

VERIFICATION: SERVANT OR MASTER OF DISARMAMENT?

Alexei Arbatov,

Head of the Center for international security, IMEMO RAN,
scholar in residence, Carnegie Moscow Center.

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Four decades of US-Soviet and then US-Russian bilateral negotiations and agreements on nuclear disarmament have accumulated a fascinating experience of the dialectics of arms limitation and reduction, verification methods and technologies and political will or reluctance to make the two meet.

In principle, the greater scope of disarmament - the higher requirements for reliable verification capabilities, but this function has not been linear. Sometimes most radical disarmament agreements alleviated the need for intrusive verification. And some of the most sweeping disarmament steps were taken without any verification provisions at all (i.e. parallel US and Soviet elimination of a predominant parts of their tactical nuclear weapons).

Although the evolution of verification systems, which were being basically perfected as means of reconnaissance ("spy satellites", "electroning eavesdropping" etc.), gave an initial push to strategic arms control, its progress has not been determining the pace and

directions of disarmament. True, the development of technology has been constantly improving verification systems and capabilities. But at the same time technical progress has been giving birth to new weapon systems with features and performances, that made them elusive for verification or enabled them to break through established definitions and criteria for limiting various classes and types of nuclear arms (MIRV systems, cruise missiles, mobile ICBMs etc.).

There is no doubt, that it would have been a losing match for verification and thus for the whole of arms control, were it not for growing political will, mutual trust and ingenuity of the two powers, that bridged the gap between arms and arms control with means of transparency, cooperative measures, counting rules - and sometimes with decisions to either disregard technical uncertainties or even to sacrifice some weapon systems for the sake of a larger benefit of reaching an agreement (as Soviet SS-23 tactical missile, eliminated under INF/SRF in spite of its shorter range than 500 km cut-off limit).

That is why disarmament and verification exercise has been so stimulating for improving broad political relationship between Moscow and Washington. Political rapprochement, for its turn, was conducive to more radical treaties, exchanging more data, accommodating inspections and resolving compliance controversies.

The subjects of the paper are SALT/START/SORT negotiations. For the sake of deeper analysis of those, INF-SRF talks, ABM Treaty and space-defense negotiations and consultations of the 1980's are not discussed, although they certainly deserve attention and provide rich material for research. This study is not an effort to present a full

chronological account of the above bilateral negotiations, but rather an attempt to highlight some most significant mechanisms of the above dialectics of disarmament-verification and to provide examples of its dynamics.

1. The painful birth of strategic arms control – SALT I and Vladivostok Accord.

Paradoxically, the greatest by its goals and achievements, one of the longest by time (forty years by 2008), certainly most complicated technically, extremely exhaustive politically bilateral negotiations in the history of diplomacy - SALT/START/SORT endeavor - was born as a step-child of other talks – on anti-missile systems.

After a failed attempt to educate Soviet Prime-minister Alexei Kosygin in Glassboro in June of 1967, Robert McNamara, the then US Secretary of defense, in his famous speech in San Francisco in September of the same year called for ending a "mad momentum" of the arms race, fuelled, according to him, by the progress of technology and action-reaction dynamics, in particular defense-offense competition. At that time his particular target were anti-ballistic missile defenses, which were being deployed or planned for deployment in the USSR (Galosh or A-35 by Russian designation) and in the US (Nike-X or later Sentinel).

Nonetheless, McNamara's elaboration on mutual deterrence through assured destruction, uncertainty and conservative

propensity of strategic planning, action-reaction and offense-defense interactions and their implications for strategic stability - all laid the conceptual foundation for strategic arms control of the next four decades.

When SALT negotiations started in June of 1969 (after an aborted start in June 1968, interrupted by Soviet invasion of Czechoslovakia) limits on offensive strategic nuclear forces (SNF) were negotiated in a general linkage to limits of defensive anti-missile systems. However, the ABM Treaty was undoubtedly the central subject of the talks while offensive limits were rather an adjunct to them, which was revealed in the final product. In May, 1972 defensive systems were limited by very stringent parameters in the ABM Treaty of unlimited duration, while offensive forces were bound by loose provisions in the Interim Agreement (as it was titled: on Certain Measures with Respect to the Limitation of Strategic Offensive Arms) with five-year term. Both principle agreements of SALT I were based on the employment of "national technical means of verification" (NTM) at disposal of each party (foremost reconnaissance satellites).

For all its political significance, as the first step on a long road, the Interim Agreement of SALT I was very superficial in its effect on the SNF. As for ballistic missile numbers, which were to be capped by SALT I via launcher and SSBN number ceilings, by that time the US had already stopped its quantitative missile build-up (in 1967), while the USSR was finishing its ICBM program. In the Soviet case the agreement might have slightly affected the final numbers of deployed ICBMs and submarines and imposed earlier retirement of older missiles

(SS-7 and SS-8), which were to be substituted one for one by SLBMs. The same is true about missile submarine limits, although the US never used its full quota (44), while the Soviets filled their generous quota (62 maximum) only a decade later.

But the most important liability of the agreement was that the ceilings on ICBM and SLBM launchers, as well as on strategic submarines, missed the main avenue of the arms race, that was being opened at that time. That avenue was the introduction of multiple independently targeted reentry vehicles (MIRVs), which signified a major new phase of the nuclear weapons competition. The US started flight-testing its first generation MIRVed missiles in 1968 (Minuteman-3 and Poseidon) and commenced with deployment in 1970. The USSR started tests of its ICBMs (SS-17, SS-18 and SS-19) in 1973 and initiated deployment in 1975.

