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Transfer of Defense Technologies: Should They Be Included in the ATT?

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Executive summary

The most remarkable pages in the history of mankind are closely associated with the acquisition of new technologies. At all times high technologies predetermined the outcome of the battles, opened up new opportunities for business and prosperity, predestine the fate of civilizations. The largest military conflict in the world was preceded by periods of avid race for the newest military technology. The technology transfer has often become an issue that united or divides peoples and states.

There is certain disagreement among states about whether or not to include transfers of defense technology (TDT) in the scope of the future Arms Trade Treaty (ATT) and how to do so.

During the Cold War period the USSR and the USA intensively armed their allies preparing them for small and large scaled conflict. The superpowers not only sold hardware but they also helped to build up the defense industries of newly industrialized nations.

The year 2011 marked the 20th anniversary of the termination of political conflict, military tension, proxy wars, and economic competition between the Communist World and Western Powers. Curious to relate that the number of known arms producers increased twice after the end of the cold war.

These 20 years created a multiplicity of sources of defense technologies for both advanced and developing countries. It has produced a buyers' market in which a range of modern as well as outdated defense technologies are generally available to any country that is financially viable.

Present economic constraints have led to cuts of military budgets in many states with advance defense capacities. Decreasing national demand for military hardware and reduction of investments in the development of new weapons becomes a serious challenge to the defense industries of these countries. Many governments find themselves on the horns of a dilemma of cutting

their military programs or trading their defense technologies. Some countries prefer to develop new defense technologies in cooperation with other parties. The other popular way to compensate the reduction of military expenses is through the transfer of defense technologies. There is a growing demand for TDT: some developing countries are streaming to become regional defense industry hubs. Each new center will be capable of transferring technology and selling weapons to additional countries. The primary result in the aggregate is expansion and proliferation of defense industrial capacity in both advanced and developing nations. As all major arms-producing nations have adopted policies of collaborating with other nations to share development costs, and exporting technologies to reach affordable economies it resulted in overcapacity of supply and tough competition for sales to foreign buyers. The collateral effect is the gradual and collective loss of control over the destination and disposition of potent weapons emanating from many different parts of the world. Increasing proliferation of sophisticated technological know-how has injected new elements of uncertainty and concern into international relations.

The problem of proliferation increases because no single nation (or group of nations to date) can control the final distribution of advanced weapons or the technologies necessary to build them.

All exporters of conventional weapons and dual-use goods and technologies should therefore be encouraged to strengthen their export control programs in order to enhance global security by supporting inclusion of TDT into the ATT. All countries benefit when strong and effective reporting and controls become a global priority and the ATT's philosophy is aimed at accomplishing this goal.

Transfers of Defense Technology can have various forms: licensed production, technology transfer deal, joint venture for development of arms and weapons or offset deal. Offset deals are probably the most destabilizing form of TDT because being regarded as an auxiliary by-product of a bigger deal it in fact allows the buyer to procure sensitive technologies at a relatively low cost. From the point of view of the international community offset deals are an easy means to proliferate defense technologies which brings new risks to regional security and stability.

It is very important to correctly define the TDT because its definition is closely connected to the other important question: what is the main concern and what should be the purpose of control over TDT?

There are numerous national export control systems which provide examples of comprehensive and strict control over transfers of national defense technologies. These export control systems could even be regarded as helpful guidelines in this field but with one important remark: the problem of technologies proliferation will continue to increase because no single nation (or group of nations to date) can control the ultimate distribution of advanced weapons and the technologies necessary to build them. Apart from national export control systems there are good examples of regional and international agreements on control over arms transfers like the Wassenaar Arrengement. Whilst acknowledging the merits of the Wassenaar Arrangement it is important to note that the WA has no global geographic coverage and therefore is not an appropriate instrument to regulate the global arms trade.

ATT might accumulate and implement in the field of control on transfer of arms technologies various good findings available in other existing arms control regimes.

To properly address the problem of TDT it is vital to thoroughly understand the scale of international transfers of technology, their trends and threats. The dual-use nature of many current innovations in science and technology is making it both more important and harder to pin down and estimate TDT, licensed production and military assistance. The lack of internationally agreed definitions, or adherence to existing definitions, poses obvious problems for international comparisons. There is no systematic, reliable, valid and global set of quantitative data on the TDT.

In spite of the fact that there are several international arms transfer reporting systems and databases the information available doesn't provide a comprehensive picture of transactions with technologies transfer and military services and doesn't allow for a thorough evaluation of international TDT. In other words transfer of defense technologies remain an obscure territory out of international community control and international regulation.

The issue of inclusion of TDT into the ATT provoked a large variety of opinions in the international community. 51 states out of the 90 countries which submitted their views on an ATT supported the inclusion of technology transfer in their list of suggested items. This issue discussed further at the GGE, OEWG and PrepComs.

TDT remains a topic of disputes and controversy today as far as some experts argue that TDT is a steam powering national economies which is vital for sustainable economic development.

Other specialists express fear that excessively bureaucratic interpretations of TDT in the ATT might hamper operation of small or medium size manufacturers and national defense industries.

Some other UN delegations express their concerns that the adoption of a universal international arms control instrument could establish lower standards than those available in certain national legislations which would undermine the achievements of national export control systems.

This report offers some suggestions of particular actions to approach the issue of TDT in a constructive and nondiscriminatory manner. Transparency and step-by-step measures are combined with incentives to those who are ready to discard their military technologies in exchange for peaceful development and international assistance.

Unlicensed Re-export of Small Arms Technologies

No matter how advanced the transferred defense technology might be it has an impact on national security and regional stability. Transfer of SALW technology could be regarded as one of the most sensitive transactions because it might not only affect international relations but also destabilize internal situation in the recipient country and course violation of human rights.

Re-export of defense technology or TDT to a third country without permission from the primary technology owner is commonly regarded by the international community as a breach of license agreements? It is equally true with respect to relatively old and simple technologies like small arms know-how as well as with respect to most high-tech craftsmanship like drones production.

There are numerous known cases when a country manufactures small arms without a license or on a basis of an expired license.

The pictures in the right column are taken from the official website of a defense factory in an African country. The website advertises the small arms named MAZ, Marra, Karar and Tihraga that appears to be versions of equipments originally designed by manufacturers in the USSR, Czech Republic and Germany. The pictures in the left column are original small arms: assault rifle AK-47 which used to be manufactured by the USSR, pistol CZ-75 produced by Czech Republic, German origin machine gun (Rheinmetall AG MG3) and assault rifle (Heckler und Koch MP-5).

The tables demonstrate that the African country possesses the German, Czech and Soviet/Russian technologies of small arms production though it is known that neither Czech Republic and Russian nor Germany transferred these technologies to the government of this African country. The African manufacturer has apparently received this know-how from a third country which transferred these sensitive technologies to Africa without gaining permit from the primary patent holders. The website candidly informs that these technologies are obtained by the African manufacturer “out of a third country’s machineries”.

As long as the problem of unlicensed production has no legal solution in the international law there will be a permanent threat of proliferation of small arms and other destabilizing weapons around the world. Only one out of 10 Kalashnikovs has a legal origin while the other nine pieces are counterfeit products. This number will definitely increase as far as the problem of unlicensed production has no solution so far. Addressing this problem at the international level can considerably limit possibilities for illicit production of small arms.

Facts about Transfers of SALW Technologies

- The number of legal manufacturers increased from less than 200 companies in 1980 to more than 600 today. At least 95 countries have the capacity to undertake legal production of small arms.
- More than half of the world's producers are located in the United States.
- Much of the growth in the number of companies that produce small arms has come from the spread of licensed production to more regions and countries and the rise of numerous small, niche manufacturers.
- Illicit production of small arms takes place in at least 25 countries. In some regions, such as Southern Africa, South Asia, and Southeast Asia, illicit production is a well-established alternative.

The highly competitive nature of the global small arms market, together with increasing numbers of producers, may jeopardize the efforts of the international community to tackle the small arms proliferation problem.

Defining transfer of defense technologies

Transfers of Defense Technology can have various forms or even be a combination of different approaches.

1. Licensed production is a commercial arrangement between a national company and a foreign company or a foreign government providing for the transfer of production information which enables the licensee to manufacture, in whole or in part, an item of defense equipment. A typical license production arrangement would include the functions of production engineering, controlling, quality assurance and determining of resource requirements. It may or may not include design engineering information and critical materials production and design information. Usually a license agreement defines terms under which royalties are to be paid in favor of the licensor.

2. Technology transfer deal might mean a broad set of agreements covering the flows of knowledge, experience and equipment amongst different companies or governments. It can be embodied in goods (including physical goods, tools and machinery), services and people, and organizational arrangements, or codified in blueprints, designs, technical documents, and the content of innumerable types of training.

3. Joint venture for development of arms and weapons might also be a form of TDT. It frequently happens that one side invests its knowledge and skill while the other side makes financial contributions. Such a partnership permits the financial partner to quickly pass through the new technology lessons and to get full capacities in implementing as well as creating advanced defense technologies.

Miracles of Iranian Defense Technology

Television of Iran regularly broadcasts successful tests of newly designed Iranian weapons that are widely transmitted by the international media. This news makes defense analysts of the leading military powers carefully examine the growing Iranian arsenal. How come that the modern defense industry has been erected in Iran which was amongst primary arms importers in the world just 30 years ago and was subjected to severe US, EU and UN sanctions?

The Iran–Iraq War, and post revolutionary sanctions at the time led the Iranian leadership to understanding that the country needed to immediately create its own broad defense industry. The war eventually forced Iran to seek the technical support of Russia, Pakistan, China, and North Korea as well as to use other available ways for laying the foundations for future industries.

Reverse engineering

Copying of foreign prototypes allowed Iran to set up its schools of defense designing and to start globally absorbing the military know-how.

- Through reverse engineering Iranian manufacturers learned to produce about 15 percent of the parts needed for the F-4, F-5 and F-14 warplanes available with Iran's air force since the days of its monarchy.
- The US Taw and M47 Dragon anti-tank missile systems became prototypes for Iranian Toophan and Saeghe 1/2 missiles, the US MIM-23 Hawk surface-to-air system was produced locally as Shahin. The Iranian manufacturers localized production of the US Stinger MANPADS.
- Initially imported from USA Bell helicopter «Huey Plus» was produced domestically in Iran as Model 214. The Bell AH-1K Sea Cobra helicopter became a parent type for the Storm helicopter gunship which even incorporated some brand new improvements.
- In 1979 the country took the first step into manufacturing Soviet RPG-7, MLRS BM21, and SA-7 MANPADS. Iranian engineers copied the Soviet origin SA-2 surface-to-air missile complex under the new name Sayad-1A which later became a foundation for development of the Tondar-68 tactical missile.
- By the end of the 20th century Iran was capable to manufacture Azarakhsh and Shafaq fighter jets which looked exactly like USA's F-14 Tomcat and the ancient F-5 Tiger II.

The cloning of the US, European and later Soviet and Chinese weapons and equipment deployed by Iranian armed forces became a good shortcut for Iran's military engineers.

Foreign assistance

Building upon the foundations established by western contractors direct or indirect technical help from the USSR, China, North Korea, Pakistan, Israel, Argentina, Brazil, West Germany, East Germany and Taiwan made it possible for Iran to rapidly expand the technical capabilities of its defense industrial base. Iran actively buys devices and technologies that could enable it to enhance its scientific and industrial potential.

Beijing is not only supplying weaponry to Iran but sharing its know-how of tactical and operation tactical missiles, artillery systems, war ships and motor boats and anti-ship missiles. China supplies to Tehran specialized dual-use equipment including X-ray machines for checking the quality of rocket-and-missile engines, high-precision machine-tools for manufacturing elements of gyro-stabilized platforms used in guided weapons, mobile rocket-and-missile telemetry-control systems. Chinese-Iranian military-technical cooperation has increasingly taken the form of joint ventures and training Iranian specialists and researchers in various fields for subsequent work at Iranian facilities.

Iran's technological cooperation with China has allowed it to launch production of its own short-range surface-to-air missile system and Nasr-1 anti-ship missiles, which is an upgraded version of the Chinese S-704 missile, and Noor long-range anti-ship cruise missile, which is a domestic version of the Chinese S-802 missile[1].

Iran seeks Russian designs and equipment in order to help modernize its defense-industrial base. Iran purchased a production licenses for Russian ZU-23-2 anti-aircraft cannons and jet engines, and opened plants to produce Russian-designed T-72 main battle tanks and BMP-2 armored vehicles, Metis-M and Konkurs Anti-tank guided missiles, Ilga-1M MANPADS, MLRS and artillery barrels under license. Recently Iran gained a license for domestic production of the Russian-Ukrainian An-140 passenger plane.

