Strategy vision of a complete overhaul of the defense establishment and military capabilities plus the resuscitation of national defense industries. Bolstered by a strong economy, political stability, and cultural vitality, Brazil's leaders are convinced that their country can finally assume its "rightful" place as an influential regional and global power. Economic performance, high commodity prices, and higher government revenues have made increased defense expenditures possible and revived the nation's military-industrial complex. To achieve its ambitious international goals and develop domestic defense industries, however, the National Defense Strategy acknowledges that Brazil has to consider "strategic partnerships with countries that may contribute to the development of state-of-the-art technologies in the interest of defense."<sup>5</sup> The United States is just such a country.

**International Aspirations.** In South America, Brazil is at the center of attention in such areas of looming importance as energy (oil, biofuels, and nuclear power), fresh water, foodstuffs, the environment, and interna-

tional organized crime. With unprecedented presidential diplomacy, former President Luiz Inácio Lula da Silva (2003–2010) encouraged greater continental unity, an effort to create a "consensual hegemony" to safeguard Brazil's regional interests and gain support for a greater role in international politics and high-level participation in global organizations. In 2003, Brazil led the push for expansion of the G-7 into the G-20 to make it more inclusive of emerging economies and the 2008 founding of the Union of South American Nations (UNASUR). Six months later, after consultations with counterparts, Lula's administration announced the creation of UNASUR's South American Council of Defense.<sup>6</sup> The National Defense Strategy underscores the country's intention to rise to the first stage in the world but emphasizes that Brazil has no intention of promoting hegemony or domination.

**Defense Reform: The Background.** While Brazil has risen in global economic and political influence, its military forces have remained hampered by deficiencies in equipment, planning, force distribution, and resource allocation. The National Defense Strategy asserts that Brazil's sovereignty, domestic security, and international aspirations are partly predicated on a modern and

capable defense sector. Driving defense reform are three elite groups: civilian policymakers committed to providing political direction to the nation's security strategy, military leaders pressuring for high technology weapons systems and other capabilities after decades of no-growth budgets, and a domestic defense industry seeking to expand further into both domestic and especially international markets.

***Defense Modernization: A Mixed Record.*** Civilian political leaders have long advocated funding the scientific and technological development of the armed forces not only to ensure Brazil's autonomy but also to increase domestic economic growth. In the 1990s, unprecedented changes in international geopolitics left the Brazilian military without an identifiable enemy and severely reduced budgets. Establishment of a civilian-led Ministry of Defense in 1999 centralized control and guidance of the armed forces, with an emphasis on technological advancement. In 2003, the ministry expressed support for "scientific-technological solutions and innovations . . . related to defense and national development" and subsequently joined the Ministry of Science and Technology to create a national system of Science, Technology, and Innovation of Interest to National Defense. Senior military officers judged "scientific and technological expression" that "conceives and coordinates the development of weapons systems together with industry" as one of the gauges of national power.<sup>7</sup> The 2008 National Defense Strategy specifically links technology, security, and national development. Nothing less than "national independence" is to be achieved through an "autonomous technological capacity" since "whoever does not master critical technologies is neither independent for defense nor for development."<sup>8</sup>

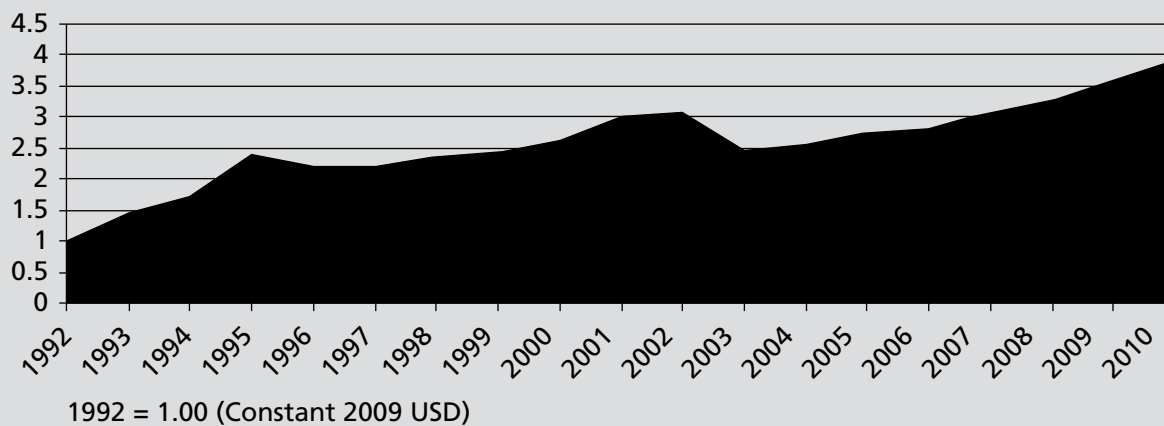
In practice, however, during the last 20 years the uniformed services' quest for scientific and technological development has fallen victim to budget cuts that have resulted in operational weakness and low morale. By 1993, the defense share of all government spending had fallen to the lowest level since 1822.<sup>9</sup> Limited resources undermined accomplishment of the most routine tasks

and, together with the low salary scale for even senior officers, contributed to an overall feeling that Brazilian society viewed the military with "injustice and lack of appreciation."<sup>10</sup> Increases in the military budget from 1995 forward went largely to pay increases, but morale remained so low that in 2006 an influential Brasilia newspaper reported that more than 600 army, navy, and air force officers had abandoned the services during the previous 6 years because of low pay.<sup>11</sup>

Operations and equipment modernization also suffered. In 2004, the navy withdrew major ships from service because of a lack of maintenance funds. In 2005, the air force suspended a buy of advanced fighter aircraft, under way for 5 years, and instead purchased a dozen 25-year-old French Mirage 2000-Cs. That same year, the navy commander stated that he lacked the means to defend Brazil's coastline, and the government announced the completion of a prototype nuclear reactor for a nuclear submarine on land only, since funds were unavailable for tests at sea. Two years later, the air force commander reportedly testified behind closed doors that 63 percent of his aircraft were immobilized for financial reasons. The Brazilian army had become a "living military museum" with combat vehicles used during the Korean War and American equipment discarded after Vietnam.<sup>12</sup>