All in all SALT I agreement was nothing more than legalization of force numbers and modernization programs of both sides and at that its role was mostly symbolic. It was hardly motivated by considerations of strategic stability, although at that time this concept was elaborated in the US strategic community and it was already known (although by no means shared) by Soviet political and military elites. Limits on submarines and SLBMs, as well as the green light to MIRVs, despite stringent limitation of ABM systems, ran contrary to the logic of strategic stability.

The parameters of SALT I were strongly determined by both parties' verification capabilities. Exclusive reliance on NTM was taken for granted and all other methods were discarded as

"license for spying". No cooperative measures were envisioned beside a general commitment "not to interfere" with the NTM of the other side. The exchange of information was minimal and confined mostly to the number of ICBM launch silos, including heavy types, and number of ballistic missile submarines in service and in the state of construction. Even at that, the parties (most of all Moscow) tried hard to avoid giving direct figures or data on characteristics and used only indirect definitions for various types of weapon systems (i.e. "heavy" ICBMs, "old" and "new" ICBMs and submarines).

The most revealing feature of that first accord was that no figures of force levels were even stated in the text, although it was understood on the basis of figures agreed in the protocol, that Soviet missile forces would be capped at about 2360 and US at 1750 launchers.

Reconnaissance satellite's performance dictated that limitation of missile numbers was done through limits on launchers (which in principle missed non-deployed and ground-mobile missiles). Subceilings on heavy ICBM types (Soviet S-9 and US Titan-2) were established by banning modernization of old (i.e. deployed before 1964) and light missile launchers for heavy missile launchers, while modernization was defined as increasing the size of launcher by more than 10-15%. This particular figure was most probably determined by satellite photo resolution. (Incidentally later it caused problems with silo modernization for Soviet SS-19 ICBMs, since

Americans interpreted the term "size" as the whole silo volume, while the Soviets - as each dimension: diameter and depth.)

One episode of great significance was connected with the verification, transparency and effectiveness of arms control. On the eve of SALT talks in early 1969 the new administration headed by Richard Nixon refused to suspend testing of MIRV systems, contending that issue should be resolved only on a mutual basis in the course of negotiations. But soon after the talks started the US linked prohibition of MIRV to a ban on flight tests of such systems (by that time US tests were almost finished). As an alternative, Americans proposed to ban their deployment with the condition of on-site inspection (implying actual opening of missile's upper stage and counting warheads). Moscow rejected both suggestions: the first as giving great advantage to the US and the second as an unacceptable method of "spying with a screwdriver".

The two sides went on with massive deployment and refinement of MIRVed missiles, which continues even now, thirty years later. During the 1970's and early 1980's it raised US and Soviet strategic missile nuclear warhead numbers by 5-6 times, destabilized strategic balance by providing broad counterforce capabilities and created huge problems for the following SALT/START negotiations, including their verification aspects.

However, it would be a gross simplification to blame the shortages of verification for the SALT I failure to arrest MIRV race of the following decades. Rather the inadequacy of verification was used as an excuse to do what both sides intended to do anyway. The US was keen to deploy MIRVed missiles to once

again establish its strategic superiority, expand targeting list, and adopt counterforce and flexible (selective) nuclear weapons employment strategy (which was actually made public one year later, in 1973, when secretary of defense James Schlesinger announced his "retargeting" doctrine). And naturally the USSR was determined to catch up with the new US technology and enhance its own counterforce capabilities. Despite short-lived detente of the early 1970-s the geopolitical, ideological and military rivalry between the two superpowers was still going on at a global scale, mutual mistrust and suspicions were overwhelming and the idea of genuine security cooperation was not taken seriously by political elites and defense establishments. This dictated both: reluctance to negotiate tangible offensive arms reductions and limitations, as well as rejection of intrusive verification schemes by both parties.

The lessons of SALT I are discussed here in such detail because that agreement for the first time set in motion the intricate mechanism of interaction of weapon programs and arms control limitations, verification methods, and political will to cooperate in the field of security. Also SALT I analysis once again reminds us how long a road the two states have passed since early 1970-s and how many obstacles, that seemed insurmountable then, were overcome later.

The next step of SALT - Vladivostok Accord of November 1974 did not envision any serious reduction in the superpowers' SNF levels, but codified exact numerical parity between them at the level of 2400 launchers, including heavy bombers, which had not

been limited in SALT I. Its duration was to be from 1977 till 1985. More importantly - the parties for the first time attempted to limit MIRV warhead numbers by inserting a subceiling of 1320 on MIRVed land- and sea-based ballistic missiles.

The significance of that subceiling was not its arms limitation capacity: it was quite liberal, neatly adopted to the then US planned Minuteman-3, Poseidon and Trident missile force deployments (550+496+240) and could easily accommodate Soviet planned forces. Its importance was that it revealed the parties' capability to tell a MIRVed missile silo and submarine tube from those of a single-warhead missile.