North Korea mainly provides Tehran with missile technologies. After acquiring the North Korean Hwasong-5 clones of the Soviet Scud missiles in 1985, production line was established in Iran, where the Hwasong-5 was produced as the Shahab-1. Experts believe that later DPRK transferred to Iran technologies for construction of the Shahab-2 having range of about 500 kms, and the Shahab-3 based on the North Korean Nodong having range of about 900 kms. A modified version of the Shahab-3, renamed the Ghadr-1, having range about 1,600 km was built with key North Korean components and technologies.

Recently North Korea assisted Iran in designing its midget Qadir submarines of the Yono class as well as transferred know-how of air-cushion vessels.

Iran is also believed to be North Korea's principal customer for nuclear technology.

According to certain sources some North Korean, Chinese and Russian firms and institutions conveyed to Iran sensitive technologies which permitted the Islamic Republic to come closer to gaining the nuclear weapons.

1 Beijing-Tehran cooperation: A loophole in Iranian sanctions, Globalia Magazine, 02 October, 2010, http://www.globaliamagazine.com/?id=1040

Illicit transfers

Though covered transfers of defense items are not frequently exposed, a number of cases of illegal exports of military equipment have become public.

- In 2001, 12 Soviet air-launched Kh-55 cruise missile having range up to 3,000 km capable to carry nuclear warheads were exported from Ukraine to Iran, which has started producing the missiles locally and is working on a longer range version.
- Iran is supposed to gain the Soviet VA-111 Shkval rocket torpedo capable of speeds in excess of 200 knots (370 km/h). Iran claimed it has created a domestic version named Hoot.
- Iran has been trying for years to obtain parts for F-14 Tomcat warplanes, which are used only in Iran. Pentagon investigators often discover shipments of contraband and intercept components headed to Iran.

Since 2000, U.S. Immigration and Customs Enforcement officers have launched more than 600 investigations into illicit Iranian military procurement efforts. Recent prosecutions involved illegal exports of stealth missile technology, military aircraft components, Naval warship data, night-vision equipment and other restricted technology for Iran[2].

Indigenous Developments

After US imposed Sanctions on Iran became one of a few nations that were trying to achieve a totally self-sufficient armaments capability. The Islamic Republic gradually gets capability not only to manufacture defense products but also design and produce new items.

Before 1979 the Iranian military plants were capable to produce small arms ammunition, batteries, tires, copper products, explosives, and mortar rounds and fuses. They also produced rifles and machine guns under license from West Germany. In addition, helicopters, jeeps, trucks, and trailers were assembled from imported kits.

In 1979 the Defense Industries Organization (DIO) took the initiative in reverse engineering and was charged with research and development. As a result Iranian engineers not only reverse engineered existing foreign hardware, but also adapted it to their own requirements and then mass produced the finished product. Iran has taken wide strides in designing and manufacturing different types of light, semi-heavy and heavy weapons in addition to military tools and equipment. Today, the DIO has more than 35,000 employees, 30% of whom are university graduates. The Iran defense industrial base currently comprises about 15-10 percent of the country's industry. Since 1992, it has produced its own Zulfiqar tanks, Boragh armored personnel carriers, three classes of submarines, the Azarakhsh and Saeqeh fighter planes, the family of Shahed-278, Shahed-285, Zafar-300 helicopters, the series of Ababil medium-range reconnaissance, surveillance and attack drones, the Shafaq subsonic stealth aircraft, the Nasr-1 anti-ship highly accurate short range cruise missile capable of evading radars, the Qaem and

2 Robin Wright, Washington Post, October 14, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/10/13/AR2007101301277.html?hpid=moreheadlines

Toofan-5 SAM missiles, a series of high-speed missile and torpedo boats capable to engage air targets.

As Iran seeks to gain total independence, Iranian reliance on foreign assistance in low tech systems has rapidly decreased over the last decade, the aerospace sector still remains an exception where Iran is heavily dependent on external help.

Publicity Campaigns

Whatever the real Iranian defense industry achievements are Tehran does a lot to make them look much more impressive. Iranian media persistently exaggerates technical specifications and capacities of Iranian inventory attributing the domestic defense manufacturers abilities which they hardly possess.

In 2009 Iran announced development of new types of oceanic Sina missile launching frigate, which was armed with «extremely powerful weapons.» Meanwhile the small displacement of the Iranian frigate revealed that Sina was nothing but a missile boat.

In order to justify mass production of small displacement vessels Iranian Navy commanders explain that their strategy relies on massive “swarm” tactics which allows to deliver a cumulative strike from all directions by a large number of light ships.

In April of 2010, at a military parade in Tehran, after failure to acquire the Russian S-300 air defense system Iran has demonstrated its own S-300. According to the Iranian military, they were «analogue of the Russian S-300, developed by local engineers.» Meanwhile defense experts recognized that these were just Chinese versions of S-300.

Even a quick glance on the Iranian aircraft industry brings memories of ancient American fighters, such as AH-1 Cobra, F-14 Tomcat and F-5 Tiger II. The most modern Iranian helicopters still remain copies of the US outdated prototypes. Iran's Shihab-1 and Shihab-2 «ballistic missiles» are simply modernized versions of Soviet Scud missiles.

Pretending to be a “Role Model” for developing countries in getting indigenous capacity to produce weaponry Iran is still import-dependent for advanced technology systems and their maintenance and may have a long-way to go before actually obtaining an indigenous capability for these systems.

4. Offset deal is an agreement between two parties whereby a supplier agrees to convey a part of the defense technology to the party to whom it is selling, in order to win the buyer’s custom and offset the buyer’s outlay. This is frequently an integral part of international defense contracts. Offset deals are often accomplished through complex foreign sales agreements in which the buyer purchases, for example, a few copies of an advanced fighter or tank, assembles a second batch under license, and manufactures the rest indigenously (also under license) to the extent that its industrial base can absorb and produce the technologies in question.

Offset deals are not obliged to include transfer of technology. Engaging in an offset deal a seller usually is interested to get a contract for sale of hardware and doesn’t intend to

transfer technologies. Meanwhile transfer of technologies becomes a supplement to the contract. It is possible to say that TDT happens unwillingly but frequently.

For the buyer offset is a relatively cheap way to procure a new technology. In cases of pure TDT the buyer usually has to pay the prices as much as the cost of 50 pcs of the final military product. Practice shows that in offset deals buyers need to pay around extra 30 percent of the value of the amount in the defense acquisition contract.

Brazil and India: Two Offset Flagships' Stories

As far as offsetting stipulates compulsory inward investment obligations on foreign suppliers this form of gaining military technologies became particularly attractive for developing economies. Offsets can mean engagement of local manufacturers in joint production of components, foreign direct investment or even a complete localization of a defense items production. Some specialists regard these economic benefits programs as nothing more than a high tech barter[3].

According to Jane's, since 1999, 22 countries have introduced formal offset policies. India and Brazil have become known flagships of the offsetting movement and their stories can shed light upon this magnetic phenomenon.

Brazil

Brazil can be regarded as one of pioneers of the offsetting in the world. The Brazilian government's support for the successful Embrarer program through technology transfer during 1969-88 through Military Research and Development funding and tax breaks for buying Embraer's shares is an important example for many developing countries planning to implement this experience on their national soil. In 1970s offsets helped Brazil to gradually overcome technological barriers and set up the aircraft manufacturer Embraer which together with the Canadian Bombardier is ranked 3-4 amongst the biggest suppliers of commercial planes after Boeing and Airbus. In 2009 Embraer delivered more than 240 planes to its civil customers.

In 1981 Embraer entered into an agreement with Aeritalia and Aermacchi of Italy to co-design and produce the AMX fighter. Each company was involved in the production of sections of the aircraft, with other Brazilian companies making additional subsystems under license. According to Brazil's agency for industrial development, the AMX agreement was fundamental to the Brazilian aeronautics industry's acquisition of project management, system integration and manufacturing know-how[4].

The Brazilian MoD underlines that the National Strategy of Defense is the driver for new high-profile programs under MoD-issued guidelines for Industrial Participation. Brazil stipulates that offsets are required on all contracts over USD1m. The MoD Offset Strategy encourages the following eligible activities: transfer of technology, investments,

3 South America Initiates Sophisticated Offset Barter In Defense Purchases, Gary Pacific, BarterNews magazine January, 2006, http://www.barternews.com/south_america_initiates_sophisticated_offset_barter.htm

4 Don't Fear the Offset, 6 January 2011 by Adam Dempsey, http://www.upi.com/Top_News/Special/2011/08/08/Brazils-arms-buying-up-for-review-again/UPI-70541312836906/

co-production, licensed production, marketing support, training and other forms of countertrade.

The Brazilian Air Force has signed 5 offset and intellectual property agreements, valued USD 4 billion recently:

- EADS CASA - P-3 & CL-X modernization of Brazil's maritime patrol aircraft fleet
- Airbus –aircraft VC-X
- Elbit Systems –F-5BR & AL-X upgrade programs
- Eurocopter –HX-BR medium utility helicopters.

The latest success case of the Brazilian offset program is the HX-BR Project that became the first joint acquisition program in Brazilian military history. Industrial cooperation agreement for local production and nationalization of 50 EC-725 helicopters, focused on transfer of technology and local industry development which included 22 international construction projects.

The other 18 agreements valued USD 9 billion are being under negotiation:

- Elbit Systems - A-1M Aircraft
- Airbus Military - CL-X2 Helicopter
- Eurocopter & Turbomeca - medium transport helicopter H-XBR CLS
- F-X2 fighter competition is waiting for final decision from the National Defense Council[5].

Today's Brazilian offset programs go far beyond the defense domain and increasingly engage large national civil projects such as high-speed rail transportation and hydrocarbons offshore prospection.

India

Though the Indian Minister of Defense AK Antony's remarks that the country's offset policies are still evolving, India has actually been receiving technology transfers since the 1960s when the Soviet Union began providing financial and material support to develop a domestic arms industry.

Since the official Indian offset policy was introduced in 2005 India implemented a policy stipulating that contracts over USD 64m must have offsets amounting to at least 30% of the contract value[6].

In October 1993 a review committee headed by Dr. Abdul Kalam, the then Scientific Adviser to the Defense Minister and head of the Defense Research and Development Organization set a goal of enhancing the indigenous part of the defense inventory from

5 Offset Strategy of the Brazilian Air Force: A comprehensive approach, Lt Col Diógenes Lima Neto, Brazilian Air Force Secretariat for Economy and Finances, presentation at Offsets 2011, Sofia, Bulgaria

6 India's Offset Policy and its Impact on Military Industrial Capability, S N Misra, India Strategic, July 2011, http://www.indiastrategic.in/topstories1096.htm

30% to a possible 70% by 2005. However the self reliance portion has not moved beyond 30%.

In 2005-2010 India finalized 12 offset contracts:

- Medium Power Radar - IAI ELTA, Israel
- Upgrade of Mig-29 Aircraft for IAF - Rosoboronexport, Russia
- Fourth Fleet Tanker - Fincantieri, Italy
- Long Range Maritime Recce Anti-Submarine warfare Aircraft - Boeing, USA
- HAROP UAVs – IAI, Israel
- Medium Lift Helicopters - Rosoboronexport, Russia
- C- l30J Aircraft - Lockheed Martin, USA
- EO/IR Pods Jaguar upgrade - RAFAEL, France
- Fourth Fleet Tanker - under option clause - Fincantieri, Italy
- Low Level Transportable Radar - Thales, France
- WIP Helicopters - Agusta Westland, UK
- UAV – IAI, Israel.

The offset contract demonstrate steady increase from USD 48.6m in 2007 to USD519.5m in 2008, USD974m in 2009 to around USD700m during 2010 where the aerospace sector accounts for 65%.

Still Indian experts are rather restrained in their estimates of the national offset policy achievements. They note that offsets have helped to master low-end products and services, setting up simulator and training facilities, project management, depot maintenance facility, aircraft ground handling equipment etc, which substituted real high-tech. The foreign arms producers are reluctant to provide core manufacturing know how, which leads to continued dependence on them for future upgrades. As a result there is almost no positive impact on exports of Indian defense items produced with use of foreign technologies[7].

Brazil and India though having different results in their national offset programs yet remain united in their determination to get self reliance in defense industry by acquiring key technologies, participating in joint production and finally developing own products and systems. Offset policy quite optimally serves these plans, which means that ATT should offer extremely attractive incentives in order to gain support of these two as well as others emerging arms producers.

7 India's Offset Policy and its Impact on Military Industrial Capability, S N Misra, India Strategic, July 2011, http://www.indiastrategic.in/topstories1096.htm

Certain countries use offset deals as their strategic instrument for creating and developing national defense industries. From the point of view of the international community offset deals is an easy means to proliferate defense technologies.

5. Reverse Engineering is a way to gain technology of an existing device by analyzing its structure, function, and operation. Reverse engineering has been done for centuries in various fields however military hardware is amongst the most popular objects for it. Although from legal point of view reverse engineering can be regarded as a kind of a stealing the original know how and is usually connected with violation of copyright yet the successful lawsuits against technology stealers are rear.

