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INTERCONTINENTAL BALLISTIC MISSILE – ICBM – A SYMBOL OF "COLD WAR"?

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ABSTRACT: World War II marked the beginning of the forty-five years long period of tense peace, described as the Cold War. Two superpowers that emerged from World War II started to compete for hegemony over the world, representing two diametrically different political and economic systems. In any other historical period, such situation would lead to an inevitable great war, but after 1945 the competition was threatened by the possibility of using nuclear weapon whose capability of destruction was so enormous that neither of parties ventured direct confrontation. World War II contributed to scientific advancement that played a crucial role in the military progress of these states. The development of technologies assisting nuclear weapon resulted in a revolutionary change in military capability provided by the parties of the conflict. Rocket projectiles were the symbol of the 20th century, due to the fact that they carried humans into space, but also because they carried deadly weapon capable of killing hundreds thousands people. This combination of nuclear weapon with medium-range and intercontinental missiles caused that the world had to face permanent threat.

Rocket projectiles became the weapon of the 20th century, and they underwent considerable development after World War II. Rocket projectiles are designed to destroy aircraft, vessels, combat vehicles, various permanent ground objects, as well as for fighting the opponent's missiles. Rocket projectiles can be fired from permanent overground and underground launchers, aircraft, surface and submarine vessels, launchers mounted on

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combat vehicles, and also from portable launchers. There are numerous methods of classifying rocket projectiles, but most frequently they are divided into classes depending on where the launching place is and where the attacked target is located. Rocket projectiles are also distinguished in respect of the performed combat tasks, into strategic, theatre (operational), and tactical missiles etc. Rocket projectiles can be guided or directed, can be propelled by solid – or liquid-propellant engines, and they can be one-, two-, or three-stage missiles.

World War II marked the beginning of the forty-five years long period of tense peace, described as the Cold War. Two superpowers that emerged from World War II started to compete for hegemony over the world, representing two diametrically different political and economic systems. In any other historical period, such situation would lead to an inevitable great war, but after 1945 the competition was threatened by the possibility of using nuclear weapon whose capability of destruction was so enormous that neither of parties ventured direct confrontation. Obviously, local conflicts broke out time after time, but they mostly resulted from the process of decolonisation. With the benefit of hindsight, we can observe that one of the chief paradoxes of the Cold War was the unprecedented long period of stability, when both states held each other in check, not allowing to cross the established limits. World War II contributed to scientific advancement that played a crucial role in the military progress of these states. The development of technologies assisting nuclear weapon resulted in a revolutionary change in military capability provided by the parties of the conflict.

After dropping A-bombs onto Hiroshima and Nagasaki in 1945, knowing that other countries did not dispose of such weapon, the United States felt safe. This sense of security was destroyed after the test explosion of an atomic bomb performed by the USSR on 29th August 1949. In the face of continuing Cold War, the state of being under constant threat, present in American collective consciousness, became paranoid-hysterical in character and size, especially after launching of the first Earth-orbiting artificial satellite by the USSR on 4th September 1957. This event proved that US territory was within the reach of Soviet intercontinental missiles armed in nuclear warheads (Kościelniak, 2010).

As James M. Gavin wrote in his work *War and peace in the Space Age*, "In the past, one of the most striking aspects of human military activity was the persistent pursuit for technical means to acquire mobility advantage over the opponent. The party that achieved that, [...] won the struggle. The struggle was lost for the party that did not manage to solve a technical problem resulting from specific needs. [...] Super-mobile troops in combination with tactical nuclear weapon, ranging from infantry hand weapon to middle-range ballistic missiles, supported by long-range ballistic missiles, will be the key to ensuring control over the land masses of the globe. [...] Nuclear firepower will complement mobility to an increasing extent. With continued pursuit for an ideal weapon, military utility of nuclear weapon will also rise. [...]" (Gawin, 1961). Since the first detonation of an atomic bomb in July 1945, nuclear weapon became a significant bargaining chip on the arena of international politics. It was the first time that military power, and hence the global balance of power, was unrelated to the size of the troops, their equipment and training. Each state possessing an atomic bomb automatically became a significant player, which all the others had to take into consideration. The threat of using the atomic bomb could not be disregarded, and consummate politicians knew that it was difficult to recognise a good bluff, and in the case of such danger, a mistake might result in extermination of the whole nations (Broń, 2015).

Since the very beginning of its existence, atomic bomb became a symbol of dissuading the other party from starting war. In order to understand what a frightening weapon was created by man, one just needs to look at 'Tsar Bomba'. It was the most powerful thermonuclear bomb detonated by the USSR in 1961. The explosion had the yield of 58 megatons of TNT, i.e. four thousand bombs dropped onto Hiroshima. It was detonated in the Novaya Zemlya island. And although the experiment took place in a desolate region, the power of the bomb was reduced from 150 to 58 megatons, due to security concerns. If it had not been done, several cities in northern peripheries of the USSR and radioactive fallout would have covered the whole Europe. As a result of the explosion, a few minor islets were obliterated. The explosion could be felt even in Alaska and was visible at the distance of 900 kilometres. Its mushroom cloud reached the