The satellite reconnaissance technology was making steady progress. The third generation of Soviet space systems of that type (Cosmos 364) appeared in 1970, the US had been operating Big Bird satellites since 1971[1]. Hence Vladivostok 1320 subceiling revealed, that both sides could now ban and dismantle MIRVed missiles, if they really wanted to, without on-site inspection. But in 1974 nobody was giving a serious thought to that idea: US deployments were going full speed ahead and Russians were preparing to follow suit in 1975. This reconfirmed once more that neither side had probably wanted to stop MIRV technology in the first place.

Another peculiar feature of Vladivostok Accord was that in history that agreement became a textbook case of a treaty thwarted by the development of military technology and parties' inability to control it. In 1975 the US discovered that Soviets started deployment of a new bomber, called Backfire in the West and suspected of intercontinental range, while designated Tu-22M

medium-range bomber in the East. Moscow refused to include it under the Vladivostok ceiling, and for its turn accused the US of developing sea-, ground- and air-launched long-range cruise missiles with nuclear warheads as a totally new class of strategic offensive arms. The USSR insisted that those be limited like ballistic missiles or banned altogether, being small, versatile and extremely hard to verify. This was flatly rejected by the US. In 1976 a compromise was reached by putting ALCM-equipped bombers under 1320 MIRVed missiles subceiling and banning the deployment of SLCMs and GLCMs with range longer than 600 km.

However, worsening political relations and the change of administration in the US prevented Vladivostok Accord from materializing. That was not necessarily bad. That agreement was extremely conservative and loose in terms of both: its limiting effects and transparency provisions. It established formal numerical ceilings, but no qualitative limitations and it did not in any way address the issues of strategic stability (apart from banning long-range sea- and ground-based cruise missiles). Vladivostok was not worth either 5 years of negotiations spent on it (1972-1977), nor generous duration term (1977-1985) as a framework of arms control.

Another important point was the impact of arms control on the Soviet defense policy-making. Traditionally there had been no civilian control or democratic accountability of Soviet nuclear policy-making. Neither constitutional legislative bodies, nor mass media, academic research

institutes, nor public at large had any real information on strategic matters, except that of a purely propagandistic character. Obviously in a totalitarian political system nobody from outside of the party-state establishment had any ability to influence nuclear decision-making. Even Foreign Ministry was completely removed from defense policy and the Communist party leadership's control was pretty formal: mostly through a general limit on resource allocation. Within those generous boundaries everything was determined by the bureaucratic interactions of the Ministry of Defense and defense industries. Hence, Soviet state paranoia about everything related to the information on armed forces, foremost nuclear weapons, and Moscow's allergy to verification issues at SALT negotiations with Washington.

In the United States, secretary McNamara imposed civilian anagement of strategic war-planning and weapon programs in the early 1960's, on the basis of recognition of the qualitatively new role, which nuclear weapons had acquired in war, peace and security.

In the Soviet Union the history was different. It was due to the beginning of practical arms control in the early 1970's that the monopoly of the military-defense establishment started to change little by little. Foreign ministry officials at negotiations and after them academic experts and journalists at international scientific conferences for the first time acquired access to a huge volume of defense information on Western and Soviet forces and weapon programs, as well as to the methods of modern strategic analysis, concepts of nuclear deterrence and strategic stability. By the early 1980's inside the USSR they for the first time started to challenge positions of the military and defense industry when discussing

SALT/START negotiations, as well as Soviet defense doctrine and policy in general.

But the qualitative breakthrough happened after Mikhail Gorbachev came to power in 1985. That was the “golden age” of civilian control and democratic accountability in their peculiar Soviet forms: i.e. mainly through political and academic debates and informal participation in major disarmament endeavors of the time. Led by Edward Shevardnadze Foreign Ministry directly involved academic community in the policy-making process and, relying on the support by Gorbachev, achieved breakthrough on INF/SRF Treaty, CFE Treaty and START I in 1987-1991, which were crucial for ending Cold War.

2. The maturing of arms control – SALT II.

In contrast to Vladivostok accord, the next step was made during only two years of talks after an initial misunderstanding between Moscow and the new US administration of president James Carter in early 1977. A major breakthrough in all respects of nuclear disarmament was SALT II. In fact its numerical limitations were quite detailed, logical, but rather moderate in terms of actual required force reductions. SALT II envisioned an overall launcher ceiling of 2250 (which meant 250, or 10% Soviet reduction); 1320 limit on MIRVed missiles plus ALCM bombers; 1200 subceiling on MIRVed missiles only (i.e. deployment of each ALCM bomber above 120 required elimination of one MIRVed missile, while eventually without SALT II the US deployed almost 200 by the late 1980-s "free"); 820 MIRVed ICBMs.

However, what was much more impressive in SALT II were its qualitative limitations and transparency and cooperative measures, which went a long way ahead in their limiting effect, than numerical ceilings would imply. After a failure to prohibit introduction of any new ICBM type (incidentally proposed by Moscow in May 1978), the parties agreed to confine themselves to only one new light ICBM type each. This limit on new weapon types was an unprecedented achievement in restraining qualitative arms race, which was unfortunately abandoned in later disarmament treaties. Another breakthrough was the limit on "fractionation" - i.e. on increasing warhead number on existing MIRVed missiles. New ICBM type and SLBM types could not carry more than the maximum number on existing missiles (10 and 14 respectively). By the same logic, no more than an average of 28 ALCMs could be placed on heavy bombers and no more than 20 on existing types. Other cruise missile types were covered by a Protocol, which prohibited their deployment during its duration time - till the end of 1981 (the treaty itself was to last till the end of 1985).