China in Drive to Excel the Master

Many countries from time to time unitize their skills of reverse engineering or gaining technologies through analysis of structure, function, and operation of existent devices, however only China made it its national technological development policy. "If you've succeeded to copy a masterpiece of your master you are a master yourself" a Chinese proverb says.

In 1950s Soviet Union transferred to Beijing and allowed China to copy various low-tech weapons. By 1980s China acquired the capability to produce almost full range of first-generation Soviet weapons designed in 1960s: ICBM; satellite; nuclear strategic submarine; nuclear attack submarine; destroyers, frigates and patrol craft; fighters and bombers; air-defense missile systems as well as ground troops weaponry.

In 1981 the leader of the Communist Party of China Deng Xiaoping charted the Chinese route towards a market economy though "four modernizations" in economy, agriculture, scientific and technological development and national defense. The plan envisaged importation of foreign machinery, electronics and other high-tech goods; reverse engineering; improvement of collected know how and development of principally new products and technologies. It took China a decade to gain momentum and skill sufficient to copy and clone foreign products with required precision[8].

In 1996, China started a new cycle of military modernization focusing on the most advanced weaponry based on Russian technology and manufactured with the use of Russian kits and spare parts. By present time the Chinese industry has the following domestically produced weapons that are supposed to be copies of foreign prototypes[9]:

- Wide variety of small arms being clones of Soviet/Russian, Czech, US originals;
- FC-1 Xiaolong light-weight, single-engine, multi-role combat aircraft representing a modernized version of the Russian MiG-21 jet;

8 China's Guochanhua (Reverse Engineering), Dr. Alexandr Nemets and Dr. Thomas Torda, June 13, 2002 archive.newsmax.com/archives/articles/2002/6/13/24549.shtml

9 Buy, Build, or Steal: China's Quest for Advanced Military Aviation Technologies, China Strategic Perspectives 4, Phillip C. Saunders and Joshua K. Wiseman, Washington, National Defense University Press, December 2011,.http://www.andrewerickson.com/2012/01/buy-build-or-steal-chinas-quest-for-advanced-military-aviation-technologies/

- Type 200-4 anti-airfield weapon is the localized adoption of the French MATRA Durandal imported during the 1980s;
- J-11 single-seat, twin-engine jet fighter based on the Soviet-designed Sukhoi Su-27;
- J-10 multirole all-weather combat aircraft based on Israeli IAI Lavi fighter;
- J-15 carrier-based fighter aircraft is based on the Russian-designed Sukhoi Su-33. An unfinished Su-33 prototype was acquired from Ukraine in 2001;
- Dong Fend DF-31 solid-fuel, road-mobile ICBM is based on Soviet technology and evidently uses some Russian and Belarusian components;
- Shenzhou manned spacecraft prototype with a LM-F2 missile booster are based on Russian technology and use some Russian-made modules;
- Hongniao series long range land-attack cruise missiles based on the variants of the Russian Kh-SD/65;
- Type 039 submarine (NATO code name Song class) uses a great amount of Russian Kilo-type submarine high-tech and components;
- Type 051B (Luhai Class) Missile Destroyer uses Ukrainian engines and evidently some technology of Russia's Sovremenny-class destroyer;
- The "093" class nuclear powered attack submarine and "094" class strategic submarine are entirely based on Russian technology and use key Russian-made components;
- HQ-9 medium- to long-range, active radar homing air defense missile (known as the FT-2000 for export) is a copy of Russia's S-300 ADM. There are unconfirmed rumors that the HQ-9 uses guidance systems that are similar to those developed in U.S. Patriot missile technology;
- Type 96, type 98 and type 99 tanks are modernized versions of T-72 Soviet main battle tank;
- ZBD-97 infantry fighting vehicle mounts a turret similar in design to that of the Russian BMP-3, although the chassis is different;
- PHL-03 300mm Multiple Launch Rocket System highly resembles the Russian 9K58 Smerch rocket system in appearance;
- The PLZ-05 or the Type 05 155 mm self-propelled howitzers is derived from the Russian 2S19 Msta;
- HQ-7 short-range air defense missile is a reverse-engineered version of the French Thomson-CSF Crotale missile;
- DH-10 and CJ-10 land attack cruise missiles are land based derivatives of the Kh-55, at least six being illegally transferred in 2000 from the Ukraine to China;
- Kunlun turbofan engine is an improved copy of Russia's AL-31 engine used with several types of fighters. In practice, it means technological independence in manufacturing fourth-generation fighter aircraft;

- Chengdu J-20 stealth bomber is likely to contain the stealth technology from parts of an American F-117 Nighthawk that was shot down over Serbia in 1999.

Given an overall assessment that the Chinese military aviation industry remains 15–20 years behind the most advanced US counterparts nevertheless China has reached technological independence in a broad range of weapon systems and dual-use products which allows Chinese engineers to design weapons of next generation and compete with leading arms exporters on developing markets.

As Beijing continues perfecting its reverse engineering skills international observers point to some other probable China's cloning projects:

- In April 1998 the Varyag aircraft carrier structurally complete but without electronics, engines, a rudder, and much of her operating systems was bought by a Hong Kong company in Ukraine for supposed converting it into a floating hotel and gambling parlor. On August 10, 2011 the ship began her first sea trials as an aircraft carrier of the Chinese People's Liberation Army Navy. Based on ex-Varyad technologies China plans to construct at least two more aircraft carriers.
- US military are concerned about possible leak of stealth technology to China used in secret stealth helicopter that crashed during the raid on Osama Bin Laden's compound in Pakistan.
- International experts predict that RQ-170 Sentinel UAV developed by Lockheed Martin and downed at Iran territory in 2011 might end in China's hands. This accident created a opportunity for China to gain insight on one of the most sophisticated stealth planes in the world.

From 2000 to 2007 US Immigration and Customs Enforcement officers have launched more than 540 investigations into illegal exports of restricted US weapons technology to China However, China's legal access to military high tech has diminished as US and EU defense arsenals remain locked for Beijing and Russia becomes less willing to provide advanced defense technologies due to China's reverse engineering practice and the frightening growth of the neighbor's military machine.

Many of these forms of TDT serve as instruments of military technologies proliferation and violation of arms embargoes. The examples of countries under UN sanctions like Iran or North Korea demonstrate that in the absence of a well-defined comprehensive international TDT control regime over the warfare technology proliferation would continue to spread globally from small arms to missiles and space weapons. Industrial spying as well as those countries' own military R&D have been significantly supplemented with transfers of defense technologies from abroad which have led the world to several serious crises. International embargoes do not have an intended effect due to absence of international mechanisms of its proper implementation. Therefore, an international consensus must be reached within ATT in order to reduce future tension and potential conflicts.

If international discussion of TDT fails, the proliferation processes will continue to take place, creating new niches for the defense industry to exploit and further exacerbating an already unstable international security situation.

The definition "transfer of defense technology" can be interpreted in different ways thereby complicating the discussion of control over this means to proliferate sensitive know-how, instruments and skills. Experts have not come to common understanding of whether or not the TDT should include dual-use technologies or licensed production. There are specialists who suppose that manufactures operating under foreign licenses should be defined and treated separately from the TDT.

The issue of unified and correct definition of TDT is closely connected to the other important question: What is the main concern and what should be the purpose of control over TDT?

- to prevent illicit trafficking and the illicit production of weapons
- to prevent proliferation of illicit manufacturing capabilities
- to enhance control on re-export of defense technologies to third countries
- to enhance control over the most destabilizing technologies (like small arms or MANPADS)
- to limit proliferation of the most advanced military technologies
- to ensure comprehensive control over TDT?

That is why during the 4th ATT Preparatory Committee that took place in February 2012 some national delegations raised concerns about the difficulty of defining technology in the Treaty since it could be open to different interpretations and was too difficult to implement.

A. Definition by the World Intellectual Property Organization

According to the World Intellectual Property Organization technology is defined as "the systematic knowledge for product manufacture and service provision in industry, farming and commercial fields," and knowledge is reflected in inventions, utility models, designs, and in data forms. Knowledge is also shown in industrial plants, design, installation, operation, and maintenance of equipment, management of industrial and commercial corporations, and the technical skill and experience of experts for those activities. In this definition, it must be noted that technology comes from knowledge. However, not all knowledge is included. That is, it must be able to be transferred and it must be systematic knowledge that can satisfy needs and problems that arise in special fields of human activity. So, there are 3 standards in the definition of technology:

- Knowledge must be systematic. This means that it must be organized in terms of providing solutions to problems.
- Knowledge must be shaped in documents or have a form of ideas in people's minds and must be able to be presented, so that irrespectively, it can be transferred from one person to another.
- It must have purpose-orientation, so that it can be utilized for useful purposes in industry, commercial fields[10].

10 Technology Handbook, *Technology Transfer Principle & Strategy*, prepared by APCTT (Asian and Pacific

B. Wassenaar Arrangement definition

According to Wassenaar Arrangement (WA) Guidelines and Principles, technology is specific information necessary for the "development," "production" or "use" of a product. The information takes the form of technical data or technical assistance:

- "Technical data" may take forms such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories;
- "Technical assistance" may take forms such as instruction, skills, training, working knowledge, consulting services. "Technical assistance" may involved transfer of "technical data" [11].

Technologies controlled under WA are defined and listed in special documents which will be described in the following article.

C. ATT Chairman's Draft Paper of 13 July 2011

Transfer of defense technologies has been broadly discussed within the ATT process. Based on the general discussion Ambassador Roberto García Moritán Chairman of the Preparatory Committee of the Conference on an Arms Trade Treaty prepared and disseminated his version of the ATT draft paper.

According to the ATT Chairman's Draft Paper transactions or activities to be covered by States in their national legislation and regulations should include:

- Manufacture under foreign license: an agreement whereby a person or entity in the exporting State grants a person or entity in the importing State an authorization to manufacture conventional arms which involves technology transfer or the use of technology or conventional arms previously supplied by the exporting State.
- Technology transfer: the export, by tangible or intangible means, of information which is required for the design, development, production, manufacture, assembly, operation, repair, testing, maintenance or modification of conventional arms.

The ATT Chairman's Draft Paper includes into the scope of the Treaty technology and equipment specially and exclusively designed and used to develop, manufacture, or maintain any of the ATT categories, i.e. tanks, military vehicles, artillery systems, military aircraft (manned or unmanned), military helicopters (manned or unmanned), naval vessels (surface or submarine vessels armed or equipped for military use), missiles and missile systems (guided or unguided), small arms, light weapons, ammunition, parts

Centre for Transfer of Technology) http://www.technology4sme.net/tech_handbook.htm

11 Best Practices for Implementing Intangible Transfer of Technology Controls, Guidelines & Procedures, including the Initial Elements, *Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies*, December 2009

or components specially and exclusively designed for any of the categories mentioned above.[12]

North Korean Defense Industry: Commitment to Self-Reliance

In 1948 the USSR which played a key role in the establishment of North Korea laid the foundation of the indigenous defense industry. 60 years later the DPRK that had already forfeited the Soviet support still was capable to give a dare to the USA and the entire world in the nuclear field. The North Korea's resolute commitment to self-reliance in defense has made the regime unshakable but completely exhausted its national economy.

The Soviet and Chinese Brotherly Aid

Since the very first day the young state of North Korea received Soviet and Chinese licensed technologies and entire industrial plants. By 1970s North Korean defense industry was capable to produce a large variety of relatively modern at the time weapons: Soviet TT and Czechoslovak CZ-75 pistols, several versions of AK-47 and AK-74 assault rifles, Yugoslav Zastava sniper rifle, RPD-44 machine gun, RPG-7 antitank rocket launcher; Soviet and Chinese mortars and recoilless guns; light tanks and armored personnel carriers; a wide range of canons, towed and self-propelled guns and 24-tubes rocket launchers; towed and self-propelled anti-aircraft guns; a series of R-17 (Scud) tactical missiles.

After the breakup of the USSR by the end of the 1990s the Russian Federation and China continued to support the former communist ally, helping North Korea's defense industry to develop the manufacture of more advanced weapons: 30 mm automatic grenade launcher; 170 mm self-propelled howitzer; up to 240 mm MLRS; T-62 and T-72 tanks; Russian portable anti-tank guided missiles and MANPADS; Chinese Romeo and Whiskey class submarines; S-802 anti-ship cruise missile systems; radar and command vehicles.

Although the North Korean defense industry considerably depended on supply of know-how and original components for production of the Soviet and Chinese origin inventory, soon the DPRK engineers were mature enough to advance available armory with dual-use technologies and equipment.

Covert procurement of technologies

In the 1970s, North Korea augmented the two TDT sources by an outreach program aimed at acquiring Western dual-use technology and equipment.

Proxy companies in Thailand, Singapore, and Hong Kong were used to mask its financial transactions, informal transfer mechanisms, cash couriers and barter arrangements. North Korean trading companies were connected with a world-wide network that procured spare parts and components for North Korea's defense industries, including its ballistic missile programs. Goods were shipped either directly to North Korea, or

12 ATT Chairman's Draft Paper, 13 July 2011, http://www.adh-geneve.ch/RULAC/pdf/Chairman-Draft-ATT-blog.pdf

indirectly through China. Several Russian, Chinese and other companies were sanctioned by the US Congress under the Nonproliferation Act.