Reequipping the armed forces to perform even minimal missions in a changing security environment became a political issue. President Lula increased the defense budget annually so that by 2010 the Defense Ministry's budget ranked third among all ministries, leading one analyst to conclude that democratization was followed "by a massive effort to maintain the power of the military, not the contrary."<sup>13</sup> Presidential commitments to reequip the armed forces and increase export sales breathed new life into the defense industry, which by 2007 included 300 companies employing 30,000 persons with a net contribution of USD 208 million to Brazil's gross national product.<sup>14</sup> By 2009, the total value of its production had grown to nearly USD 2 billion, with exports nearing USD 1 billion. Three domestic trade associations

## Indexed Brazilian Defense Expenditures, 1992–2010



Source: Stockholm International Peace Research Institute, available at <[www.sipri.org](http://www.sipri.org)>.

lobby the government to increase the use of Brazilian firms to meet domestic defense needs, constantly citing the potential benefits of spin-offs of defense technology. Especially prominent is COMDEFESA, a committee of the powerful Federação de Industrias do Estado de São Paulo (The São Paulo State Federation of Industries), representing companies that produce 95 percent of domestic defense output. COMDEFESA teaches defense resources management at the National War College, the Escola Superior de Guerra, with the objective of “aligning civilian and military interests in Brazil’s affairs.” It also sponsors the Latin American Aerospace Conference, an annual defense trade show. The 2011 edition attracted over 25,000 visitors and featured 121 Brazilian companies among the 542 exhibitors. According to the Stockholm Institute for Peace Research, Brazil’s defense expenditures, measured in constant 2009 USD, nearly quadrupled between 1992 and 2010.<sup>15</sup>

### Brazil’s National Defense Strategy

Beyond additional defense funding, a rising Brazil needed a disciplined assessment of the country’s security and defense requirements and an examination of existing capabilities. The defense strategy that emerged focused

on three thematic areas: transforming the ministry and modernizing the armed forces for peace and war, reorganizing the nation’s defense industry to reduce reliance on foreign sources, and adopting compulsory military service and improving the mobilization system.

Its implementation poses challenges for civilian leaders in addition to those created by perennially underfunding acquisitions. Leaders cannot ignore the historic independence and political strength of military forces. Traditional service cultures will influence the integration of new technology and its utilization within new, complex organizational arrangements. The strategy accepts an unavoidable tension between the traditional power and prerogatives of the army, navy, and air force and today’s recognized need for joint planning and unification of the “operations of the three branches of the armed forces, far beyond the limits imposed by joint exercise protocols.” The strategy allows each service to specify its own strategic guidelines and equipment priorities and separates service-based plans under the direction of the respective service commanders. Traditional autonomy is further maintained as each commander retains the authority to “perform the direction and management tasks of the respective branch”

and “propose its policies and doctrines.” One awkward provision allows naval districts, regional commanders, and “Regional Joint Staffs” to have “common jurisdiction areas” and directs their “operational unity” through periodic meetings among themselves and advisors. It is fair to presume that time-consuming negotiations and suboptimal decisionmaking may result.

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## modernizing the armed forces for peace and war and reorganizing the nation’s defense industry requires funding, education, and time, but especially technology

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On the other hand, the strategy strengthens the Ministry of Defense role in guiding the equipping, training, and structuring of the uniformed services. The minister has direct authority over the joint staff, charged to unify service doctrine, strategy, and operations. The strategy calls on the army to transform itself based on concepts of mobility, flexibility, and daring (innovation). All services are directed to increase their abilities to plan and conduct joint operations. Military research centers will be linked to academic institutions and private companies to support increased technology development. The core of the document mandates service organizational changes needed to transform today’s technological innovations into desired capabilities, whether for the conduct of peacekeeping operations; “power projection in the areas of strategic interest”<sup>16</sup>; the defense of Brazil’s territory, especially the Amazon region; or the protection of the “Blue Amazon” region of oil reserves lying off the Atlantic coast. The wide-ranging scope of the organizational changes foreseen by the National Defense Strategy are:

1. improve search and rescue capabilities
2. reorganize the navy into underwater, surface, and aerospace components
3. transform the army based on mobility, flexibility, and elasticity

4. conduct joint land, sea, and air planning and operations
5. strengthen Brazilian Aerospace Defense Command
6. link military research centers, academic institutions, and private companies
7. decentralize the business and technology complex of São José dos Campos
8. enhance the role for the Ministry of Defense in weapons development and acquisition
9. increase support for national defense industry
10. increase support for defense studies at national universities
11. reorient National War College under joint staff and services
12. enhance interagency cooperation
13. enhance planning responsibility for Ministry of Defense
14. raise academic level of National War College
15. enlarge curriculum of service educational institutions
16. integrate military intelligence activities under Ministry of Defense
17. expand peacekeeping training and operations
18. improve national crisis planning and management.

**Implementing the Strategy.** Achieving the twin goals of modernizing the armed forces for peace and war and reorganizing the nation’s defense industry requires funding, education, and time, but especially technology. Achieving the first goal requires an innovative transformation of operational practices and extensive capacity building to be conducted according to a “technological timeline.” Reaching the second goal ultimately must be based on foreign as well as national technologies that are to be “unconditionally mastered domestically.”<sup>17</sup> Recent increases in funding have allowed defense reform to begin, but Brazil must look well into the future for foreign partners for technology and financing.