In order to similarly interpret and verify those limitations the parties undertook an unprecedented transparency and cooperative measures effort. Meticulous definitions were given to each term used in the treaty, including classes and types of weapon systems, MIRV systems, missile launch-weight and through-weight etc. Direct figures were exchanged on the existing numbers of various classes of strategic arms and all types of missiles' warhead numbers. New type limit dictated strict rules of permitted modernization or modification of existing ICBM types as to their number of stages, length, diameter, launch- and through-weight,

weight of warheads and type of propellant in each stage, as well as flight-tests rules (in particular, dispensing MIRV warheads from the "bus").

Verification still was confined to NTM, but relied on much more sophisticated systems and broader range of means. The USSR launched its fourth generation photo-reconnaissance satellites in 1975 and the US in 1978 orbited a revolutionary satellite of "Key-hole" class (KH-11)[2]. Both sides extensively used electronic satellites (ELINT), as well as ground- and sea-based radars to monitor each other's missile flight-tests and intercept telemetry transmission. In order to facilitate verification concealment measures were prohibited, including telemetry encryption during flight-tests, which is relevant to verifying provisions of the treaty. The "rule of type" and requirement that treaty-limited systems have "functionally related observable differences" restricted technological freedom of maneuver for each side by putting a price-tag on it.

The Soviet Union cancelled its SS-16 mobile ICBM system and took an obligation not to extend the range of Tu-22M bomber, not to provide it with air-refuelling capacity or increase production rate of Backfires. Both sides had to modify their strategic modernization plans, in particular MIRVed missile and ALCM deployment programs in technical characteristics, scale and rate of introduction of strategic weapons. All in all with rather high aggregate ceilings and marginal enhancement of strategic stability, SALT II would have gone far in placing qualitative restrictions, establishing the "book of rules" and "dictionary" of arms control and would have made a real breakthrough in transparency and cooperative measures.

No doubt, it was a misfortune of historic dimensions, that the superpowers failed to separate strategic nuclear relationships and SALT II from foreign policy tensions over Soviet intervention in Afghanistan in 1979 - in contrast to their success in doing exactly that with SALT II and escalation of US bombing of Vietnam in 1972. If SALT II was ratified and implemented it would certainly take much less than 12 years to make next step with START I treaty in 1991.

3. Golden age – START I and START II.

The START I treaty on reduction and limitation of strategic offensive forces was signed in 1991 and ratified in 1992-1994 (the delay was caused by the disintegration of the USSR and talks with Ukraine on withdrawal of strategic weapons from its territory). It probably the most voluminous and complex international-law document in history. The text of the treaty itself runs to roughly 100 pages and consists of 18 articles. But, in addition to the treaty, the parties are also to sign roughly 7 different documents: protocols, an annex, and memorandums. All told, the text of the treaty, together with the documents (which are part and parcel of it) run to more than 500 pages.

The next treaty START II was signed in 1993, ratified by the US in early 1996, and by Russia in early 2000. Since the two treaties were closely related, had to overlap in time and relied on a common basis of definitions, counting rules, verification procedures, cooperative measures and factual data, it's expedient to describe them together, treating START II as something like a protocol to its predecessor.

At the time of the signing of START II, the SNF of the two sides (in accordance with the agreed counting rules) were made up as follows: the US possessed 2246 delivery vehicles and 10563 warheads, the USSR - 2500 and 10271 respectively. Since the counting rules did not take separately into account such armaments of heavy bombers as nuclear air-to-surface missiles with shorter than 600 km range and nuclear gravity bombs, the maximum loading of warheads on the strategic delivery vehicles of the two sides was different: for the USA - about 14000, for the USSR - 10600.

In accordance with START I, the two sides assumed the obligation to reduce over a period of seven years the aggregate number of warheads on each side to 6000 units (this according to the counting rules, but by maximum actual loading down to about 8000 for the US and 7000 for the USSR), while the number of delivery vehicles was to be lowered to 1600. The next treaty, START II, provided for the reduction, over the same period, down to 3800-4250 warheads (the first phase), but this time by the actual force loading, since all armaments of heavy bombers were subject to the counting rules. In the second phase of START II, by 1 January 2003, the aggregate ceiling on warheads were to be lowered to 3000-3500. Limitations on delivery vehicles were not laid down.

START I established a sub-ceiling for the number of warheads on some classes and types of weapons. Thus, the total number of warheads on sea-based and land-based ballistic missiles could not exceed 4900 units. The number of warheads on land-based mobile ICBMs was limited to not more than 1100, the number

of heavy ICBMs to not more than 154 (50% reduction for the USSR) and their warheads to not more than 1540. The latter limitations affected only the USSR (its mobile SS-24 and SS-25 ICBMs and heavy SS-18 ICBMs), in as much as the US did not possess missiles of these types. In comparison START II treaty provided for more radical measures: in the first phase (till the year 2000) all MIRVed ICBMs were limited by a sub-ceiling of 1200 warheads of which no more than 650 could be deployed on heavy missiles. In the second phase (till the year 2003 or earlier date) all multiple-warhead ICBMs were to be eliminated entirely and after that only single-warhead land-based missiles could be retained. This was a maximum tribute to the concept of strategic stability, and by opinion of many Russian experts in this case arms control went too far, since ground-mobile ICBMs were no less a stabilizing weapons than SLBMs and could be permitted to carry MIRV.