This program included a wide range of projects, from acquiring Japanese trucks and electronic gear to obtaining Austrian forging equipment with gun barrel applications, to purchasing US manufactured Hughes MD-500 helicopters (which has never been reverse engineered). North Korea apparently acquired mini-submarine technology from both Yugoslavia and the West Germany. Technology of air cushioned vehicles most probably acquired from Britain was improved for carrying a platoon.

This clandestine instruments for procurement of defense items and sensitive technologies became even more sought-after in October 14, 2006 when the United Nations Security Council voted unanimously to impose on Pyongyang sanctions including ban on arms sales and other financial measures.

New lease of arms' life

Pyongyang engineers gradually augmented proficiency in advancing outdated technologies that were supposed to be abandoned by leading defense manufacturers. The production experience and knowledge collected by Korean students in Soviet universities allowed Pyongyang to reverse engineer and modify the original designs and produce both derivatives and indigenously designed versions of armored personnel carriers, self-propelled artillery, light tanks, and high-speed landing craft. Since then perfection of available defense technologies became the biggest forte of North Korean engineers. They designed thermo-pressure anti-tank round for the outdated RPG-7; 30 mm self-propelled hex-gun anti-aircraft weapon system; anti-aircraft gun fire control system; thermo-pressure cluster ammunitions; radio waves absorbents for missiles, fighters, ground weapons and warships; thermal night vision devices; fire control vehicles; advanced radars; a wide range of specialized infiltration craft; K200 and K200 Small submarines; GPS jamming systems; tactical UAVs; cushion vessels and multiple thermo-pressure warheads for ballistic missiles. North Korea is believed to have been developing an electromagnetic pulse system that could disrupt South Korean military communications and radar.

Joint venture for arms designing

As the DPRK national economy was undermined by the huge defense expenses which drained the treasury the North Korean arms manufacturers sought for new ways to procure military technologies.

The first military contacts between Pyongyang and Tehran took place in 1980s when North Korea provided military assistance to Islamic Republic in the war against Iraq by testing and supplying anti-ship cruise missiles. Later Iran provided North Korea a financial assistance for modernization of the Scud missiles. There are evidences that the ballistic missile development ties between the two countries remain active and produce improvements in the arsenals of both countries in violation of UN sanctions which make the relationship between them even closer. The BM25/Musudan road-mobile ballistic missile with a projected range of 3,000-4,000 km possesses characteristics associated with Iran's Shahab 3 missile. It makes international experts think that not only North

Korean components and engineering was shipped by air and diplomatic pouch to Tehran but whole DPRK missile systems have been test-flown in Iran.

The two countries might be cooperating in development of anti-ship cruise missiles, long-range missiles, and space launchers that could allow them to develop an intercontinental ballistic missile.

The principle "Army is First" ("Army is Most Important of All") advocated by the North Korea leadership allowed Pyongyang to reach success when it assigned priority resources to specific projects. However, it did not help the country to shift gears to the next technological level, thus the military was incapable of producing fighters, transport aircraft or helicopters, sophisticated radars, or electronic equipment. The available defense systems still lag dramatically behind military state of the art because the systems remain dated which compels North Korea apparently to place the highest priority on quantity to make up for a lack of quality. North Korea has an exceptionally large number of outdated weapons like barrage balloons and antiaircraft guns. The defense industry stopped dead at the level of 1970-80s with the lion's share of national resources being invested into the missile and nuclear programs.

The resources and efforts committed to the national defense industry haven't brought neither prosperity to the country nor security to the region.

Background of international technology transfer regimes

The international community has invested a lot of intellectual resources and produced many useful instruments which have prevented nuclear war and considerably slowed down the proliferation of nuclear and missile technologies.

ATT has a chance to inherit best practices of the existing regimes in order to implement them in the field of conventional arms technologies transfer. As an example there is an important principle of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) according to which "the NPT non-nuclear-weapon states agree never to acquire nuclear weapons and the NPT nuclear-weapon states in exchange agree to share the benefits of peaceful nuclear technology". I believe that this is a principle which might be quite applicable to the conventional defense technologies.

Benefits of Peaceful Nuclear Technology

According of one of the NPT principles "the NPT non-nuclear-weapon states agree never to acquire nuclear weapons and the NPT nuclear-weapon states in exchange agree to share the benefits of peaceful nuclear technology".

In the early 1960s, there were predictions that there could be as many as 25-30 nuclear-weapon states within a couple of decades. Still there has been very little actual nuclear weapons proliferation since the entry into force of the NPT in 1970.

The International Atomic Energy Agency (IAEA) uniting 151 member states serves as an intergovernmental forum for scientific and technical cooperation in the peaceful use of

nuclear technology and nuclear power worldwide. The “inalienable right” of all parties to use of nuclear energy for peaceful purposes, in conformity with their other treaty obligations, and the need of all parties to cooperate in its provision: assisting states in this respect is part of the IAEA’s core mission.

The IAEA has established programs to help developing countries in planning to build systematically the capability to manage a nuclear power program, including the Technical Cooperation Program aimed to assist developing states to take full advantage of peaceful nuclear energy for human development, and the Integrated Nuclear Infrastructure Group, which has carried out Integrated Nuclear Infrastructure Review missions in Indonesia, Jordan, Thailand and Vietnam.

Currently, 439 reactors are operating in 30 countries and are contributing approximately 14% to global electricity generation. The share of nuclear in global electricity generation has declined slightly in recent years. However, the total amount of nuclear electricity generation is increasing as plant availability, power uprating, and new plants offset the loss from older plants that are being shut down. Out of the 30 countries currently using nuclear power for electricity generation, 24 intend to allow new plants to be built, and, of those, the majority is actively supporting the increased use of nuclear power, some by providing incentives.

In addition, a growing number of countries are expressing interest in introducing nuclear power. Of the 51 countries expressing an such an interest, 17 are from Asia and the Pacific (from the Middle East to the Pacific) region, 13 are from the Africa region, 11 are from Europe and 9 from Latin America. Over 20 countries are actively considering nuclear power programs to meet their energy needs and the others have expressed interest in possible introduction of nuclear power through requests to the IAEA to participate in technical cooperation projects.

The contribution of nuclear energy to total electricity generation varies considerably by region. In Western Europe, nuclear generated electricity accounts for almost 30% of total electricity. In North America and Eastern Europe, it is approximately 18%, whereas in Africa and Latin America it is 1.8% and 2.6%, respectively. In the Far East, nuclear energy accounts for 11.5% of electricity generation; in the Middle East and South Asia it accounts for 1.6 %.3 Nuclear energy use is concentrated in technologically advanced countries

The IAEA’s projections indicate a world total for nuclear electrical generating capacity of between 437 and 542 GW(e) by 2020 and between 473 and 748 GW(e) by 2030.

Nuclear power use in non-electricity generation applications may increase in the future for applications such as desalination of seawater, district heating, process heat for industrial applications and coal liquefaction, and hydrogen production. Nuclear power’s contribution to the reduction of greenhouse gas emissions may be increased through its indirect contributions in the transportation sector, such as electric powered vehicles and trains.

International cooperation can help to offset the cost of technology development, especially for innovative or longer term systems. Two major international efforts, the Generation IV International Forum and the IAEA’s International Project on Innovative

Nuclear Reactors and Fuel Cycles, help participating Member States to assess new technology developments and how nuclear energy would be a viable option and an integral part of their future energy mix.

The initiative of the Russian Federation to develop a global nuclear power infrastructure, with an International Uranium Enrichment Centre at Angarsk as a first step, as well as the Global Nuclear Energy Partnership initiative of the USA, intend to provide a link between States that share a common vision of the necessity of the worldwide expansion of nuclear energy for peaceful purposes in a safe and secure manner[13].

The effective assistance of nuclear-weapon states to non-nuclear-weapon states in exploring full advantage of peaceful nuclear energy for human development might serve as a significant example for regulation of TDT within the ATT.

National Export Control Systems (ECS) might be a source of good examples in effective controls over transfer of sensitive equipment, software and technology, preventing proliferation of weapons and technologies, comply with international commitments. This report examines ECS of the two leading arms exporters in the world the USA and Russia.

The USA Export Control System

The USA technology export controls which is probably the most sophisticated and elaborated control system of defense export and military technology transfers in the world, is governed by the following primary laws and directives: the Arms Export Control Act (AECA), the Foreign Assistance Act (FAA), the National Defense Authorization Act (NDAA) and the Export Administration Act (EAA).

The AECA charges the US President with the authority to control the import and export of defense articles and requires governments that receive weapons from the United States to use them for legitimate self-defense.

The EAA restricts the dual-use export based on national security, foreign policy, or for the effect of domestic exports on the national economy.

The FAA stipulates conditions for providing aid including the military assistance to foreign countries.

The NDAA authorizes funding for the defense of the United States and its interests abroad.

The national policy guidelines and provisions stipulated in these basic documents are implemented in numerous regulations the most important of which are the International Traffic in Arms Regulations (ITAR), a set of United States government regulations that control the export and import of defense-related articles and services on the United States Munitions List (USML); and the Export Administration Regulations (EAR) regulating the export or re-export of US-origin dual-use goods, software, and technology.

13 International Status and Prospects of Nuclear Power, The International Atomic Energy Agency, Vienna, 2008

Though the US President is authorized to control transfers of defense articles and defense services and to provide foreign policy guidance to persons of the United States involved in the export and import of such articles and services, he remains accountable to the US Congress which enjoys the rights to regulate this field by Congress Acts.

Several major agencies are engaged in American technology export controls:

- The Department of State (DoS) is technically responsible for approving explicitly military sales. They enforce ITAR sales, which are governed by the AECA. The Directorate of Defense Trade Controls (DDTC) at the DoS administers the ITAR. Through the USML, DDTC controls the export of weapons and military technology. The Under Secretary for Arms Control and International Security Affairs is a position within the DoS that serves as Senior Adviser to the President and the Secretary of State for Arms Control, Nonproliferation, and Disarmament.
- The Department of the Treasury's Office of Foreign Assets Control administers and enforces economic and trade sanctions applied to specific companies as well as specific countries[14].
- The Bureau of Industry and Security (BIS) within the Department of Commerce (DoC) is responsible for implementing and enforcing EAA regulations, which pertain to the export and re-export of dual-use commercial items.
- The Defense Technology Security Agency in the Department of Defense (DoD) conducts national security reviews for license applications referred from DoC and DoS. The Defense Security Cooperation Agency (DSCA), as part of the DoD, provides financial and technical assistance, transfer of defense matériel, training and services to allies, and promotes military-to-military contacts.
- The Department of Energy also reviews dual-use license applications referred by BIS for nuclear uses and nuclear end-users.

There are several programs and means to transfer sensitive information or a defense technology to a foreign user:

- Direct Commercial Sales
- Foreign Military Sales (FMS)
- Cooperative Development Production
- Release of Technical Information and Publications
- Trade shows, conferences etc.

The export authorization may take the form of:

- a FMS Case whereby the US Government sells the USML items directly to a foreign government;

14 USA Moves to Improve Arms Export Regulation Process, Defense Industry Daily, July 20, 2011 http://www.defenseindustrydaily.com/usa-moves-to-reform-arms-export-regulation-process-04665/

- an export license, which authorizes the temporary or permanent export of defense articles and/or technical data to a foreign person (but not technical assistance or defense services);
- a Warehouse and Distribution Agreement which is an agreement to establish a warehouse or distribution point abroad for defense articles to be exported from the United States for subsequent distribution to entities in an approved sales territory;
- a Technical Assistance Agreement which authorizes a US manufacturer or service provider to supply defense services to a foreign person (which could involve training or technical discussions regarding US technology);
- a Manufacturing License Agreement which authorizes a US manufacturer to supply manufacturing know-how related to defense articles to a foreign person.

According to the ITAR the technical data to be controlled includes information on design, development, production, manufacture, assembly, operation, repair, testing, maintenance or modification of defense articles, (including blueprints, drawings, photographs, plans, instructions, documentation and software directly related to defense articles)[15].

Apart from the US Munitions List there are some other controlled lists, the main of which are the Military Critical Technology List (MCTL) and the Commerce Control List (CCL). The Secretary of Defense and the Secretary of Commerce are obligated to periodically review and revise the MCTL which is generally consistent with the control list of the Wassenaar Arrangement and contains the goods and technology to be controlled for national security purposes. The CCL compiled by the BIS within the Department of Commerce is aimed at regulation of export and re-export of dual-use commercial items

In order to facilitate the US exporters' interaction with the responsible agencies the Automated Export System (AES) is employed to electronically declare of their international exports prior to the clearance of a shipment for export. The AES helps to collect US trade statistics and share this information with the Customs and other federal agencies involved in monitoring and validating US exports.