Resource requirements are demanding, especially because the strategy prioritizes three high-cost technology sectors: space, cybernetics, and nuclear. The

navy is to develop a versatile defense and attack aircraft, conventional and nuclear submarines, and multipurpose ships that can also be used as aircraft carriers. The army is to monitor or control the development of satellite launch vehicles, low and high altitude satellites, a new and independent global positioning system, and cybernetic communications systems. The air force is to educate civilian and military “techno-scientists” and achieve technological independence; conduct transformational technological projects; create ties between its technological centers and private companies; build up technological capabilities by simultaneously purchasing an advanced fighter aircraft while developing the prototype of its own advanced crewed fighter aircraft; develop network-centric warfare capabilities; advance unmanned vehicle programs; and integrate space activities into air force operations. The strategy commits the Minister of Defense to establish “special financial resources” for the development of 13 costly, highly technical weapons systems.

The strategy recognizes the need for foreign partnerships and appears to allow foreign roles in developing most systems. In several cases, and even for the cybernetics, space, and nuclear sectors, the document explicitly recognizes the need for foreign partnerships, at least as a transition measure toward technological independence. In the near term, the source of original and development technology for all 27 programs cited in the strategy is reasonably expected to rely on foreign partners.

## Complexity of Technology Transfer

Any foreign commercial or government entity contemplating a defense partnership with Brazil immediately confronts the issue of transfer of technology, a complex process encompassing many disciplines and practices often misunderstood as simply the transfer of a specific product. Technology transfer is a “profoundly human endeavor” based on sharing “systematic knowledge for the manufacture of a product,

for the application of a process, or for the rendering of a service.” It incorporates not just technological specifications but also “entrepreneurial expertise and professional know-how.”<sup>18</sup> As a knowledge-centric interaction between two or more parties, it also implicitly involves a negotiation of terms.<sup>19</sup> In the Brazilian case, potential defense partners must respond to four Brazilian priorities: funding arrangements, creation of a defense industrial base, human capital development, and integration of legacy systems and organizations.

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*Funding Arrangements.* Developing new weapons systems through foreign partnership and high degrees of technology transfer is one way for Brazil to overcome funding shortages throughout its military acquisitions cycle, especially for R&D. The Ministry of Defense wants to take “advantage of foreign savings without depending upon them.” A study of defense budgets from 1995 to 2008 showed that personnel costs consumed 80 percent of the defense budget, with 63 percent of those costs supporting pensions for retirees and “inactive” former uniformed members. Acquisitions—termed “investments”—received only 6.7 percent of the overall budget during the 13 years in the study. While there recently was a budgetary increase in investments from a mere USD 725 million in 2006 to USD 2.3 billion for 2009, in reality budget allocations are merely authorizations. Major portions of the defense budget are not spent but held in “contingency” to meet other government needs. Between 2006 and 2008, an average of nearly 13 percent of the authorized defense budget was never spent.<sup>20</sup> Complicating funding arrangements, in February 2011

President Rousseff announced a USD 2.4 billion cut in the defense budget as part of a government-wide program to slow inflation.

The Ministry of Defense is due additional funding from other ministries and agencies, but these amounts are generally small and often partially withheld. The navy, for example, receives compensation from the state oil company Petrobras for providing security for off-shore oil platforms although, at least in 2007, over 62 percent of the USD 771 million in royalties due were withheld from the navy's account. Government spending for defense R&D is subject to an interministerial process through which the Ministry of Defense solicits project funding from the Ministry of Science and Technology. Total funding support for defense-related R&D from the "Integrated Program of Science Technology and Innovation in Strategic Areas" for 2008 stood the equivalent of only USD 147 million, including subsidies for private sector "Science, Technology and Innovation" projects.<sup>21</sup> The Ministry of Defense reciprocates by supporting teaching and scientific and technological research related to national defense. The 12 projects of its "Pro-defesa" program received over USD 2.2 million between 2006 and 2010.<sup>22</sup>

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### **the Franco-Brazilian "Strategic Partnership" agreement includes provisions for the transfer of technology related to automation, hydrodynamics, acoustics, and combat systems to Brazil**

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Other subsidies benefit defense-related private business and educational programs. The Ministry of Development, Industry, and Trade is active in this sector. The National Development Bank (Banco Nacional de Desenvolvimento) funds private-sector projects to strengthen engineering and technical capabilities in the petroleum, gas, automotive, shipbuilding, aeronautics, nuclear, and

"national defense" industries. This activity had an overall budget of over USD 2.2 billion for 2010, but the amount actually committed to national defense technologies is difficult to determine.

The size and scope of financial commitments from partners can therefore become important, as indicated by the Franco-Brazilian arrangements to advance the most ambitious projects yet undertaken to implement the strategy. The governments signed a defense cooperation agreement in January 2008, followed by a "Strategic Partnership" agreement in December that committed the two nations to cooperate to build four conventionally powered *Scorpène* submarines and the hull for a nuclear-powered submarine, as well as construct the naval shipyard to build the five submarines and eventually be the naval base for submarine operations. The agreement includes provisions for the transfer of technology related to automation, hydrodynamics, acoustics, and combat systems to Brazil. The acquisition of other military systems, such as 50 EC-725 Super Cougar helicopters, will advance joint production in Brazil. The helicopters will be assembled in country by Helibras, a company partially owned by Eurocopter, an EADS subsidiary.

External financing is of central importance to each major program. For the submarine project, the Brazilian congress approved an overall budget of USD 10 billion, of which 63 percent will be provided by external bank funding. The helicopter agreement depends even more on external financing, with French banks providing 96 percent of the USD 2.7 billion required. In addition, Eurocopter, which holds a 45 percent equity stake in Helibras, reportedly will invest USD 300–\$400 million in the Helibras plant.