START I did not limit sea-based missiles in any direct way. The next treaty, in contrast to ICBMs did not prohibit MIRVed SLBMs, but in the first phase the aggregate number of warheads on sea-based missiles was limited by 2160 and in the second phase by 1700-1750 sub-ceiling.

As has already been noted, an important innovation in the START II treaty affected the aviation component of the Triads. Heavy bomber weapons were counted according to their actual loading. Not only air-launched cruise missiles (ALCMs) were counted individually, but also air-to-surface missiles with a range of less than 600 km and nuclear gravity bombs. This was not so in START I,

which counted each bomber, equipped with short-range missiles and bombs, as one delivery vehicle and one warhead. US aircraft with ALCMs were counted as carrying 10 warheads, although it was permitted to equip them with no more than 20 such missiles (for Soviet ALCM heavy bombers 8 warheads were counted on each, while they could not carry more than 16). Under START II the actual weapon loading of each bomber type was agreed upon, and the two sides assumed the obligation not to exceed these.

Additionally, under START II not more than 100 nuclear heavy bombers, which did not carry long-range ALCMs, may be converted into non-nuclear category. In this case they should have observable differences from nuclear bombers, which can be monitored by national technical means and by inspections of the other side. Such heavy bombers may again be re-converted for nuclear capacity, but after that may not be again be re-equipped for non-nuclear missions. All modifications should be reported within 90 days. All this is designed to exclude manipulations with the notions "nuclear" and "non-nuclear" and to prevent a tacit, rapid and unexpected build-up of the air component of the strategic force. With the same purpose in mind, nuclear weapons cannot be stored at less than 100 km from the airbase with bombers converted for non-nuclear role.

START II treaty provides for procedures to eliminate missiles, launchers, submarines, heavy bombers, as well as for inspection procedures and extensive verification measures. The treaty introduced a number of changes and additions, in

particular, in respect of the rules for the modification of missiles, launchers and bombers. The relationship between the START I and START II treaties, both of which had to be simultaneously in force and implemented up to the year 2000, constituted a question of some importance. The rule was applied that what was not subject to the second treaty was regulated by the articles of the first. This order, laid down in the Preamble of START II, gave priority in all matters in dispute to the new treaty. Nonetheless much in START I was to remain in force, constituting a broad, legal foundation for START II.

In particular, the new treaty did not mention the prohibition on the encryption of telemetry information during the testing of ballistic missiles, in so far as this had been agreed upon within the framework of START I. Another example is the limitation on long-range SLCMs by 880 level, which remains in force. Actually, sea- and ground-based cruise missiles, over which so much blood had been spilled during SALT II and START I talks were eventually surprisingly easily removed from the agenda. In accordance with unilateral initiatives taken by the two sides in the Fall of 1991, SLCMs, as well as all naval tactical nuclear weapons, were to be taken out of operational service and put in storages ashore, while GLCMs were eliminated by INF-SRF treaty of 1987.

A relatively new, less complicated and expensive disarmament measure consisted of reducing the warhead number not exclusively by elimination of the missiles and launchers, but by downloading

MIRVed missiles, which means removing some warheads from their nose-cones. Such a procedure was provided for in START I treaty, in accordance with which the total number of warheads removed could not amount to more than 1250. The number of downloaded types of missiles was also restricted to not more than two and the maximum number of warheads removed on any individual missile was limited to two without changing the "bus", and to four with changing it (which entailed development and production costs and flight tests). Downloading of heavy ICBMs was prohibited altogether. All this was done in view of the considerable mistrust, that still existed between the sides and the fear of a tacit up-loading of downloaded delivery vehicles by the opponent to achieve superiority in nuclear warheads.

In a spirit of far greater mutual trust and more radical cuts START II loosened these limitations, although the right to download still did not apply to heavy ICBMs and not more than 4 warheads might be removed from each downloaded missile. The limit on the aggregate quantity of removable warheads, on the number of types of downloaded missiles, and on the number of warheads removed without changing the "bus" was lifted. For one particular type of ICBMs the number of warheads, that could be removed without changing the type of the "bus", was increased from 4 to 5. The relaxation of these limitations enabled the Russian side to download 105 of the SS-19 missiles from 6 to 1 warhead, thus turning them into single-warhead missiles. Both sides could considerably reduce the number of warheads on SLBMs to comply

with the established sub-ceilings without expensive procedures of changing their "bus". Also for the purpose of lowering the cost of implementing the Treaty, it was permitted to modify 90 of Russian heavy ICBM silos for light single-warhead missiles.

It is not the purpose of this paper to scrutinize the effects of both treaties on strategic stability or the balance of their impact on strategic forces and weapon programs of each of two sides. In most general terms, it may be pointed out that START I embodied more or less balanced adaptation of arms limitations and weapons programs of the parties, while START II signified domination of the thrust of arms control and considerations of strategic stability - over force levels and modernization programs and technological preferences of the US and Russia. At that Russia was affected even more radically than the US.

Verification and transparency framework of START-I/II corresponded to the scale of the treaties. If anybody either in Moscow or in Washington suggested something of this kind at the times of SALT I, such person would be at best considered insane and at worst - a traitor. Suffice it to say, that the START I provides for 13 different types of inspections: inspection to verify initial data; challenge inspection which can be carried out at very short notice, i.e., arrival virtually at any facility connected with the strategic forces, be it a missile base, a submarine base, or any other element of this vast infrastructure.