altitude of 60 kilometres and the diameter of 40 kilometres. Third-degree burns might have been caused at a distance of 100 km from ground zero. The shockwave circled the Earth three times. The force of explosion amounted to 1% of energy of the Sun's surface. If we multiply all of this by three, we will receive the result demonstrating what would have happened if the initial charge having the yield of 150 megatons had been detonated. Deterrence itself consists in an enormous paradox. The aim is to prevent the outburst of war, and the means to achieve it is making the other party perfectly aware that if necessary, one is capable and willing to fight, and hence a Roman maxim *si vis pacem, para bellum* ought to be quoted here – meaning "if you want peace, prepare for war." (Craveld, 2008). The problem which emerged immediately was how to deliver the bomb to its target. It became obvious that such a load would be delivered by planes, therefore the construction process of machines capable of reaching every major city in the Soviet Union was initiated. However, compared to bombers, ballistic missiles designed and used for the first time by Germans during World War II had the advantage of not requiring large military bases susceptible to enemy attack. Another benefit of ballistic missiles was that they did not need aircrew. And above all, they were travelling much faster than bombers, hence being much more difficult or even impossible to intercept (Craveld, 2008).

In the 70s, in a warhead weighing 250 kg, it was possible to place a charge whose yield was three times greater than the one used to destroy Hiroshima (The bomb dropped onto Hiroshima weighed over four tons). The range, reliability and accuracy of ballistic missiles were gradually increasing until the first intercontinental ballistic missiles (ICBMs) appeared (Craveld, 2008).

One can definitely state that no weapon from the Cold War period had more profound strategic influence than intercontinental ballistic missile, which is in a way the symbol of the Cold war and the main pillar of the doctrine of reciprocal deterrence. Actually, ICBMs capable of causing total destruction to both parties shaped the structure of confrontation between the East and the West. Until that time, a situation when one type of weapon exerted such enormous influence on the shape of political and strategic thought (Guilmartin, 2009).

The Third Reich, constructing rocket weapons, namely the V-1 and V-2 flying bombs, instigated the so-called "rocket arms race". After the defeat of Germany, the USA and the USSR made use of German engineers' achievements, and the effect was, among others, launching Sputnik 1 into the Earth orbit on 4th October 1957 (Zaitsev, 2009). The possibility of a satellite flight was already known at the turn of the 20th century thanks to the works of K.E Ciołkowski, H.J Oberth and R.H. Goddard. Technical conditions to accomplish this task appeared with the construction of the first liquid-fuel rocket developed by R.H. Goddard in the United States.

The operational range of the V2 missile was 375 km, and additionally it was inaccurate (dispersion 1.5 km); its warhead carried 750 kg of demolition explosive. Germans considered the idea of increasing the rockets' range to intercontinental distances (by equipping it with wings or attaching additional stage). After Hiroshima and Nagasaki, the possibility to use such means of transport for carrying nuclear warheads became even too obvious. Engineers in the USSR and the USA began design work on exactly this solution, even before the Cold War really started (Guilmartin, 2009).

The constructor of the V2 rocket, Wernher von Braun, began working for Americans, hence becoming the creator of the American space program. However, Russians had at their service Helmut Groettrup, von Braun's assistant, who reconstructed the V2 documentation. However, the father of Russian space program was Sergei Korolev (Wade, 2009). By 1952, the USA and the USSR adopted, tested and improved German achievements. Considerable reduction of the nuclear warheads' size enabled to begin works on intercontinental missiles. The first rockets of the type were the Atlas Model 7 in the United States and the R-7 (Semyorka) in the Soviet Union (Wade, 2009).

The Atlas and the Semyorka rockets were considered to be temporary solutions, since their launch preparation time was too long, which was why they might be destroyed even before the launch. In next-generation rocket projectiles (assembled in underground silos), the propellants used did not require constant cooling and might remain in rockets' fuel tanks for a longer time. In 1964 Americans introduced the Titan II rocket, and Russians their R-16 (the SS-7 Saddler in NATO terminology). The ideal

rocket projectile would be a missile which might be stored in a silo in operational readiness for an indefinitely long period of time, which was not possible with any of liquid propellants. The solution to this problem was rocket propellant which would be chemically inactive until ignition moment, and hence safe in storage. Solid propellants fulfilled these conditions. Its central disadvantage was its low specific impulse. Solid propellants gave an impressive initial acceleration, but a considerably lower thrust than liquid propellants. The construction of multistage rocket allowed to surmount this obstacle. Bringing the first intercontinental solid-fuelled ballistic missile into service (Minuteman I in the USA) was one of the benchmarks in the history of the Cold War, as it marked the beginning of the ICBM era (Guilmartin, 2009).