**Defense Industrial Base.** A basic premise of the National Defense Strategy is that foreign partners must be willing to transfer technology to Brazilian institutions and agree that a substantial part of research and manufacturing be accomplished in Brazil. The strategy illustrates how the transfer of technology advances Brazilian capabilities by linking the purchase of defense products with the stimulation of indigenous research and development. Aside from increasing sales for commercial partners, this would cre-



ate economies of scale for domestic and non-Brazilian customers through an integration of various countries' defense industrial bases. In this way, an internationalized national defense industry advances the consolidation of regional integration under Brazilian leadership.<sup>23</sup>

For Brazil's approach to technology transfer to be viable, foreign commercial partners will have to agree not only to share technology as an accelerator of Brazil's indigenous industrial capabilities but also to be convinced that the partnership will lead to future company profits on sales to third parties. In the process, foreign partners may be able to help the Brazilian defense industry to overcome its Achilles' Heel: the lack of market size and consequent high unit cost. Under the military government, the domestic defense industry grew and prospered when it was seen as "the maximizing instrument of national autonomy . . . to fulfill, in the long run, the old ambition of establishing the bases of a great power with global projection." The defense industry benefited from government sponsorship as an "island of excellence" and grew through a combination of tax incentives, import relief, and promotion schemes. In the 1990s, however, the international market for weapons using mid-level technology collapsed, domestic military sales plummeted, and democratic governments withdrew preferential treatment. Brazil did not have the institutional resiliency to adapt to changing market and political conditions. Major arms producers reoriented their production to civilian goods to survive.<sup>24</sup>

This approach differs sharply from the approach of the United States and China, both of which adopted a "dual-use" policy through which industry produces both civilian and military-oriented goods. This model provides common technologies, processes, labor, equipment, material, and facilities to meet both defense and commercial needs. It links designs and component specifications to commercial standards and buys commercial items directly whenever possible. Defense-unique industrial capabilities and products are created only when absolutely necessary.

Brazil continues to emphasize the "island of excellence" model for its defense industries and foreign

partners, presenting significant risk. The strategy calls for a "special legal, regulatory and taxation regime" to protect companies with defense products from "the risks of the mercantile immediacy." The document continues the strong hand for the state in defense industries by proposing a special legal regime to retain "strategic power" over these enterprises. An unknown factor is the size of the South American or other markets for defense goods. In a recent study, a Brazilian expert on the nation's defense industry estimated the demand within South America for weapons systems of intermediate technology to be only \$100 million per year, a market 400 times smaller than the market of Europe's four major arms producers. The study concludes that forming an international cooperative venture based on the sale of defense items to the South American market, while offering possible political benefits and access to additional research and development, may not be profitable enough to warrant "important initiatives."<sup>25</sup>

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### **foreign partners may be able to help the Brazilian defense industry to overcome its Achilles' Heel: the lack of market size and consequent high unit cost**

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*Human Capital Development.* Foreign partners are asked to respond to the strategy's need for investments in human capital usually through arrangements with foreign academic institutions. These ties are intended to facilitate the assimilation of new technology, whether transferred from foreign partners or developed within Brazil. The strategy envisions both education and training programs at foreign schools to enhance the technical skills of the armed forces, especially in the core strategic areas of nuclear, space, and cybernetics.

*Integrating Legacy Systems.* Throughout this process, foreign partners must introduce new technologies

and effect organizational change in the face of powerful legacy systems and cultures that condition all aspects of their operational employment. With the construction of the French-designed *Scorpène* submarines, for example, Brazil's submarine fleet will consist of a mixture of conventionally powered German- and French-designed craft: four German-designed diesel-electric *Tupi*-class U-209s commissioned between 1989 and 1999; one improved *Tupi* class designated the *Tikuna* class and commissioned in 2005; and the four new French-designed, conventionally powered *Scorpènes*; and a single nuclear-powered vessel with a French-designed hull and a Brazilian-designed reactor powerplant. Adding to the inherent logistical and operational challenges, the *Tupi*-class submarines are being modernized by a U.S. contractor, Lockheed Martin Maritime Systems, under a USD 35.3 million contract awarded in January 2008.

## Roadmap to Closer U.S.-Brazil Defense Cooperation

Ample opportunities exist, therefore, for a fully understood and mutually beneficial concept of technology transfer between the United States and Brazil to serve as the foundation for a stronger cooperative relationship. The focus on technological advances and organizational change in Brazil's National Defense Strategy, coupled with six decades of U.S. experience in integrating technological innovations with institutional change, could open the door for a more robust defense interchange. A bilateral approach could support the recognition that technology transfer inherently requires the preparation of human capital and changes in organizational portfolios to best assimilate the knowledge transferred. The United States could become more than a provider of technical knowledge by lending extensive support to modernizing the country's defense structure. Brazil's strategy leaves open the possibility of a strong official nexus between its Ministry of Defense and the U.S. Department of Defense precisely because the technology transfer process foreseen in the National Defense Strategy will have a

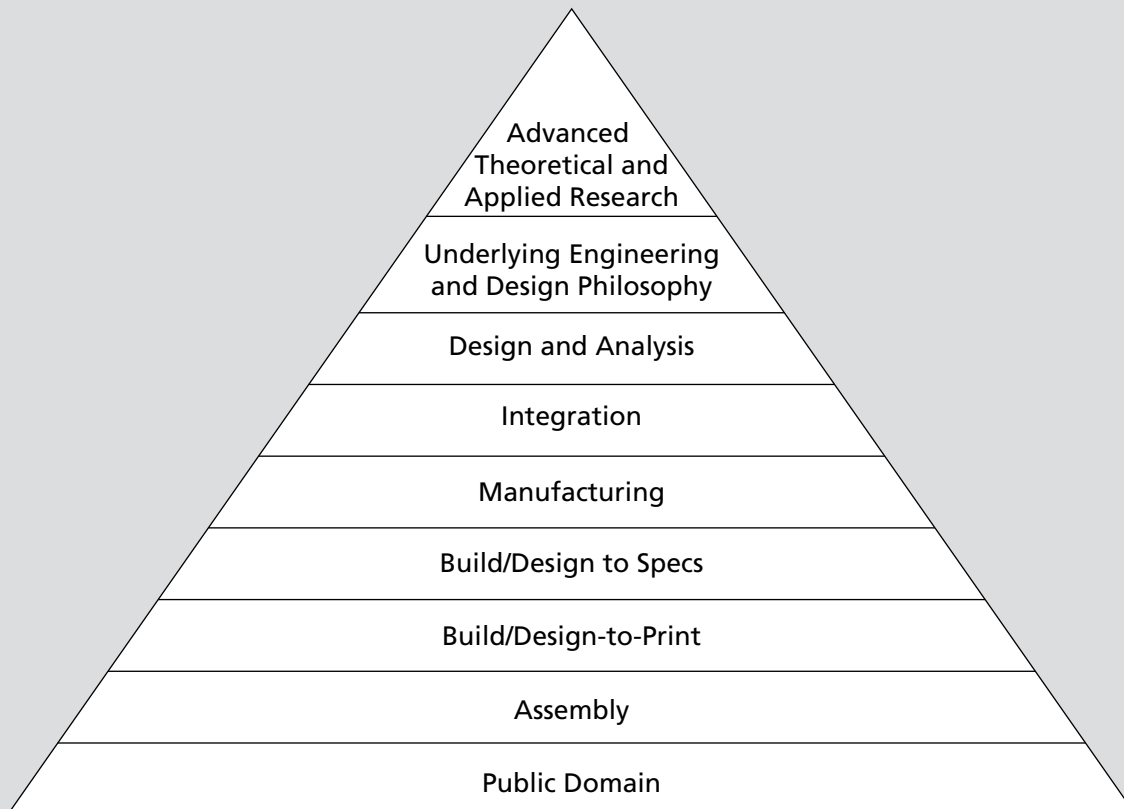
broad impact on defense organization and operational doctrine, areas of unique U.S. expertise.