This infrastructure is to be largely opened up to scrutiny. There is provision for permanent monitoring at some enterprises

producing strategic weapons, demonstrations of strategic arms to each other, inspections after dispersal of some types of strategic weapons (like mobile land-based missiles) upon their return to their base areas. The treaties, furthermore, provide for an extensive range of notifications. This means making available to each other data on technical characteristics of strategic offensive arms, which is listed in a Memorandum of understanding of roughly 250-300 pages. This Memorandum is to be renewed annually. New data on any changes taking place in this sphere is to be made available, as well as notification on missile test launches and on the introduction of new kinds of strategic weapons. Cooperative measures with national technical means of verification of the other party are envisaged, such as partial withdrawal of mobile missiles from their fixed shelters, and the opening up of the roofs of some such fixed shelters, demonstration of the number of warheads in missiles' nose cones to inspectors etc.

Yet another aspect of the same question is the regulation of activity in the sphere of strategic arms. The treaty provides for an extensive set of limitations concerning the area that may be taken up for the deployment of land-based mobile missiles, the number of fixed installations for these missiles that may be present in the areas of deployment (limited areas), the sizes and parameters that must not be exceeded by the basing stations of rail-mobile missiles, the amount of installation equipment that may be stored at the bases, the number of non-deployed missiles,

and the number of missile storage depots. Notification is provided for all movements of strategic missiles, there is regulation of the modes of their transportation, testing and deployment, dismantling, conversion into systems for launching objects into space, etc.

All these terms of the treaty make the strategic forces of Russia and the United States much more transparent, reducing unpredictability and lowering uncertainty and mutual suspicion. The START I provides for truly unprecedented measures in this sphere, and makes the parties to substantively alter traditional practices. A good illustration to this is the issue of encryption of telemetry information (TMI) during missile flight-tests, without which no deployment is conceivable.

The SALT II treaty included commitment: "neither Party shall engage in deliberate denial of telemetry information, such as through the use of telemetry encryption, whenever such denial impedes verification of compliance with the provisions of the Treaty". (Article XV, paragraph 3). This prohibition was needed to ensure verification of throw-weight and other limitations, but both sides retained freedom to encrypt TMI to conceal parameters not limited by the treaty.

Because of this contradictions were unavoidable. During the 1980s Americans many times accused Soviets (in spite of US failure to ratify the treaty) of heavy encryption during flight-tests. But the response was that no information relating to SALT II limitations was being encrypted. When the Soviet

delegates asked, what particular data was of interest to the U.S. and what prevented them from intercepting it - Americans didn't answer not to compromise their intelligence gathering capabilities. At START I talks this experience was taken into account. It was agreed that encryption of TMI would be prohibited altogether. Still many complications emerged in translating this principle into formal treaty provision, which eventually grew into separate article (Article X).

Initially the Soviet side proposed to apply this prohibition to flight tests not only of ICBMs but also to air- and sea-launched cruise missiles. As a measure of transparency Soviet position was fine, but logically no cruise missiles' limitations in the treaty required this ban, which moreover was much more difficult technically because of low flight altitude. U.S. position of singularizing ballistic missiles only prevailed.

US definition of practice which denies access to TMI broadcast during flight tests, included encryption, encapsulation (recording and copying data on board for later recovery) and jamming. Soviets added another method: narrow directional radio beaming, used in particular by the U.S. The lowest permitted power transmission level also was became a subject of contradictions. The problem was complicated by the differences of practical policy of the parties, which of course evolved historically without regard for arms control verification. U.S. Minuteman-2 ICBM was not equipped by telemetry equipment and used encapsulation during tests. USSR was launching missiles from

operational silos, and not from test-range, for firing exercise. Unlike testing, there was no need for TMI broadcasts with these launches. But in both cases the opposite side might suspect that the commitment to broadcast all TMI was being violated and some test data encapsulated on-board. On the other hand equipping these missiles with TMI equipment to broadcast during flights would have been expensive and quite irrational. Finally the sides decided to introduce exceptions to the rule of TMI open broadcasting: for firing of old Soviet systems: SS-11, SS-N-6 and SS-N-8, which could be launched out of test ranges without TMI broadcasts. U.S. Minuteman-2 system was permitted to be launches with encapsulation but not more than twice a year.

Encapsulation created a separate problem. During flight-tests at the re-entry phase of the trajectory overheating of the RV leaves a long plasma tail which is an obstacle to broadcasting. Hence at this phase encapsulation is frequently used to recover TMI later. The need of encapsulation on the plasma phase created a "loophole": to store data, recorded earlier and related to the Treaty limitations, in order to conceal it. In order to solve these problems the parties applied the limitation on the number of annual flights with permitted plasma phase encryption. The difficulty was that due to asymmetries of technical policies the USSR needed much greater number of tests than the U.S. Soviet has twice as many different missile types. Their reliability, in-service time, frequency of substitution for newer modes, efficiency of TMI gathering at each

flight determined the intensity of tests and practice firings.

Finally the parties limited the number of allowable flights with plasma-phase encapsulation and encryption (11 per year, including 4 for MIRVed warheads) and agreed to exchange all the necessary data, including magnetic tapes and detailed description of all parameters of broadcasting modes [3].