General trend was that atomic bomb were becoming smaller and lighter, until they could be carried not only by heavy bombers and intercontinental rockets, but also by many other armament systems. Fighter-bombers, tactical rockets and heavy artillery started to be used for carrying them. In the 1960s and 1970s, the first multiple reentry vehicles (MRVs) appeared, and later multiple independently targetable reentry vehicles (MIRVs), which enabled to deploy as many as ten warheads in a single rocket. Cruise missiles, which were actually development versions of the rockets designed by Germans during World War II, considerably increased the capability of destruction (Creveld, 2008). By 1955, the USSR had already begun mass production of medium-range ballistic missiles (SS-3), and in 1957 it fired an intercontinental ballistic missile at a distance of 8,000 kilometres, utilising the same rocket engine which launched the Sputnik 1 into Earth orbit in October 1957 (Kennedy, 1994). Russians were the first to shoot down their own intercontinental missile using another rocket projectile in 1961, while Americans conducted the first successful interception in 1962, Nike-Zeus anti-ballistic missile was used to complete the task. It could destroy intercontinental and medium-range missiles, capable of a speed up to 7000 m/s. (Kościelniak, 2009). As a result, a doctrine known as MAD (Mutually Assured Destruction) was developed in the USA in the early 1960s. Its main assumption was deterring the potential opponent from invasion by maintaining the capability of inflicting the aggressor losses of the scale and size exceeding accept-

able level, even if the attack was unexpected (Keegan, 1998). As long as the number of nuclear warheads and means of weapon delivery, airplanes and rockets, were maintained at a relatively low level, the MAD doctrine served as quite an effective system securing against nuclear destruction (Keegan, 1998).

MAD presumed creating forces which would be large enough to endure the first assault, and to strike back. However, MAD was an American idea, popular with the milieus of J.F. Kennedy and Johnson. Soviets assumed in their plans, among others, that even in the case of a conventional conflict with the USA, they would have used nuclear weapons, e.g. in order to prepare the ground for their armoured divisions (Pawłowski, 2009).

Nevertheless, deterrence which so profoundly affected both the strategies and the doctrines of the Cold War period, was not a novel method of exerting influence on the protagonists of the political life on an international scale. Humans have always employed deterring in the relationships with others. The essence of deterring consists in convincing the opponent that the costs and risks related to certain actions will exceed the benefits. Deterrence has always involved the risk associated with the lack of its full effectiveness. Constructing nuclear weapon and introducing it into political and military action in a wider context granted the possibility to achieve the capability of "super-deterrence", based on the monopoly on possessing a deterrent. The threat of a massive nuclear assault was to frighten the opponents still at peacetime, and if carried out, it was to obliterate them (Piątek, 2011).

Deterrence strategy never in the whole period became a coherent theory. Theories and the subsequent variants of deterrence strategy were primarily developed in the USA. In the USSR, this issue was not a matter for debate. Deterrence theory had different variants and, what is interesting, it outlasted the Cold War, becoming the basis for reasoning of the new nuclear-weapon. Due to the achieved balance of nuclear capability of the USA and the USSR, the hazard of using nuclear weapon was to be trustworthy only if the most vital interests of one of these states. The effectiveness of deterrence was also affected by the fact that the two existing political-military camps considered nuclear weapon as a purely defensive means of combat, at least in official speeches. All of them were at the same

time willing to wait until the opponent strikes first, confident that it will never happen. This way, balance of fear was born (Piątek, 2011).

Until the end of the 20th century, almost 2,000 test explosions were conducted – the record-holder being the United States that have conducted more than 950 tests. One cannot also forget about India and Pakistan (6 tests each),states that seem relatively active when we consider their capabilities, since each experiment of the kind involves enormous costs, from 30 to 150 million dollars. At the turn of the 21st century, there were c. 60,000 warheads in nuclear arsenals (out of which 98% were located in the USA and the Russian Federation, or in their spheres of influence. The yield of the warheads was equal to the force of 1 million bombs dropped onto Hiroshima. These sinister statistics amounted to the potential of "overkill capacity." (Pawłowski, 2009).

The intercontinental ballistic missiles were an effective means of implementing the Mutually Assured Deterrence doctrine. It appears that the United States and the Soviet Union were so terrified by the threat posed by the ICBMs and additionally so determined to keep their deterrence capability in hand, that no intercontinental ballistic missile equipped with an armed nuclear or thermonuclear warhead has never been launched (Guilmartin, 2009).

Historically, the club of "nuclear powers" encompassed the United States, the Soviet Union (Russia), Great Britain, France and China. These states were the first to achieve the level of technological development allowing them to construct nuclear weapon. During the Cold War, these states also became involved and actively participated in the arms race whose significant, if not the most important element were strategic nuclear forces. This competition led to an extremely dynamic expansion of both the types of nuclear weapons, as well as the size of the collected arsenals. In the course of time, the leading powers – the United States and the Soviet Union – began investing more and more effort into constructing advanced means of weapon delivery, allowing to transport nuclear charges even faster and more accurately to any target in the world. As a result, the heavy and difficult to transport warheads of the yield of several or several dozen megatons started to be impractical, giving way to smaller constructions of variable yield. Although since that time, new

countries have joined the group of nuclear-weapon states, this trend has not changed (*Broń*, 2015).

According to SIPRI report, at the beginning of 2015, nine nuclear powers: Russia, the USA, Great Britain, France, China, India, Pakistan, Israel and North Korea disposed of approximately 15850 nuclear warheads (Muller, Stasik, 2015).

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