A stronger U.S.-Brazil relationship must overcome a long list of mutual irritants. The post-World War II "brotherhood of arms" that spanned three decades fell victim to tensions related to Brazil's nuclear program and to the Carter administration's enforcement of human rights sanctions against the military government in 1977. The Reagan administration sought to revive the relationship in the 1980s without success.

Brazil searched for greater autonomy on foreign policy and defense issues through the 1990s and into today's contemporary security challenges. The country sat on the sidelines during the 1991 Gulf War and spoke out strongly against the U.S. invasion of Iraq. While military-to-military contacts presently are vibrant and evidence good will and mutual respect, some senior Brazilian military leaders and intelligence officials still suspect that the United States seeks to foment regional discord and might try to internationalize the Amazon to control its fresh-water resources out of concern for the environment since preserving the rain forest is a delicate issue. Brazil's founding of the South American Council of Defense symbolized a Brazilian drive to address South American security issues without U.S. interference. Defense Minister Jobim affirmed in 2010 that "the South American defense system is our affair, [as] one of the countries in the region." The current minister, Celso Amorim, has expressed similar sentiments.<sup>26</sup> An important irritant has been Washington's refusal to cooperate with Brasilia's space and nuclear programs, thus encouraging a Brazilian diplomat to claim to a U.S. defense audience in 2008 that the United States has carried out a "technological embargo against Brazil for the last 20 years."

The 2010 Defense Cooperative Agreement's terms and related statements and actions hint that major changes are feasible, with important implications for Brazil's defense industries. At the signing ceremony for the agreement, Secretary of Defense Gates stated that the resulting cooperation not only will strengthen both countries' military capabilities, but will also provide

## The Incremental Steps of Technology Transfer: “The Technology Transfer Pyramid”



*Source:* Charles G. Jameson, “The Technology Transfer Pyramid and How to Climb It,” *The DISAM Journal of International Security Assistance Management*, Fall 2000, 75.

“opportunities for industry.” Defense Minister Jobim claimed that closer defense ties would facilitate the sale of Brazilian aircraft to the United States. The timing of the 2010 Defense Cooperative Agreement—in the midst of an intense competition among French, Swedish, and U.S. aircraft manufacturers to sell advanced fighters to the Brazilian air force—can be seen as indicative of both the Obama administration’s support for selection of the U.S. competitor—Boeing—and a Brazilian determination to link any sale to greater access to proven defense technology.

Deep-seated tensions on security related issues remain despite friendly dialogue among general officers

and substantive exchanges between senior defense officials and policy experts. Some Brazilian military officers are suspicious of U.S. global intentions and actions. One naval officer writing in a professional military journal even suggested that the United States may actually have been responsible for sinking Brazilian ships to encourage Brazil’s entry into World War II. References in the National Defense Strategy to actions against an “enemy force [that] is much more powerful” and to the defense of the Amazon against a “military enemy with a far superior power” are thinly veiled references to uncertainty about U.S. intentions.<sup>27</sup> As pointed out by the Brazilian-American scholar Thomaz Guedes da Costa, the

establishment of trust requires major efforts by civilian and uniformed service leaders. Particularly sensitive are end-use issues on which the nations have not reached an agreement. These include guidelines for the export of transferred technology to third parties. This issue has a long history. It led to the breakdown of relations under the 1984 agreement and a recurring complaint by Brazilian military officers resentful of the U.S. decision to disapprove a prospective sale of Brazilian *Tucano* aircraft to Venezuela in 2006.<sup>28</sup>

Both countries will therefore have to work to build higher levels of trust. The U.S. administration and potential commercial partners have been making concerted efforts to convince Brazil that the United States can be a reliable defense partner. Recent high-level exchange visits of senior military officers, bilateral discussions among U.S. and Brazilian defense staffs, and participation in joint exercises and simulations have produced encouraging results. Stronger ties between the National Defense University and Brazil's National War College could lead to better understanding of today's globalized security environment by future national military leaders of both countries.