All US manufacturers, exporters, and brokers of defense articles, defense services, or related technical data, as defined on the USML, are required to register with US Department of State. Registration is primarily a means to provide the US Government with necessary information on who is involved in certain manufacturing and exporting activities. According to the ITAR "any US person, wherever located, and any foreign person located in the United States of otherwise subject to the jurisdiction of the United States who engages in the business of brokering activities" can be eligible for an arms trade license.

There are three US End-Use Monitoring Programs providing assurance that recipients comply with US export control requirements regarding the use, transfer, and security of defense articles and services: the DoD "Golden Sentry", effecting end-use verification

15 Keith Alexander and Sally Andrews, US Technology Transfer, Presentation to Industry, International Traffic in Arms Regulations, http://www.defence.gov.au/strategy/deco/docs/ITAR_Industry.pdf

of sensitive technologies vulnerable to diversion or misuse; the DoS “Blue Lantern” focusing on monitoring of direct commercial sales of defense articles by US industry to a foreign government; and the DoC “Extrancheck” that focuses on monitoring of dual-use items transfers by the US industry to a foreign government.

The core principles of the US policies in arms export are briefly recounted in the US Code of Conduct on Arms Transfers initiated in 1999 according to which the recipient governments should be up to the following qualities:

- democratic form of government
- respect for basic human rights of its citizens
- non-aggression against other states
- full participation in the UN Register of Conventional Arms.

Under the FAA no assistance should be provided to a government which “engages in a consistent pattern of gross violations of internationally recognized human rights unless such assistance will directly benefit the needy people in such country”.

The US foreign policy controls directs the President to require the foreign recipient country to modify its laws and regulations to establish an export control regime that is at least comparable to United States law, regulation, and policy.

According to the AECA the President “shall seek to establish new enhanced international controls on technology transfers that threaten international peace and United States national security”. The President should take appropriate actions to improve the sharing of information by nations that are major exporters of technology so that the United States can track movements of technology covered by the Wassenaar Arrangement and enforce technology controls and re-export requirements for such technology.

The US Congress not only defines the arms sales general policy via Congress Acts but also considers particular proposals to sell major defense equipment, defense articles and services, or the re-transfer to third party nations of such military items. Under the AECA, Congress must be formally notified 30 calendar days before the Administration can take the final steps to conclude a government-to-government foreign military sale of major defense equipment valued at $14 million or more, defense articles or services valued at $50 million or more, or design and construction services valued at $200 million or more.

Numerous Arms Export Control documents prescribe the US President “to transmit to the appropriate congressional committees a report that contains a detailed description” of various issues related to transfers of military goods or to transaction with countries of concern. The Congress received regular assessment of various arms transfer aspects by the Director of Central Intelligence and the Secretary of Defense.

The US export control system represents a comprehensive and sophisticated mechanism providing efficient control over transfers of military items and defense technology while ensuring transparency and accountability.

The advantages of the US ECS are:

- Comprehensive approach and clearly articulated policies
- Transparency, accountability and social control over the ECS authorities
- Thorough end-use and post-delivery checking procedures
- Anti-corruption provisions.

As major shortages of the US ECS one might mention:

- Complexity and burdensome redundancies of current export control system where three different primary licensing agencies, each applying their own policies and overlapping control lists administered by different departments
- The ECS is frequently used for influencing the end-user's foreign policy
- Private brokering has a permanent potential for good diversions and other abuses.

The Russian System for Military-Technical Cooperation

The Russian legislation for control of military export is considerably smaller and easier to embrace as far as it is governed by a separate institutional structure which was created just after the break-up of the Soviet Union.

The Federal Law on the Russian Federation's Military-Technical Cooperation (MTC) with Foreign States adopted in 1998 laid legal foundation for all Russian arms exports. The law established the principles of government policy on arms exports which is based on a state monopoly right to trade in armaments and military hardware.

The Russian Federal Service for Military-Technical Cooperation with Foreign States (FSMTC) is a governmental institution responsible for implementing the decisions of the President and the Government, working out the national arms export policy and controlling the Russian arms trade actors (Rosoboronexport and other Russian arms exporters).

According to the Federal Law only state owned enterprises have the right to export arms from Russia, the Russian designers and manufacturers of arms and military hardware have the right to foreign trade operations only if not less than 51 per cent of their shares are federal property and the other shares are owned by Russian legal entities or individuals[16].

The list of Russian arms exporters includes the state-owned corporation Rosoboronexport enjoying a universal license for full range of arms trade operation and a handful of big arms manufacturers who can export their own products only. Several dozens of smaller arms producers have a permit for export of components and spare parts as well as servicing of their production which was delivered to foreign customers previously.

16 Beyond the Kalashnikov: Small Arms Production, Exports, and Stockpiles in the Russian Federation. Maxim Pyadushkin with Maria Haug and Anna Matveeva, August 2003, Small Arms Survey

Russian private companies or individuals are not allowed to engage in MTC ("military technical cooperation" is a Russian definition for arms trade and military cooperation). Should an entrepreneur or a company violate this rule they'll be subjected to the Criminal Code for smuggling or illegal export (see extracts from the Articles 188 and 189 of the Russian Criminal Code).

> **Article 188. Smuggling**
>
> 1. Smuggling … shall be punishable by deprivation of liberty for a term of up five years.
>
> 2. The movement across the customs border of the Russian Federation of … explosives, sources of radiation, nuclear materials, firearms, explosive devices, ammunition, weapons of mass destruction, means of delivery thereof, other armaments and other military hardware, as well as of materials and equipment, which can be used in the development of weapons of mass destruction and means of delivery thereof, of other armaments and other military hardware … shall be punishable by deprivation of liberty for a term of three to seven years, with confiscation of property or without such confiscation.
>
> **Article 189. Illegal Export or Transfer of Raw Stuff, Materials, Equipment, Technology, or of Scientific and Technical Information, or Illegal Carrying Out Works (Rendering Services) Which May Be Used in the Development of Weapons of Mass Destruction, Armaments, and Military Hardware**
>
> 1. Illegal export or transfer by a person, empowered to exercise foreign economic activity, to a foreign organization or to its representative raw stuff, materials, equipment, technology, scientific and technical information, or illegal carrying out works (rendering services) by this person for a foreign organization or for its representative, or illegal rendering to a foreign organization or its representative services, which are known to said person as those that can be used in the development of armaments and military hardware and in respect of which export control has been established … shall be punishable by a fine in the amount of from 700 to 1,000 minimum amounts of labour wages, or in the amount of the wage or salary, or any other income of the convicted person for a period of from seven to twelve months, or by revocation of the right to hold certain posts, or by deprivation of liberty for a term of up to three years[17].

All arms export transactions are licensed by the FSMTC on a case by case basis with preliminary agreement and approval by the following federal executive bodies: the MFA; the MoD; the Ministry of Finance, the Ministry of Economic Development and the Ministry of Justice. If required the list of federal agencies might be supplemented by the following bodies: the MoI, the Foreign Intelligence Service; the Federal Security Service; the State Technical Commission under the president.

17 The Criminal Code Of The Russian Federation adopted by the State Duma on May 24, 1996, http://www.russian-criminal-code.com/PartII/SectionVIII/Chapter22.html

Licenses are only issued for the duration of a particular contract based on two lists:

- a list of military-purpose goods permitted for transfer to foreign clients (list No. 1); and
- a list of states eligible to procurement of Russian military-purpose goods listed in the first list (list No. 2).

In case the goods or the applicant state is not available in these lists the FSMTC has to apply to the President for the final decision. The President has the right to decree additions to or removals from the both lists.

In spite of the fact that the state monopoly exercises total control over activities of arms exporters through a system of controlling bodies and numerous endorsement procedures the Russian arms export cannot be regarded as transparent because neither the Russian parliament nor NGOs play any role in supervision or decision-making process.

Decisions on transfer of military technologies generally fell out of public attention and frequently get into field of public viewing only as a result of an international scandal and subsequent national information campaigns.

Although Russian authorities underline that they strictly execute their international obligations Russia's transfers of defense technologies often provoke tough reaction on the international arena. Since 1992 the US Congress imposed sanctions for violation of it national North Korea, Iran and Syria Nonproliferation Act against Russian enterprises 31 times.

US Sanctions Against Russian Legal Entities and Citizen

Objects of US Sanctions	Year
State Self-Financing Organization "GlavKosmos"	1992
Member of the Russian Academy of Sciences Anatoly Kuntsevich	1995
The Baltic State Technical University Europalace-2000 company State Self-Financing Organization "GlavKosmos" Grafit Research Institute (NIIGrafit) Polyus Scientific Production Association Russian Scientific and Production Center (Inor) MOSO Company Moscow Aviation Institute (MAI) Mendeleyev University of Chemical Technology of Russia	1998
The Scientific Research and Design Institute of Power Technology (NIKIET) TSNIITochmash Volsk Mechanical Plant Tula Design Bureau	1999
Tula Design Bureau Bazalt State Science and Production Enterprise Aviation Plant № 168 (JSV Rostvertol)	2002
Tula Design Bureau	2003
Omsk Baranov Engine Building Enterprise Russian citizen Vadim Vorobey Omsk Baranov Engine Building Enterprise Federal Research and Production Complex Altay Khazra Trading Company	2004

Federal State Unitary Enterprise Rosoboronexport JSC Sukhoi	2006
Federal State Unitary Enterprise Rosoboronexport Tula Design Bureau Kolomna Design Bureau (KBM) Mr. Alexi Safonov	2007
Federal State Unitary Enterprise Rosoboronexport	2008

In retaliation for that in 2006 the Russian chair of the Export Control Commission of the Russian Federation, deputy prime minister and defense minister Sergey Ivanov, announced the Russian watch list of foreign companies that require special attention, caution, and vigilance. The list which was developed with the help of the Russian Ministry of Foreign Affairs, the intelligence community, and through information sharing with other nations concerned with WMD proliferation, included 1,152 entities from 51 countries though neither the companies nor the countries were specified.

Ivanov noted that in carrying out international business transactions with these entities, Russia reserves the right to monitor the use of exported goods and technologies after they are delivered, in order to verify that they are used for the purposes declared on export license applications[18].

With all the benefits deriving from the state monopoly on arms export and strict control exercised by the Russian authorities over the national arms manufacturers and exporters the Russian military export policy is still regarded by many Western countries as ambiguous. The Russian arms exporters underline that they strictly observe the Russia's international obligations which they interpret in a narrow way e.g. recognizing unilateral sanctions and omitting human rights and sustainable development provisions.

In return the Russian authorities frequently highlight "double standards" in US and European arms trade policy.

The absolute state monopoly for export of military items and technologies implemented in the Russian MTC provides reasonable assurance that the government actors have less commercial incentives to divert sensitive shipments or operate with forged end-user certificates which might be regarded as an advantage of the Russian ECS in comparison to the US one that considers eligible for gaining the arms export license "any US person, wherever located, and any foreign person located in the United States of otherwise subject to the jurisdiction of the United States[19]".

On the other hand the US control in respect of sensitive technologies transfer is often stricter than that of Russia, e.g. providing foreign graduate students an access to information on United States Munitions List items might be regarded as a breach of the AECA.

The US End-Use Monitoring Programs represent an undisputable strength of the US export control system that no country can rival. The Russian MTC system also reserves

18 International Export Control Observer, the Center for Nonproliferation Studies, Monterey Institute of International Studies, Issue 7, May 2006

19 US ITAR, Registration and Licensing of Brokers, § 129.3

legal provisions for post-delivery checks of the most sensitive military items like certain small arms, MANPADS and portable anti-tank missiles which are rarely implemented in practice.

The most visible difference between the US and Russian ECS lies in the sphere of transparency, accountability and public control where the Russian President enjoys resolute license for taking unilateral decisions without Parliament notice or concordance. Neither Russian Parliament Members nor Russian public society receive reports on the national export control activities or have instruments to influence the arms export policies.

The non-transparency of the Russian military export might be an opportune ground for misuse of powers as well as corruption then as the US ECS legislation provides for Congressional control and accountability of the US actors. The NDAA ensures protection for contractor employees who wish to disclose wrong-doing to a member of the US Congress or a Congressional committee member while the AECA contains such provision as “Fees for Military Sales Agents and Other Payments” or “Prohibition on Incentive Payments”.

The USA often uses its foreign assistance programs as an instrument to influence the recipient country’s internal and foreign policy. For example while providing assistance for the Government of the Russian Federation, the US authorities withheld 60 percent from obligation until the President determined and certified in writing to the Committees on Appropriations that the Government of the Russian Federation provided full access to international non-government organization and terminated support for the communist regime in Cuba, including removal of troops, closing military and intelligence facilities[20].

The ATT might become an instrument for harmonizing different approaches to arms trade and setting up universal rules for defense technologies transfers.

Multilateral and International Export Control Regimes

Apart from national export control systems there are remarkable examples of regional and international agreements on control over arms transfers.