Unfortunately political realities have separated the two great treaties. START I is being successfully implemented, while domestic political turmoil and financial difficulties had created great uncertainties for START II ratification in Russia. Paradoxically, for Russia this treaty was both: too radical and too conservative. The total ban on MIRVed ICBMs, that have been the backbone of its strategic forces since mid-1970-s would have left Russia with about 400 single-warhead ICBMs (SS-25 and downloaded SS-19). Together with 1750 permitted SLBM warheads and 500 bomber weapons this would have obliged Russia to deploy 350 single-warhead ICBMs during 6 years to reach 3000 aggregate ceiling, or 850 to reach upper 3500 level of START II. In addition to the cost of earlier retirement of its newest SS-18, SS-24 and part of SS-19 missiles, the expenditures on new missiles deployment of such a scale would have been beyond Russia's resources. Were START II ceilings lower: like 2000-2500 warheads - single-warhead missiles deployment would not have been prohibitively costly and the ban on MIRVed ICBMs would have been less detrimental for Russia.

In 1997 an agreement was reached to extend the term of START II implementation by 5 years – till the year 2009,

which was to greatly alleviate Russian economic burden of dismantling older missiles before the end of their service life and deploying new single-warhead ICBMs. At the same time START III framework agreement (reductions down to 2000-2500 warheads) and agreement on delineation of strategic and tactical ant-missile defenses were concluded. If implemented this package of agreements might further enhance strategic stability and reduce the cost of maintaining it . Unfortunately it never happened, adding yet another case of missed opportunity to the saga of strategic arms control.

Domestic conflicts between president Boris Yeltzyn and parliament, and unwillingness of the executive branch to actively work for a compromise, blocked START II ratification till the end of Yeltzin's rule. Only in March of the year 2000 the new Russian president Vladimir Putin finally achieved it after 7 years of debates. But by that time the situation the situation profoundly changed in the US: Bill Clinton's administration was swept away by that of president George Bush. American official attitude towards arms control changed for the worse, START II and START III framework agreements never entered into force.

4. SORT - arms control in decline.

The new US administration rejected any new strategic offensive arms treaty, claiming that termination of Cold War confrontation era and movement of the two countries towards strategic partnership made arms control irrelevant. Each country was supposed to independently shape its own nuclear policy and program of nuclear force development, proceeding from its own conceptions of national security.

However, in Russia, this position was perceived with suspicion and displeasure. It was concluded that while being aware of the critical condition of the Russian defense complex and its inability of sustaining the nuclear forces at the level of the START I, and even START II treaties, Washington decided to decisively tip the strategic nuclear balance between Russia and the United States and become the only nuclear superpower which would be beyond the reach for any other country of the world.

However, attempts to radically change the nature of strategic relations between Moscow and Washington simply by “assuming away” the implications of their technical and intellectual basis have proved a failure during the 1990’s and were still less effective afterwards. The point is that it was not arms control that was a legacy of Cold War, but rather mutual nuclear deterrence relationship between the US and the Russia, while arms control was just an instrument to stabilize this relationship at lower levels of forces and ensure predictability. Doing away with arms control could in no way lead to abandoning mutual nuclear deterrence, but rather would make it less stable, regulated and predictable with negative strategic, political and economic consequences.

Recognition by the US of Russia's interest in some arms control framework, against the background of the new spirit of cooperation in the aftermath of the tragedy of "09.11" ultimately led the parties to sign the Strategic Offensive Reductions Treaty (the SORT) in May 2002, after the US withdrawal from the 1972 ABM Treaty, which also killed START II, START-III framework agreement and strategic/tactical delineation agreement.

The basic feature of the new treaty was, first of all, that it fully accommodated the previously approved US and Russia's plans of development of their SNF based on their own assumptions of the military requirements and economic restraints. Thus, in contrast to START I and START II, neither of the countries was obliged to make concessions and look for compromises that could make them adjust their plans of SNF development. Issues under discussion were only procedures and techniques of reductions of weapons, counting rules and an associated problem of the so-called reconstitution potential.

Besides, the treaty had no verification measures. For the period up to 2009, i.e. until the duration time of START I is over, the treaty-defined systems of verification and confidence-building measures would be in effect. Using START I the parties would have comprehensive information about each other's forces and programs. But a different matter is that without warhead counting rules and procedures for weapon dismantling as applied to the provisions of the SORT, this information cannot be used for verification of implementation of the new treaty. And if START I verification system in full, or in most important elements is not extended after the year 2008, all the benefits of a comprehensive transparency and

predictability would be eventually lost, as well as the ability to at least indirectly verify the implementation of the SORT.

The fact that the new treaty doesn't limit any party is hardly its advantage – at least as long as the two states continue planning deployment and employment of their forces largely against each other rather than to oppose other threats separately or jointly. Profound changes in their political relations may slow down nuclear modernization programs, encourage unilateral reductions of excessive force levels – but in and of themselves cannot change the nature of their strategic relationship: mutual nuclear deterrence through assured destruction capabilities.

Changing such relations requires a sustained and elaborate effort on both sides to negotiate agreements, deeply affecting each other's nuclear forces, programs and strategies. The goal of this effort should be to transform the nature of nuclear relations in line with new political relations of partnership and strategic alliance against new threats to national and international security. Otherwise, traditional and outdated military relations would come into growing contradiction with US-Russian political cooperation and may hamper or even undercut it altogether.