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### **like all recipients of U.S. defense sales, Brazil can receive varying levels of access to knowledge associated with each product**

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According to Deputy Assistant Secretary of Defense for Western Hemisphere Affairs Dr. Frank A. Mora, "U.S.-Brazil defense cooperation is closer today than at any time since 1977."<sup>29</sup> Former Under Secretary of Defense for Policy Michèle Flournoy assured Brazilian civilian and military officials during a May 2011 visit to Brasilia that Washington seeks "increased high-tech defense trade, flowing in both directions between our two countries." She reminded Brazil that the potential sale of the Boeing F-18 Super Hornet includes "an unprecedented offer to release

significant technology to Brazil." Staff experts in the U.S. State and Defense Departments insist that the decision not to concur in the *Tucano* sale to Venezuela represented a rare exception to U.S. policy. They point out that the United States denied only 17 of the 6,900 defense-related export license applications for Brazil between 2007 and 2011, a disapproval rate of only 0.2 percent. Furthermore, they state that the United States approved 2,019 applications for export of military articles and services to Brazil in 2011 and that only two license applications were denied.<sup>30</sup> The total value of authorized defense sales to Brazil for 2010 surpassed USD 209 million and included nearly every category of goods: firearms, ammunition, missiles, torpedoes, bombs, mines, explosives, naval vessels, tanks, military vehicles, aircraft, training, spacecraft systems, electronics, guidance control equipment, and submersible vessels, among others.<sup>31</sup> Continuing discussions during 2012 to resolve the possibility that the U.S. Air Force might purchase Brazilian Super *Tucanos* for its Light Aircraft Support platform have demonstrated the difficulties as well as the potential of closer defense relationships between the countries.

The high rate of approval of licenses to export U.S. defense goods to Brazil indicates U.S. willingness to consider transferring defense technology as well. Like all recipients of U.S. defense sales, Brazil can receive varying levels of access to knowledge associated with each product, ranging from what is available in the public domain to co-development rights. Important to high levels of technology transfer are the recipients' ability to prevent technology diversion, the sellers' intentions regarding possible coproduction and research arrangements, the sensitivity of the technology, and the absorptive capacity of the recipient. One U.S. company has devised a "technology transfer pyramid" to highlight the degrees of exchange possible through international collaboration.<sup>32</sup> Implementation of the U.S.-Brazil Defense Cooperation and General Security of Military Information agreements will foster broad engagement and high levels of trust related to technology

transfer, leading the way for increased benefits for both sellers and buyers.

On a broader level, U.S.-Brazil security cooperation could encompass the nuclear and energy sectors. According to President Emeritus of the Inter-American Dialogue Peter Hakim, “U.S. technology could contribute a great deal to accelerate Brazil’s development of a world-class nuclear energy industry—and could, over time, help increase Brazil’s support of non-proliferation.” Such collaboration would reflect a U.S. determination to “align Brazilian and U.S. interests and priorities on specific issues of concern” instead of attempting to restrain Brazil, with potentially counterproductive results.<sup>33</sup>

Building trust is not a one-way process. On the U.S. side, there are questions whether Brazilian intentions for the use of advanced technology are consistent with technology control regimes, especially the Nuclear Non-Proliferation Treaty (NPT) and the Missile Technology Control Regime. Brazil’s refusal to agree to the additional protocol of the NPT, which would provide greater access to national nuclear programs, raises speculation about the long-term intentions of its nuclear program despite repeated Brazilian assurances about its peaceful nature. Ambiguous language in the National Defense Strategy, lamenting that “Brazil was deprived of the option of employing nuclear power for any non-peaceful purposes,” may also cause unease within nonproliferation circles. The former director of the planning staff in the German Defense Ministry from 1982 to 1988 recently speculated that Brazil may in fact be developing a nuclear weapons program.<sup>34</sup> President Lula’s 2010 personal diplomatic initiative to find an alternative to United Nations (UN) sanctions against Iran’s nuclear program put a spotlight on such concerns. Now observers at the United Nations surely are scrutinizing President Rousseff’s policy toward Iran. Furthermore, any proposal to assist the Brazilian space program may stir not-so-dormant memories of the role Brazilian defense experts played in modernizing Iraqi missiles prior to the regime’s 1991 invasion of Kuwait.

These are formidable political hurdles, but President Rousseff’s commitment to sustain defense initiatives un-

dertaken by her predecessor and support the long-range perspective of the defense strategy mean that preliminary bilateral work is not lost. Her foreign policy goals seem more traditional than those of her predecessor, with a focus on protecting Brazilian offshore oil deposits and the nation’s Amazon borders as well as sustaining ties with its South American neighbors. She has been more critical and less supportive of Iran, supporting an April 2011 UN resolution to send a human rights investigator to Iran. Under the leadership of Defense Minister Amorim, senior-level bilateral dialogue on defense issues is moving forward with reciprocal visits and meetings of the Defense Bilateral Working Group. President Rousseff’s decision to reopen competition for selection of an advanced fighter aircraft improves the odds for selection of the Boeing offer. Together with President Obama’s emphasis on engaging Brazil as a strategic partner, the stage may be set for substantive upgrading of the relationship.

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## **U.S.-Brazil security cooperation could encompass the nuclear and energy sectors**

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Decisions by the United States and Brazil either to continue the current level of dialogue and engagement on defense and security issues or enhance the relationship will define future bilateral security cooperation both globally and within the Americas. Only a conviction by political leaders and senior defense officials in both countries that major benefits will accrue to each nation’s posture can move the reinvigorated relationship to higher levels. President Obama and President Rousseff took such a step during their April 2012 Washington meeting by establishing a U.S.-Brazil Defense Cooperation Dialogue. The presidents noted the importance of enhanced dialogue in enabling closer bilateral cooperation, based on mutual respect and trust, and providing a forum for exchanging views and identifying opportunities for collabor-

ration on defense issues around the world. The first meeting of the Defense Cooperation Dialogue took place in Brasilia 2 weeks later. Consistent with the 2010 Defense Cooperation Agreement, Defense Secretary Leon Panetta and Defense Minister Amorim stated that they intend for defense cooperation to focus on six priority categories of activity during 2012: science, innovation, and technology transfer; logistics; communications; humanitarian assistance and disaster response; cooperation in support of African nations; and cybersecurity.<sup>35</sup>

If Brazil gains confidence that a powerful northern neighbor is its partner in defense, instead of an indifferent bystander or worse, the South American state can focus on advancing its national security and development without unnecessary defense burdens. The United States benefits from having the trust and confidence of a new international and regional power, although there may not be full agreement on every matter of policy. The United States can focus on ways to achieve “real progress on bilateral, hemispheric, and global issues” through a more constructive relationship with an emerging regional player. A more fluid transfer of U.S. defense technology, by understanding Brazilian terms, can be a catalyst and a test case for interactive cooperation. Given appropriate levels of political will on both sides, increasing the intensity of defense engagement and cooperation between “friends at the same level,” in the words of former Minister Jobim,<sup>36</sup> could result in a major transformation in Brazil-U.S. security relations and bring important benefits to both countries.