In 1998 the EU adopted the Code of Conduct on Arms Exports which was aimed at harmonizing EU member states arms export policies in line with agreed minimum standards. They contain eight common criteria which member states agree to apply when issuing arms export licenses as well as mechanisms of information exchange and consultation. Amongst other rules Member States agreed to take into account the risk of reverse engineering or unintended technology transfer.

20 Sec. 498A.602 Criteria for Assistance to Governments of the Independent States, Legislation on Foreign Relations Through 2002, Committee on International Relations Committee on Foreign Relations, http://www.usaid.gov/policy/ads/faa.pdf

The following active international agreements provide convincing examples of effective control over transfers of specific technologies:

- Nuclear Non-Proliferation Treaty, 1970

The NPT objective is to prevent the spread of nuclear weapons and weapons technology, to promote cooperation in the peaceful uses of nuclear energy and to further the goal of achieving nuclear disarmament and general and complete disarmament. Apart from other principles the NPT member States affirmed that "the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear-weapon States"[21].

- Missile Technology Control Regime, 1987

The MTCR which unites 34 nations today was created in order to curb the spread of unmanned delivery systems for nuclear weapons, specifically delivery systems that could carry a minimum payload of 500 kg a minimum of 300 km. In 1992 it was agreed to expand the scope of the MTCR to include nonproliferation of unmanned aerial vehicles (UAVs) for all weapons of mass destruction. Prohibited materials under the Regime are outlined in the MTCR Equipment, Software, and Technology Annex.

MTCR has been successful in helping to slow or stop several ballistic missile programs: Argentina, Egypt, and Iraq abandoned their joint Condor II ballistic missile program; Brazil, South Africa, South Korea, and Taiwan also shelved or eliminated missile or space launch vehicle programs. Some Eastern European countries, such as Poland and the Czech Republic, destroyed their ballistic missiles. The regime has further hampered Libyan and Syrian missile efforts.

In 1994 member states adopted an important principle concerning technology transfer. In order to make the enforcement of MTCR Guidelines more uniform, the MTCR states established a "no undercut" policy, meaning if one member denies the sale of some technology to another country, then all members must adhere.

In 2002 the MTCR was supplemented by the International Code of Conduct against Ballistic Missile Proliferation (ICOC) which works parallel to the MTCR with less specific restrictions but with a greater membership. Thus 117 nations within ICOC now enforce export controls to curb the proliferation of UAV's.

Technology Alert List (TAL)

TAL was created by the US federal government in 2000 as a guideline for US consular officials to use in reviewing visa applications. The purpose of this guideline is to prevent the export of "goods, technology, or sensitive information" through activities such as "graduate-level studies, teaching, conducting research, participating in exchange programs, receiving training or employment". TAL is regularly updated.

21 The Treaty of the Non-Proliferation of Nuclear Wepons, http://www.un.org/en/conf/npt/2005/npttreaty.html

CRITICAL FIELDS LIST

A. CONVENTIONAL MUNITIONS: Technologies associated with: Warheads and other large caliber projectiles; Reactive armor and warhead defeat systems; Fusing and arming systems; Electronic countermeasures and systems; New or novel explosives and formulations; Automated explosive detection methods and equipment;

B. NUCLEAR TECHNOLOGY: Technologies associated with production and use of nuclear material for both peaceful and military applications. Included are technologies for: Enrichment of fissile material; Reprocessing irradiated nuclear fuel to recover produced plutonium; Production of heavy water for moderator material; Plutonium and tritium handling

   Also, certain associated technologies related to nuclear physics and/or nuclear engineering. Includes materials, equipment or technology associated with: Power reactors, breeder and production reactors; Fissile or special nuclear materials; Uranium enrichment, including gaseous diffusion, centrifuge, aerodynamic, chemical; Electromagnetic Isotopic Separation; Laser Isotope Separation; Spent fuel reprocessing, plutonium, mixed oxide nuclear research; Inertial Confinement Fusion; Magnetic confinement fusion; Laser fusion, high power lasers, plasma; Nuclear fuel fabrication including Mixed Oxide (uranium-plutonium) fuels; Heavy water production; Tritium production and use; Hardening technology.

C. ROCKET SYSTEMS (including ballistic missile systems, space launch vehicles and sounding rockets) and Unmanned Air Vehicles (including cruise missiles, target drones, and reconnaissance drones): Technologies associated with rocket systems and UAV systems. The technology needed to develop a satellite launch vehicle is virtually identical to that needed to build a ballistic missile.

D. ROCKET SYSTEM AND UNMANNED AIR VEHICLE SUBSYSTEMS: Propulsion technologies include solid rocket motor stages, and liquid propellant engines. Other critical subsystems include re-entry vehicles, guidance sets, thrust vector controls and warhead safing, arming and fusing. Many of these technologies are dual-use. Technologies include: Liquid and solid rocket propulsion systems; Missile propulsion and systems integration; Individual rocket stages or staging/separation mechanism; Aerospace thermal (such as superalloys) and high-performance structures; Propulsion systems test facilities.

E. NAVIGATION, AVIONICS AND FLIGHT CONTROL USEABLE IN ROCKET SYSTEMS AND UNMANNED AIR VEHICLES: These capabilities directly determine the delivery accuracy and lethality of both unguided and guided weapons. The long- term costs to design, build and apply these technologies have been a limiting proliferation factor. Technologies include those associated with: Internal navigation systems; Tracking and terminal homing devices; Accelerometers and gyroscopes; Rocket and UAV and flight control systems; Global Positioning System.

F. CHEMICAL, BIOTECHNOLOGY AND BIOMEDICAL ENGINEERING: The technology used to produce chemical and biological weapons is inherently dual-use. The same technologies that could be applied to develop and produce chemical and biological weapons are used widely by civilian research laboratories and industry; these technologies are relatively common in many countries. Advanced biotechnology has the potential to support biological weapons research. In the biological area, look for interest in technologies associated with: Aerobiology (study of microorganisms found in the air or in aerosol form); Biochemistry; Pharmacology; Immunology; Virology;

Bacteriology; Mycology; Microbiology; Growth and culturing of microorganisms; Pathology (study of diseases); Toxicology; Study of toxins; Virulence factors; Genetic engineering, recombinant DNA technology; Identification of nucleic acid sequences associated with pathogenecity; Freeze-drying (lyophilization); Fermentation technology; Cross-filtration equipment; High "DOP-rated filters" (e.g., HEPA filters, ULPA filters); Microencapsulation; Aerosol sprayers and technology, aerosol and aerosolization technology; Spray or drum drying technology; Milling equipment or technology intended for the production of micron-sized particles; Technology for eliminating electrostatic charges of small particles; Flight training; Crop-dusting, aerosol dissemination; Unmanned aerial vehicle technology; Fuses, detonators, and other munitions technology; Submunitions technology; Computer modeling of dissemination or contagion; Chemical absorption (nuclear-biological-chemical protection)

In the chemical area, look for: Organo-phosphate chemistry; Neurochemistry; Chemical engineering; Chemical separation technology; Pesticide production technology; Pharmaceutical production technology; Chemical separation technology; Toxicology; Pharmacology; Neurology; Immunology; Detection of toxic chemical aerosols; Chemical absorption (Nuclear-Biological-Chemical protection); Production of glass-lined steel reactors/vessels, pipes, flanges, and other equipment; Aerosol sprayers and technology; Flight training; Crop-dusting, aerosol dissemination; Unmanned Aerial Vehicle technology; Fuses, detonators, and other munitions technology; Submunitions technology; Computer modeling of dissemination.

G. REMOTE SENSING, IMAGING AND RECONNAISSANCE: Satellite and aircraft remote sensing technologies are inherently dual-use; increasingly sophisticated technologies can be used for civilian imagery projects or for military and intelligence reconnaissance activities. Drones and remotely piloted vehicles also augment satellite capabilities. Key-word associated technologies are: Remote sensing satellites; High resolution multi-spectral, electro-optical and radar data/imagery; Imagery instruments, cameras, optics, and synthetic aperture radar systems; Ground receiving stations and data/image processing systems; Photogrammetry; Imagery data and information products; Piloted aircraft; Unmanned Air Vehicles; Remotely-piloted vehicles; and drones.

H. ADVANCED COMPUTER/MICROELECTRONIC TECHNOLOGY: Advanced computers and software play a useful (but not necessarily critical) role in the development and deployment of missiles and missile systems, and in the development and production of nuclear weapons. Advanced computer capabilities are also used in over-the-horizon targeting, airborne early warning targeting, Electronic Countermeasures processors. These technologies are associated with: Supercomputing, hybrid computing; Speech processing/recognition systems; Neural networks; Data fusion; Quantum wells, resonant tunneling; Superconductivity; Advance optoelectronics; Acoustic wave devices; Superconducting electron devices; Flash discharge type x-ray systems; Frequency synthesizers; Microcomputer compensated crystal oscillators.

I. MATERIALS TECHNOLOGY: The metallic, ceramic and composite materials are primarily related to structural functions in aircraft, spacecraft, missiles, undersea vehicles, and propulsion devices. Polymers provide seals and sealants for containment of identified fluids and lubricants for various vehicles and devices. High density graphite is used in missile nosetips, jet vanes and nozzle throats. Selected specialty materials (i.e., stealth and the performance of these materials)

provide critical capabilities that exploit electromagnetic absorption, magnetic, or superconductivity characteristics. These technologies are associated with: Advanced metals and alloys; Non-composite ceramic materials; Ceramic, cermet, organic and carbon materials; Polymeric materials; Synthetics fluids; Hot isostatic; Densifications; Intermetallic; Organometals; Liquid and solid lubricant; Magnetic metals and superconductive conductors.

J. INFORMATION SECURITY: Technologies associated with cryptography and cryptographic systems to ensure secrecy for communications, video, data and related software.

K. LASER AND DIRECTED ENERGY SYSTEMS TECHNOLOGY: Lasers have critical military applications, including incorporation in guided ordinance such as laser guided bombs and ranging devices. Directed energy technologies are used to generate electromagnetic radiation or particle beams and to project that energy on a specific target. Kinetic energy technologies are those used to impart a high velocity to a mass and direct it to a target. Directed energy and kinetic energy technologies have potential utility in countering missiles and other applications. Look for technologies associated with: Atomic Vapor Laser Isotope Separation; Molecular Laser Isotope Separation; High Energy Lasers (i.e., laser welders); Low Energy Lasers; Semiconductor lasers; Free electron lasers; Directed Energy systems; Kinetic Energy systems; Particle beam, beam rider, electromagnetic guns; Optoelectronics/electro-oPtics (Europe); Optical tracking (i.e., target designators); High energy density; High-speed pulse generation, pulsed power; Hypersonic and/or hypervelocity; Magnetohydrodynamics.

L. SENSORS AND SENSOR TECHNOLOGY: Sensors provide real-time information and data, and could provide a significant military advantage in a conflict. Marine acoustics is critical in anti-submarine warfare; gravity meters are essential for missile launch calibration. Look for technologies associated with: Marine acoustics; Optical sensors; Night vision devices, image intensification devices; Gravity meters; High speed photographic equipment; Magnetometers.

M. MARINE TECHNOLOGY: Marine technologies are often associated with submarines and other deep submersible vessels; propulsion systems designed for undersea use and navigation and quieting systems are associated with reducing detectability and enhancing operations survivability. Look for technologies connected with: Submarines and submersibles; Undersea robots; Marine propulsion systems; Signature recognition; Acoustic and non-acoustic detection; Acoustic, wake, radar and magnetic signature reduction; Magnetohydrodynamics; Stirling engines and other air independent propulsion systems;

N. ROBOTICS: Technologies associated with: Artificial intelligence; Automation; Computer-controlled machine tools; Pattern recognition technologies.

O. URBAN PLANNING: Expertise in construction or design of systems or technologies necessary to sustain modern urban societies. Look for technologies/skills associated with: Architecture; Civil engineering; Community development; Environmental planning; Geography; Housing; Landscape architecture; Land use and comprehensive planning; Urban design[22].

22 Technology Alert List, U.S. Department of State, August 2002, http://www.bu.edu/isso/forms/tal.pdf

- Wassenaar Arrangement, 1996

The Wassenaar Arrangement is a multilateral export control regime with 40 participating states. It deserves closer attention due to the fact that control over transfer of sensitive technologies is one of its primary goals.

Every six months member countries exchange information on deliveries of conventional arms to non Wassenaar members that fall under eight broad weapons categories: battle tanks, armored combat vehicles, large-caliber artillery, military aircraft/unmanned aerial vehicles, military and attack helicopters, warships, missiles or missile systems, and small arms and light weapons. Members are also required to report transfers or denials of transfers of certain controlled dual-use items. Denial reporting helps to bring to the attention of members the transfers that may undermine the objectives of the Arrangement[23].

The WA member states reiterated that the central purpose of the Arrangement is to contribute to regional and international security and stability by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilizing accumulations. Pursuing this purpose, the participating states exchanged information and views on the transfer of arms and dual-use goods and technologies to sensitive regions of the world.