It's not enough to stop being enemies to do away with mutual nuclear deterrence; it is necessary to become full-scale military allies to achieve this if the states retain considerable nuclear forces within range of each other. In this sense, the end of Cold War in no way removed the need for new arms control agreements, but provided an opportunity for much

more radical solutions with greater degree of transparency and predictability, and with simpler and cheaper verification regimes.

The new stage of arms control should have a new goal: rather than limit weapon numbers and stabilize nuclear deterrence – profoundly change the very basis of the strategic relationship, liberating the maintenance of the national security of the two powers from reliance on capability to inflict nuclear devastation on each other.

Up to now this opportunity has been largely missed in US-Russian relations after the failure of START II and START III framework treaties, which might serve as a departing point for a new type of arms control. The Moscow 2002 SOR Treaty has not tangibly improved the situation and looks more like a PR lip service to nuclear disarmament than a real new stage of strategic arms control. (It is a curious coincidence that in Russian the abbreviation SOR means “trash”).

It is precisely in such a situation that the value of the existing arms control and transparency framework, primarily associated with START I, provides an indispensable "cushion" to maintain strategic cooperation, stability and predictability between the two sides. This framework should be preserved at all cost to support implementation of both: SORT and desirable follow-on treaties, which should be designed to do away with the outdated mutual deterrence relationship.

Discussing such treaties is beyond the scope of this paper. In a very general sense they should envision further SNF reductions (for instance down to 1000-1200 warheads), and much more important - de-alerting the bulk of strategic offensive arms through various verifiable technical methods. In parallel there should be integration of early-warning and

monitoring systems of the two sides and their joint development and deployment of anti-missile defenses, as envisioned by the documents signed at US-Russian summit of May 2002.

With the improvement of political relations between the parties verification system will not need to be so complicated and redundant, as envisioned in START I (in particular the excessive and expensive variety of inspections and notifications). However the scale of transparency on the state and development plans of SNF, their technical characteristics, strategic and operational concepts, SNF training and exercises – all that should expand in line with the process of moving away from mutual deterrence to genuine strategic partnership and cooperation.

Conclusion.

The path of the evolution of strategic arms control during the recent four decades has been: from symbolic limitations, depending on simple verification principles (SALT I, Vladivostok) - to moderate indirect limitations relying on comprehensive verification with NTM (SALT II) - to more tangible cuts and limits on forces and programs based on most intrusive verification and transparency measures (START I) - to deep cuts and limits virtually subordinating US and Russian forces and programs to arms control philosophy (START II). And then – as a major historic aberration – back to a primitive and largely symbolic SORT without any verification instruments whatsoever.

This recent setback may lead to the loss of all the benefits of arms control, accumulated during the last forty years, including transparency, trust and predictability due to verification framework. But it would not do away with mutual nuclear deterrence relationship. Rather the nuclear balance would become less stable or predictable and might backfire with revived mutual suspicions, mistrust, tensions and a growing danger of inadvertent or accidental nuclear war.

As four decades of history show, the more arms control is driven by technical verification capabilities - the less relevant it is to blocking real avenues of weapons modernization, including most destabilizing systems and technologies. While verification feasibility defines some broad boundaries for what's impossible, even if desirable in arms control (i.e. directly limiting missile accuracy or warheads yield), ingenuity in devising verification methods, on-site inspections, transparency and cooperative procedures may solve most of the problems with sufficient political will of the parties to negotiations. The more radical and genuine arms control - the more rigorous the requirements for transparency/cooperative measures and even for discarding some weapon systems and operation practices to enhance verification. This nature of expanding verification methods was exactly the factor, which made practical strategic arms control so crucial in improving political relations, trust and mutual military understanding between Moscow and Washington.

Somewhat paradoxically, as was demonstrated during the 1990's, good relations after some point do not necessarily enhance arms control, since they lower perceived need for enhancing security through

disarmament and encourage tacit cooperation between defense establishments in accepting each other's "rights" to enhance military capabilities with minimal limitations.

Naturally, there is no need for arms control between allies, but if relations stop short of alliance and may deteriorate - the neglect of arms control may lead to disintegration of arms control system and regime, probably with most dire political and military consequences. Improved political relations should not make arms control irrelevant – rather they should open the way to more radical agreements as an instrument for facilitating still better security relationship and liberate it from reliance on mutual destruction.

Having started as a timid servant to practical arms control, verification gradually acquired a growing value on its own rights, providing for greater trust between parties, mutual understanding of strategic policies of each other, common ideas on strategic action-reaction phenomenon and potential scenarios of war outbreak. Verification ensured military predictability and facilitated lower reliance on planning for "greater than expected threat". Eventually, under START I, START II and START III framework the two sides came close to a new type of strategic relationship, which virtually implied joint management of their strategic nuclear balance.

From there only one step was left to a qualitatively new type of arms control, designed not just to stabilize and reduce force levels of mutual nuclear deterrence, but to move away from it - to a new mode of strategic relationship, which is not based on mutual nuclear deterrence and assured destruction capability. But regrettably this step was never made because

of the lack of political wisdom, will, competence and responsibility of US and Russian political leaders, as well as due to bureaucratic, technological and mental inertia of defense establishments.

Hopefully this mistake will be corrected in the foreseeable future. In the meanwhile the existing START I verification regime should provide continuity in the cooperative strategic interaction of states, insure a considerable measure of stability and predictability and preserve prospects for future agreements.

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