The United States should welcome Brazil as a true and equal partner in international affairs. Each shares a vital interest in hemispheric prosperity and peace and in a strong normative antiproliferation regime. With no territorial or imperial ambitions, the two powers ought to see each other as equally interested in bolstering international peace and security as the best way to buttress the world against terrorism, crime, and the threat of nuclear war. It is long past time for the two giants of the Western Hemisphere to increase their defense

cooperation, whatever may be the titles given to agreements between them.

The author appreciates the constructive comments of Ambassador Luigi R. Einaudi, Dr. Gabriel Marcella, and Col. John A. Cope, USA (Ret.). Brazilian budget allocations are expressed in dollars according to the existing interbank exchange rate when announced as indicated by <[www.oanda.com](http://www.oanda.com)>.

## Notes

<sup>1</sup> Available at <[www.youtube.com/watch?v=5A-JJ\\_jg6yQ](http://www.youtube.com/watch?v=5A-JJ_jg6yQ)>; *National Security Strategy* (Washington, DC: The White House, May 2010), 44, available at <[www.whitehouse.gov/sites/default/files/rss\\_viewer/national\\_security\\_strategy.pdf](http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf)>.

<sup>2</sup> Riordon Roett, *The New Brazil* (Washington: The Brookings Institution, 2010), 152.

<sup>3</sup> Luigi R. Einaudi, *Brazil and the United States: The Need for Strategic Engagement*, INSS Strategic Forum 266 (Washington, DC: NDU Press, March 2011), 12.

<sup>4</sup> Weapons import data reflect sales as compiled by the Stockholm International Peace Research Institute Trade Registers, available at <[www.sipri.org/US](http://www.sipri.org/US)>. Department of State figures include both sales and services and also sales authorized but not yet consummated. U.S. Department of State, “U.S.-Brazil: A Strong Defense Technology Partnership,” talking points paper provided to author, January 2012.

<sup>5</sup> Brazil, Ministry of Defense, “National Defense Strategy,” 55, available at <[www.defesa.gov.br/eventos\\_temporarios/2009/estrategia/arquivos/estrategia\\_defesa\\_nacional\\_ingles.pdf](http://www.defesa.gov.br/eventos_temporarios/2009/estrategia/arquivos/estrategia_defesa_nacional_ingles.pdf)>.

<sup>6</sup> Tullo Vigevani and Gabriel Cepaluna, *Brazilian Foreign Policy in Changing Times: The Quest for Autonomy from Sarney to Lula*, trans. Leandro Maura (Lanham, MD: Lexington Books, 2009), xiv; Jeffrey W. Cason and Timothy J. Power, “Presidentialism, Pluralization and the Rollback of Itamaraty: Explaining Changes in Brazilian Foreign Policy Making in the Cardoso-Lula Era,” *International Political Science Review*, no. 30 (2009), 122–124, 130.

<sup>7</sup> Mauricio Pazini Brandão, “Ciência, Tecnologia, Inovação e a Defesa Nacional,” 3ª Conferência Nacional de Ciência, Tecnologia e Inovação, October 2005, 798, available at <<http://cncti3.cgee.org.br/Documentos/Seminariosartigos/Areasinternacional/DrMauricioPaziniBrandao.pdf>>.

<sup>8</sup> “National Defense Strategy.”

<sup>9</sup> Scott D. Tollefson, “Civil-Military Relations in Brazil: The Myth of Tutelary Democracy,” (1995), available at <[www.lanic.utexas.edu/project/lasa95/tollefson.html](http://www.lanic.utexas.edu/project/lasa95/tollefson.html)>.

<sup>10</sup> Lourival Sant’Anna, “Desprestigio leva à ‘angústia’ das Forças,” *O Estado de São Paulo*, March 14, 1999.

<sup>11</sup> *Correio Braziliense* (Brasilia) Web site, March 12, 2006.

<sup>12</sup> *Folha de S. Paulo and O Estado de S. Paulo*, reported in “Observatório cone sul de defesa e forças armadas, Informe Brasil nº 270 Período: 13/10/07 a 19/10/07”; Saint-Pierre, 9; *Correio Braziliense*.

<sup>13</sup> Jorge Zaverucha and Flavio da Cunha Rezende, “How the Military Competes for Expenditures in Brazilian Democracy: Argu-

ments for an Outlier," *International Political Science Review*, no. 30 (2009), 418–419.

<sup>14</sup> "Dr. Jairo Cândido da FIESP fala com ALIDE," January 20, 2010, available at <[www.alide.com.br/joomla/index.php/capa/75-extra/1015-dr-jairo-candido-da-fiesp-fala-com-alide](http://www.alide.com.br/joomla/index.php/capa/75-extra/1015-dr-jairo-candido-da-fiesp-fala-com-alide)>.

<sup>15</sup> Calculated from data available at <[www.sipri.org/databases/milex](http://www.sipri.org/databases/milex)>. For estimates of exports, see <[www.estadao.com.br/noticias/nacional/dilma-assina-mp-para-desonerar-industria-da0-defesa,779195.htm](http://www.estadao.com.br/noticias/nacional/dilma-assina-mp-para-desonerar-industria-da0-defesa,779195.htm)>.

<sup>16</sup> "National Defense Strategy," 52.

<sup>17</sup> *Ibid.*, 5, 10, 11.