Some observers question the Wassenaar Arrangement effectiveness because it relies on consensus of its 41 member states.

On the one hand the necessity for consensus results in a level of control acceptable to all. Its minimal reporting requirements mandate notification only that an item has been sold, thus preventing effective pre-export consultation among member states.

On the other hand the limited number of the WA uniting only high-tech possessing states leads to obvious discretion in the decision making stage which does not let the voices of the countries outside the WA to be heard and their opinions considered.

Spread of Drones Technology over the World

Unmanned aerial vehicles represent an example of the most modern defense technology. Drones are frequently used for wide variety of purposes in civil as well as military fields. Since the 1970s when UAVs were initially utilized as flying targets the drone technology has experienced a considerable development. The military UAVs can perform reconnaissance, surveillance and other combat missions including air strikes today.

Israel is a leading producer and supplier of unmanned aerial vehicles (UAVs) in the world. In the 1980-90s Israeli engineers made considerable advances in the development of drones based on technologies obtained from the United States. Israeli defense enterprises adopted and developed the UAV technologies gained from the USA.

23 More information can be found in the report “Technology transfers and the Arms Trade Treaty – Issues and Perspectives”, France Research Center

Drones have become for Israel not only a reliable instrument of national defense but also a profitable business. Israel has supplied systems and licenses for production for more than 100 UAVs to 18 states, including all of the world's top five suppliers (USA, Russia, France, Germany, UK). Almost all UAV recipients have their own drone development programs. Russian militaries confirmed that the Russian ministry of defense would like to use Israeli technologies for development of Russian national UAV production facilities. Turkish defense industry also purchased UAV technologies from Israel. Israeli know-how helped Turkey to create Angha UAV which is already being offered to foreign customers. According to official statements 4-5 foreign countries including Pakistan have applied to Turkey for procurement of Angha UAVs. Syria and Turkey have signed a military cooperation agreement "in the fields of defense industries and the exchange of technical and scientific information."

Apart from Pakistan several dozens of other countries develop their national UAV programs. It means that this technology will quickly proliferate over the globe which will lead the world to a buildup of more and more sophisticated weapons.

UAV technology is a huge market that is not easy to evaluate and even more difficult to control. In spite of sensitivity of the issue of transfer of defense technologies this field remains less transparent than any other military transfer.

The spread of UAVs poses new risks and challenges. If UAV proliferation proceeds unimpeded, it would have negative consequences for homeland defense, regional stability and the spread of potent terrorist capabilities. This reality should energize the search for more effective brakes on the uncontrolled spread of UAVs.

Transparency of international transfers of technology

To properly address the problem of TDT it is very important to have a correct understanding of the scale of international transfers of technology, their trends and threats. Availability, reliability, comprehensiveness, comparability and disaggregation of information on TDT are valuable components for an effective and adequate response. The dual-use nature of

many current innovations in science and technology is making it both more important and harder to pin down and estimate TDT, licensed production and military assistance.

The lack of internationally agreed definitions, or adherence to existing definitions, poses obvious problems for international comparisons. There is no systematic, reliable, valid and global set of quantitative data on the TDT.

Professionals and experts who would like to estimate the volume of global arms transfers have several sources of information. The most well-known and reputable ones are the following four data systems:

- The UN Register of Conventional Arms, (UNROCA)
- Wassenaar Reports
- OSCE Reports
- SIPRI arms transfers database.

Transparency:
Sources of Information on Arms Transfers

Categories of Weapons and Equipment	The UN Register of Conventional Arms	Wassenaar Reports	OSCE Reports	SIPRI arms transfers register
I. Battle tanks	+	+	+	+
II. Armored combat vehicles	+	+	+	+
III. Large caliber artillery systems	+	+	+	+
IV. Combat aircraft	+	+	+	+
V. Attack helicopters	+	+	+	+
VI. Warships	+	+	+	+
VII. Missiles or missile systems	+	+	+	+
MANPADS	+	+	+	+
Sensors (radars, fire control, sonars)				+
Air Defence Systems				+
Engines				+
Turrets				+
Small Arms		+	+	+
Dual-use technologies denials		+		
Dual-use technologies transfer		+		
Defense Technologies Transfers		+		+
Reporting Period	Annual	Semi-Annual	Annual	Annual
Information Access	Public	Internal	Internal	Public

Their core elements include the seven categories of weapons and equipment that are to be reported to the UN Register of Conventional Arms.

Not all the databases are freely accessible to experts. While UNROCA and SIPRI information is easily available via Internet, the Wassenaar and OSCE information exchange have only internal circulation which means that just a few authorized officials are in a position to access information available there.

TDT is covered only by two out of these four data systems as well as other less known arms transfer databases available in the world: Wassenaar Arrangement information exchange and SIPRI arms transfers database. Wassenaar information is not available for public evaluation and analysis. Public information on TDT is available in SIPRI arms transfers database.

The SIPRI database is probably the most comprehensive and open collection of information on international arms transfers. The SIPRI Arms Transfers Project uses a wide variety of sources when collecting information for the database: newspapers, periodicals and journals, books, monographs and annual reference works and official national and international documents; some governmental publications: defense white papers, the UNROCA, Pentagon notifications on government-to-government arms transfers to the US Congress and translations of articles in the global press.

The type of open information used by SIPRI cannot provide a comprehensive picture of world arms transfers. Published reports often provide only partial information, and

substantial disagreement among reports is common. TDT is probably one of the least reported arms transfer activities, which in turn considerably complicates the task of collecting the data and presenting it in a structured report for researchers. There are simply not enough important elements in the database for exercising judgement and compiling estimates.

Meanwhile in many cases TDT might be a real reason for the numerous discrepancies in the values of annual arms exports reported by official national sources and the ones estimated by independent analysts.

Still this information cannot be regarded as complete because it represents a collection of unsorted facts from the media and other open sources. This information doesn't provide a comprehensive picture of transactions with technologies transfer and military services and doesn't allow for any substantive evaluation of international TDT. In other words transfer of defense technologies remain an obscure territory out of international community control and international regulation.

Military services (like overhaul, upgrade and modernization) which is frequently interconnected with TDT also fall out of focus of major arms transfer databases.

States' views on the inclusion of transfer of defense technology in the ATT

At the sixty-first UN General Assembly in 2006, Member States adopted resolution A/RES/61/89, Towards an arms trade treaty: establishing common international standards for the import, export and transfer of conventional arms (ATT Resolution). The resolution called on the Secretary-General to "seek the views of Member States on the feasibility, scope and draft parameters for a comprehensive, legally binding instrument establishing common international standards for the import, export and transfer of conventional arms, and to submit a report on the subject to the General Assembly at its sixty-second session". Following the adoption of the resolution, the Secretary-General invited Member States to submit their views on an arms trade treaty (ATT). Over 90 states have provided submissions.

51 states out of the 90 supported inclusion of technology transfer in their list of suggested items[24].

Although only six states explicitly mentioned the need to include technological development in the list of categories covered[25], several other states that suggested annexing a list of weapons to the ultimate instrument noted the need for flexible descriptions to accommodate technological progress and weapon development and to

24 Albania, Australia, Austria, Bangladesh, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Canada, Colombia, Côte d'Ivoire, Croatia, Cyprus, the Czech Republic, the Democratic Republic of the Congo, Denmark, Djibouti, Estonia, Fiji, Germany, Hungary, Ireland, Italy, Jamaica, Japan, Kenya, Latvia, Liechtenstein, Lithuania, Luxembourg, the former Yugoslav Republic of Macedonia, Malawi, Malta, Moldova, Montenegro, Morocco, the Netherlands, New Zealand, Niger, Norway, Paraguay, Peru, Portugal, Republic of Korea, Slovakia, South Africa, Spain, Sweden, Togo, Turkey, the United Kingdom and Zambia).

25 Australia, Cyprus, Ireland, Japan, Peru and Turkey

avoid frequent updating[26]. While 27 states supported the inclusion of dual-use goods[27], several states expressed the need for the Group of Governmental Experts on an ATT to consider the matter carefully[28].

Brazil stressed that inclusion of dual-use goods would be neither feasible nor desirable because this may have a negative impact on the civilian use of such goods, and that negotiating a list of such items and keeping it updated may involve "insurmountable difficulties".

Only 15 states specifically mentioned intangible transfers in their submissions[29]. Eleven of these made specific reference to the transfer of technology[30].

Seven of the eight states that specifically mentioned licensed production also mentioned intangible transfers[31].[32]

The discussion of the issue of TDT was later addressed in a Group of Governmental Experts (GGE). The GGE created by Resolution 61/89 published their report on the feasibility, scope, and parameters of a treaty in August 2008. The report highlighted several key issues that would later dominate discussions on the treaty: amongst the activities to be covered by the treaty the GGE potentially included technology transfer, and foreign licensed production: "Experts observed that globalization had changed the dynamics of international arms trade. They noted that the types of weapon systems, equipment and their components being manufactured in cooperation, under joint ventures and licensing was increasing and that most arms-producing States were increasingly relying on technology transfers and upgrades from external sources, rather than from their own indigenous production". The Group considered that besides the seven categories of the United Nations Register of Conventional Arms, small arms and light weapons and other categories, such as ammunition, explosives, components, defense services, technology related to the manufacture of weapons and ammunition should also be included. Experts discussed the types of activities/transactions that might be included in a potential arms trade treaty. Some of the activities discussed included technology transfer and manufacturing and foreign licensed production, as well as countering illegal re-exports, unlicensed production and transfers[33].

Negotiation of TDT further continued within the framework of the Open-Ended Working Group (OEWG) and the PrepCom. In the context of discussions Technology Transfer, Manufacture under Foreign License as well as Technical Assistance have been identified

26 Belgium, Montenegro and the Netherlands

27 Albania, Bangladesh, Belgium, Bosnia and Herzegovina, Burkina Faso, Canada, Colombia, Costa Rica, Côte d'Ivoire, Fiji, Hungary, Iceland, Japan, Liberia, Moldova, the Netherlands, Niger, Norway, Paraguay, Peru, Philippines, Republic of Korea, South Africa, Sweden, Togo, the United Kingdom and Zambia

28 Canada, Japan and the United Kingdom

29 Austria, Denmark, Ecuador, Finland, France, Germany, Hungary, Iceland, Ireland, Japan, the Netherlands, Norway, Senegal, Sweden and Togo

30 Austria, Ecuador, Finland, Germany, Hungary, Iceland, Ireland, Norway, Senegal, Sweden and Togo

31 Austria, Denmark, Ecuador, Finland, Iceland, the Netherlands and Norway (the eighth country is Brazil)

32 Sarah Parker, Analysis of States' Views on an Arms Trade Treaty, UNIDIR, October 2007, http://www.unidir.org/pdf/activites/pdf2-act350.pdf

33 Towards an arms trade treaty: establishing common international standards for the import, export and transfer of conventional arms, Note by the UN Secretary-General, 26 August, 2008, http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N08/491/10/PDF/N0849110.pdf?OpenElement

as potentially falling into scope of the ATT amongst the other activities: Import, Export, Re-export, Temporary Re-export, Transshipment, Transit, Brokering, Artisanal Manufacture, Leases, Loans, Gifts, Promotion and, Research, Financing, Training[34].

In course of the subsequent international meetings several national delegations opposed regulation by the ATT of technology transfer and technical assistance whereas other countries expressed support for the inclusion of technology in the UN Register[35].

Arguments against the inclusion of transfer of defense technology

Admitting the destructive impact of the defense technologies race on national economies some experts still argue that TDT is essential for economic development. They question the international community's ability to reverse or even control TDT as far as it is closely connected to industrial growth. These experts assume that acquisition of foreign technologies by newly industrialized countries, coupled with domestic "technological learning" are key factors in their technological and economic development.

Jurgen Brauer expressed this point of view in such a way: "If we want countries to develop economically, that is, in terms of industrial and human capacity, then we must recognize and acknowledge their increasing ability to produce arms. Since we cannot and do not want to restrict countries' ability to improve their manufacturing capacity, it seems to me that we need to supplement studies on arms supply restrictions with those focusing on arms demand reductions, however difficult that may turn out to be. If it is naive to believe that one can influence countries' demand for armaments, it is equally naive to believe that restricting arms supplies will somehow prevent developing countries from supplying their own needs in this regard on account of their growing industrial and human capacity to do so"[36]. Jurgen Brauer and his supporters believe that control of TDT though being humane and constructive still remains unrealistic and unachievable as far as it constitutes a part of industrial and economic development. Jurgen Brauer is ready to prove with facts and figures what he calls "a clearly identifiable trend": the higher a country's potential, the higher its actual engagement in arms production activities.