<sup>18</sup> Chandra Malairaja and Girma Zawdie, "The 'black box' syndrome in technology transfer and the challenge of innovation in developing countries: The case of international joint ventures in Malaysia," *International Journal of Technology Management and Sustainable Development* 3, no. 3 (2004). Robert L. Paarlberg, "Knowledge as Power: Science, Military Dominance and U.S. Security," *International Security* 29, no. 1 (Summer 2004), 142.

<sup>19</sup> See Tae Kyung Sung and David V. Gibson, "Knowledge and Technology Transfer: Level and Key Functions," IC2 Institute, University of Texas at Austin, n.d., 1; United Nations Conference on Trade and Development (UNCTAD), *Transfer of Technology* (Geneva: UNCTAD, 2001), 5–6.

<sup>20</sup> See Jair Candido, "Aula Inaugural—FIESP, Curso de Gestão de Recursos de Defesa," FIESP, May 12, 2009, slides 25, 26; "Pesquisa mostra que Brasil investe pouco em estratégia na FAB," *Jornal do Globo*, December 11, 2009, available at <<http://g1.globo.com/jornaldoglobo>>; "Um projeto de potência para o Brasil do século XXI," April 22, 2010, available at <[www.monitormercantil.com.br/mostra-noticia.php?id=77992](http://www.monitormercantil.com.br/mostra-noticia.php?id=77992)>.

<sup>21</sup> OECD figures cited in "A Agenda Brasileira," *Indústria Brasileira* 9, no. 99 (November 2009), 19; "Informe Brasil, No 269, 06/10/07 a 12/10/07," Observatorio Cone Sul de Defesa e Forças Armadas; "Defesa entregará ao MCT lista de projetos tecnológicos prioritários para as Forças Armadas," *Tecnológica e Defesa*, October 10, 2008, available at <[www.tecnodefesa.com.br](http://www.tecnodefesa.com.br)>; "Ciência, Tecnologia e Inovação para o Desenvolvimento Nacional," "Plano de Ação 2007–2010," available at <<http://www.mct.gov.br>>.

<sup>22</sup> Brazil, Ministry of Defense, "Pro-Defesa 2006–2010," 13.

<sup>23</sup> "National Defense Strategy," 35, 17.

<sup>24</sup> Fernando Bustamante, "La Transferencia de Tecnológica Militar desde Estados Unidos al Brasil," Documento de Trabajo, FLACSO, no. 335, April 1987, 42. Patrice Franko-Jones, Review of "Manufacturing Insecurity: The Rise and Fall of Brazil's Military Industrial Complex," *Journal of Interamerican Studies and World Affairs* 40, no. 4 (Winter 1998), 136; Patrice Franko-Jones, *The Brazilian Defense Industry* (Boulder: Westview, 1992), 83. A viable model is

Embraer's extensive use of Pratt and Whitney engines for its military and civilian aircraft.

<sup>25</sup> "National Defense Strategy," 18; Renato Peixoto Dagnino and Luiz Alberto Nascimento Campos Filho, "A revitalização da indústria de defesa brasileira: análise da alternativa Cooperação Sul-americana/européia," *Vértices* 9, no. 1/3 (January/December 2007), 41.

<sup>26</sup> See Sonny B. Davis, *A Brotherhood of Arms: Brazil-United States Military Relations 1945–1977* (Boulder: University of Colorado Press, 1996); Monica Hirst, *The United States and Brazil: A Long Road of Unmet Expectations* (New York: Routledge, 2005), xviii; Interview, *La Nación*, November 20, 2008. One exception to this trend was Brazilian-U.S. military cooperation along the Peruvian-Ecuadorian border following the 1995 War of the Cenepa. Even so, this collaboration was the product of an earlier era, implementing a mechanism designed in 1942.

<sup>27</sup> "National Defense Strategy," 22, 27.

<sup>28</sup> Thomaz Guedes da Costa, "Grand Strategy for Assertiveness: International Security and U.S.-Brazil Relations," March 24, 2010 available at <[www6.miami.edu/hemispheric-policy/Task\\_Force\\_Papers/Costa-Grand\\_Strategy\\_for\\_Assertiveness.pdf](http://www6.miami.edu/hemispheric-policy/Task_Force_Papers/Costa-Grand_Strategy_for_Assertiveness.pdf)>.

<sup>29</sup> Frank A. Mora, "Testimony Before the Subcommittee on the Western Hemisphere, Peace Corps, and Global Narcotics, The Committee on Foreign Relations, United States Senate," February 17, 2011.

<sup>30</sup> U.S. Department of State, "U.S.-Brazil: A Strong Defense Technology Partnership," talking points paper, n.d., provided to author, January 2012.

<sup>31</sup> U.S. Department of State, Directorate of Defense Trade Controls, "Direct Commercial Sales Authorizations for Fiscal Year 2010, 5, available at <[www.pmdtc.state.gov/reports/655.htm](http://www.pmdtc.state.gov/reports/655.htm)>.

<sup>32</sup> See U.S. Congress, Office of Technology Assessment, "Arming Our Allies: Cooperation and Competition in Defense Technology," May 1990, 77–78; Charles G. Jameson, "The Technology Transfer Pyramid and How to Climb It," *The DISAM Journal of International Security Assistance Management*, Fall 2000, 75.

<sup>33</sup> Peter Hakim, "Brazil and the U.S. Security Agenda," *Política Externa*, February 6, 2012, available at <<http://www.thedialogue.org/recentpubs>>.

<sup>34</sup> For reference in the strategy to nuclear weapons, see National Defense Strategy, 33; the *Der Spiegel* article available at <[www.spiegel.de/international/world/0,1518,693336,00.html](http://www.spiegel.de/international/world/0,1518,693336,00.html)>.

<sup>35</sup> Department of Defense, news release 306-12, April 24, 2012, "Secretary of Defense Leon Panetta and Brazilian Minister of Defense Celso Amorim Define, in Dialogue, New Areas of Defense Cooperation between Brazil and the United States."

<sup>36</sup> Nelson Jobim, "Brazil's Security Strategy and Defense Doctrine," speech, U.S. Army War College, October 20, 2010, 4.

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