There is an opinion that transfer of technology is vital for sustainable development of national economies. Some specialists argue that TDT permits acquiring and selling nations:

- to build a high-tech competence within the nation;
- to create jobs for domestic industry and to build a stronger national industry base;
- to guarantee reliable supply of defense products from domestic industry;

34 http://armstradetreaty.blogspot.com/search?updated-min=2010-01-01T00:00:00-05:00&updated-max=2011-01-01T00:00:00-05:00&max-results=16

35 Rendering of the latest discussions national delegations had during the recent UN forums is available in the report "Technology transfers and the Arms Trade Treaty – Issues and Perspectives", France Research Center

36 Security and Conflict. London: Routledge, 2003. Reprint of Jurgen Brauer (2000). "Potential and Actual Arms Production: Implications for the Arms Trade Debate." Defence and Peace Economics, Vol. 11, No. 5, pp. 461-480

- to develop interoperability with allies;
- to promote cost savings by work sharing;
- to find civilian application to defense industry skills and know-how.

Other experts apprehend that too broad definition of TDT in the ATT could be interpreted as an obligation to have a license process for all transactions and all daily routine technical contacts between prime manufacturers and their suppliers. Wrong interpretation of TDT might not only jeopardize the supply chain but even undermine operation of small or medium size manufacturers, and hamper national defense industries.

Some other (mainly US) experts express their concerns that the adoption of a universal international arms control instrument could establish lower standards than those available in certain national legislations. They suppose that a weak control on TDT would be a step back for those member states which have strong and robust systems of technology transfer regulation.

That is why the real challenge for ATT is to set up new universal international rules of TDT and create mechanisms for gradual improvement of them to the best available standards.

Kazakhstan Emerging as Regional Arms Producer

In October 2011 President of Kazakhstan Nursultan Nazarbayev approved a new military doctrine which prescribes the country to intensively develop its national defense industry. According to the new strategy by 2015 Kazakhstan should have high tech defense enterprises capable to furnish national armed forces and Navy with modern arms and weapons to make them mobile and professional. Kazakhstan plans to replace the outdated Soviet technological lines with modern industrial equipment and gain capacities to modernize and renovate armory and arsenals remaining from the Soviet army.

In addition to the national budget benefits from sales of surplus military hardware and equipment should become a source of finding this ambitious military reform.

Development of cooperation with foreign arms manufacturers for designing and production of new military systems as well as overhaul and modernization of aircraft, armored vehicles, missile and artillery weapons, communication and control systems, ammunition and other special equipment is an important part of the new strategy which encourages foreign investments for qualitative renovation of scientific and production facilities of Kazakhstan's defense industry.

Under new military doctrine the national defense enterprises should increase their military export potential by exploring new arms markets, diversifying their armory lines and boosting their export oriented branches.

After the breakup of the Soviet Union Kazakhstan inherited 196 industrial enterprises involved in military manufacturing and only 1,7% of the workers engaged in weapon production. With the collapse of the USSR these enterprises were left without the

defense contracts as none of them had a complete circle of production or was able to produce finished products. Still according to SIPRI Kazakhstan might have defense enterprises big enough to be listed in Top-100 arms-producing companies if the information on them was publicly available[37].

The military strategy 2011 became an extension of the military doctrine 2007 which heavily focused on fostering relationship with the West and stressing Kazakhstan's military cooperation with the United States, in particular. Therefore, Kazakhstan planed to deepen its military cooperation with Washington for technological modernization of Kazakhstan's armed forces, transfer of military technology, training, and helping to construct and consolidate key military infrastructure in order to promote regional security. In 2007 President Nazarbayev appealed to foreign investors from Western countries and sought security assistance from NATO.

Meanwhile as the Coalitions Forces plan to withdraw from Afghanistan and the USA exhibit reluctance to engage in broad military cooperation with Kazakhstan President Nazarbayev starts searching for partners in other regions.

With establishment of the Customs Union between Kazakhstan, Russian and Belarus Kazakhstani authorities expect that growth in trade turnover with Russia and Belarus in military and dual-use goods and transfer of up-to-date technologies of these countries could help to make the President's plan real.

At the first stage the Kazakhstan defense engineers intend to erect new facilities for manufacturing artillery systems, armored recovery vehicles based on T-72 tank, Igla-S and Shturm-Ataka missiles universal launching modules for armored vehicles, means of communication and e-intelligence.

Kazakhstan defense design bureaus plan to develop technologies for production of radars, ammunition, automated means of command and control for troops and warships, repair facilities for vessels in the Caspian Sea. In near future Kazakhstan expects to set up domestic manufacture of ships for Kazakhstani navy.

In October 2009 during the visit of the French President Nicolas Sarkozy to Kazakhstan the parties signed agreements on cooperation in military sphere, on military-technical cooperation and on transit of military property and personnel via the territory of Kazakhstan.

Kazakhstan and France have established the following innovative joint ventures: Centre for Assembling and Testing of Space Apparatus (satellites), Thales Kazakhstan Engineering (telecommunications), UKAD (production of titanium components for aircraft industry), Ifstar (marketing for nuclear fuel), Katco (uranium exploration), Kazakhstan-France Centre for Technology Transfer (know-how development).

With the assistance of Israeli defense companies Israel Military Industries (IMI), Soltam and Elbit, Kazakhstan's Ministry of Defense is developing its indigenous defense industry to manufacture three modern artillery systems at its Petropavlovsk PZTM industrial complex to equip the Kazakh army. What is most striking about the three systems under

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development is that all will incorporate advanced sensor technology, utilizing UAVs both for target acquisition and post-impact assessment.

The three joint development projects are the Naiza MRS rocket system, based on IMI's Lynx autonomous multipurpose rocket system, the Semser 120mm truck-mounted howitzer and Aibat 120 mm self-propelled mortar with UAVs being integrated to each system. The data received from the UAVs will be fed into the overall command architecture of the joint Israeli-Kazakh fire-control system being developed for the systems.

Transfer of Israeli defense technology to the Petropavlovsk heavy machinery building plant was one of the main conditions for establishing the joint project. The Israeli contracts also include training Kazakh personnel to service the new artillery systems.

As Kazakhstan has invested USD 180m to these joint projects Astana intends to export the armaments to the countries of the former USSR and even further. Kazakhstan's Defense Ministry noted in a statement that "New weapons systems, produced in Kazakhstan, meet the requirements of global advances in the development of precision armaments."

Turkish defense industry company Aselsan signed an agreement with Kazakhstan Engineering to start a joint venture named "Aselsan-Kazakhstan Engineering" for manufacture of Aselsan's air defense systems, stabilized weapon platforms and thermal vision systems at the Kazakh engineering firm's factories and later integrating the products to armored vehicles and electro optical equipments. The Turkish company plans to invest USD 30m into construction of a plant in Kazakhstan.

According to the Kazakh Deputy Defense Minister Kazakhstan and Belarus are looking into setting up a number of bilateral ventures to jointly manufacture high tech equipment for their air defense forces.

Samsung Thales Co. has signed a deal with the state-run Kazakhstan Engineering to develop a 152-millimeter self-propelled howitzer for the central Asian country's army. Under the USD 200m deal the Kazakh company will work with Samsung Techwin to turn Kazakhstan's 152-mm towed howitzers into self-propelled guns[38].

Azerbaijan and Kazakhstan passed a military cooperation plan for 2012 where paid special attention to modernization of arms and purchase of advanced models. Azerbaijan has experience in production of advanced equipment of interest to Kazakhstan but the parties leave details of their agreements closed.

The large revenue from Kazakh export of oil and gas might become a solid support to Astana's visible intension to become a regional arms exporter as Kazakhstan will have to spend more money to meet the demands of the ambitious military reform plan. Meanwhile according to the new military doctrine Kazakhstan plans to spend on its military needs not more than 1% of its GDP. Such a relatively small defense budget might restrain the ambitious plans for defense industry renovation. With all the President Nazarbayev's determination to convert Kazakh defense industry into the

38 Samsung to develop self-propelled artillery with Kazakhstan, Marh 10, 2010, The Korea Times, http://www.koreatimes.co.kr/www/news/biz/2010/10/123_73891.html

regional supplier, essentially, Kazakhstan has not made even the first step as far as the records of its military export contain two modest figures only: USD 5m in 2004 and USD 12m in 2006.

Recommendations

Numerous centers of advanced defense industry and technology emerge among developing nations around the globe. Each new center is capable of transferring technology and selling weapons to additional countries. It results in the expansion and proliferation of defense industrial capacity in both advanced and developing nations. There is a threat of collective loss of control over the destination and disposition of potent weapons emanating from many different parts of the world.

The acquisition of weapons and military technology is permanently changing the balance of power. Increasing proliferation of sophisticated weapons and technological know-how has created new elements of uncertainty and concern into international relations.

There is a need to swiftly address the threat of proliferation of defense technologies in ATT. The international community should find incentives for developing countries to reduce demand for arms technologies.

The ATT is intended to control procurement of conventional arms to make sure that arms and defense technology is transferred in a manner consistent with international law and basic international principles.

Problem of proliferation increases because no single nation (or group of nations to date) can control the ultimate distribution of advanced weapons and the technologies necessary to build them. The following measure concerning inclusion of TDT in the ATT could considerably improve situation with uncontrolled transfers of destabilizing technologies and let all UN member states benefit from adoption of the new rules:

1. Enhance transparency and information sharing on TDT licensing and deliveries by including it into the scope of the ATT. It might be a step-by-step process which can start with small arms know-how and gradually come to the most advanced one. Transparency will permit an adequate estimation of the situation regarding TDT and timely unilateral measures for countering the threats.

2. Initiate research in the sphere of military know-how transfers and publication of detailed “best practice” guidelines for effective export control compliance programs as well as risk assessment of future misuse of technologies transferred.

3. Regulate offset transfers of defense technologies which stimulate cheap and fast proliferation.

4. Prohibit re-transfer of technologies which are not authorized by country of origin.

5. Gradually enhance control over transfers of the most destabilizing technologies. There might be different starting points in this initiative, e.g. the process could begin with limitation of transfers of the most lethal weapons like SALW or space-warfare enabling technologies could be selected as the initial target for immediate ban or regulation.

6. Find incentives to those countries which abandon procurement of defense technologies. These could be international security guaranties; assistance in development and transfers of peaceful technologies, financing support, training, matching services, partnerships, alliances and support in equipment purchase or licensing. This is particularly relevant in a context of global trade liberalization.

7. Design and propose to the UN member states a kind of buy-back program for countries which are willing to get rid of their military production programs in favor of peaceful industries. This program might include financial assistance for the conversion of defense enterprises into civil production facilities; provision of modern civil technologies; offering educational programs to young national specialists who are expected to erect new national industries; arranging re-training of the employees.

Abbreviations

AECA	Arms Export Control Act
AES	Automated Export System
ATT	Arms Trade Treaty
BIS	Bureau of Industry and Security
CCL	Commerce Control List
COCOM	Coordinating Committee for Multilateral Export Controls
DDTC	Directorate of Defense Trade Controls
DIO	Defense Industries Organization
DoC	Department of Commerce
DoD	Department of Defense
DoS	Department of State
DPRK	Democratic People's Republic of Korea
DSCA	Defense Security Cooperation Agency
EAA	Export Administration Act
EAR	Export Administration Regulations
ECS	Export Control Systems
FAA	Foreign Assistance Act
FMS	Foreign Military Sales
FSMTC	Federal Service for Military Technical Cooperation
GGE	Group of Governmental Experts
GPS	Global Positioning System
IAEA	International Atomic Energy Agency
IAF	Indian Air Force
ICBM	Inter-Continental Ballistic Missile
ICOC	International Code of Conduct against Ballistic Missile Proliferation
ITAR	International Traffic in Arms Regulations
ITT	Intangible Transfers of Technology

MANPADS	Man-portable air-defense systems
MCTL	Military Critical Technology List
MFA	Ministry of Foreign Affairs
MLRS	Multiple Launcher Rocket System
MRS	Multiple Rocket System
MTC	Military Technical Cooperation
MTCR	Missile Technology Control Regime
MoD	Ministry of Defense
MoI	Ministry of Interior
NDAA	National Defense Authorization Act
NPT	Nuclear Non-Proliferation Treaty
OEWG	Open-Ended Working Group
R&D	Research and Development
SALW	Small Arms and Light Weapons
SAM	Surface-to-Air Missile
SIPRI	Stockholm International Peace Research Institute
TAL	Technology Alert List
TDT	Transfer of Defense Technology
UAV	Unmanned Aerial Vehicle
UNROCA	UN Register of Conventional Arms
UNIDIR	UN Institute for Disarmament Research
USML	United States Munitions List
WA	Wassenaar Arrangement
WMD	Weapons of Mass Distraction

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The United Nations Institute for Disarmament Research (UNIDIR)—an autonomous institute within the United Nations—conducts research on disarmament and security. UNIDIR is based in Geneva, Switzerland, the centre for bilateral and multilateral disarmament and non-proliferation negotiations, and home of the Conference on Disarmament. The Institute explores current issues pertaining to the variety of existing and future armaments, as well as global diplomacy and local tensions and conflicts. Working with researchers, diplomats, government officials, NGOs and other institutions since 1980, UNIDIR acts as a bridge between the research community and governments. UNIDIR's activities are funded by contributions from governments and donor foundations.